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Comprehensive and Real Time Information Disclosure of Public Health Events in the COVID-19 Context

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Doctor of Management

Supervisor:
PhD Virginia Trigo, Emeritus Professor,
ISCTE University Institute of Lisbon

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BUSINESS
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Abstract

With COVID-19 as the research background, this thesis examines the issue of information disclosure of public health events from the perspective of signal theory. At present, the information of public health events is held by the government and will not be disclosed to the public in general, unless the events have become major public health emergencies. Therefore, there is serious information asymmetry between the government and the public. From the perspective of signal theory, the problem of information disclosure of major public health emergencies, which triggered many controversies during SARS and COVID-19, is a pseudo-problem due to information asymmetry.

The Comprehensive and Real-time Information Disclosure of Public Health Events (CRID-PHE) can eliminate the information asymmetry between the government and the public. During COVID-19, the government disclosed the latest pandemic information every day, which can be regarded as a prototype of CRID-PHE. By examining the practice and effect of government's pandemic information disclosure during COVID-19, the role and influence of CRID-PHE on eliminating information asymmetry can be inferred to some extent.

At present, CRID-PHE has not been implemented in practice. In order to demonstrate CRID-PHE, this thesis first determines the stakeholders of CRID-PHE by using the literature research method and Delphi expert consultation method, and then by referring to the idea of latent variable relationship model of structural equation model (SEM) establishes a SEM-like driving model of CRID-PHE to explain the endogenous and exogenous factors. The CRID-PHE model is examined through a Likert-scale questionnaire survey among the stakeholders. At last, since the information of public health events is held by the government, CRID-PHE is also demonstrated from the perspective of government information disclosure.

Keywords: Information disclosure of public health events, endogenous and exogenous relation model, Likert-scale questionnaire, stakeholders

JEL: I18, I28

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Resumo

Esta tese toma a COVID-19 como pano de fundo da pesquisa e estuda a questão da divulgação de informações sobre eventos de saúde pública na perspectiva da teoria da sinalização. Atualmente, as informações sobre eventos de saúde pública são detidas pelo governo e não serão divulgadas ao público, a menos que o evento evolua para uma grande emergência de saúde pública, resultando numa grave assimetria de informação entre o governo e o público. Durante a pandemia de COVID-19, a assimetria de informação levou ao chamado "mercado de limões" na teoria da sinalização e também desencadeou debates acesos sobre a divulgação de informações sobre grandes emergências de saúde pública. A divulgação abrangente em tempo real de eventos de saúde pública (CRID-PHE) pode reduzir significativamente os efeitos adversos da assimetria de informação, o que pode ser verificado através da análise do efeito das notificações epidémicas diárias do governo durante a pandemia de COVID-19.

A fim de demonstrar o CRID-PHE, esta tese utiliza variáveis endógenas e exógenas no modelo econômico para estabelecer um modelo de demonstração do CRID-PHE, e calcula os coeficientes de caminho do modelo através de uma escala Likert de pesquisa por questionário entre as partes interessadas do CRID-PHE. O modelo de demonstração proposto nesta tese fornece um novo quadro geral para demonstração de políticas.

Além disso, uma vez que a informação sobre eventos de saúde pública é detida pelo governo, então a sua divulgação cai no âmbito da divulgação de informação governamental e o estudo desta tese pode ser considerado como um estudo de caso de divulgação de informação governamental. Algumas sugestões para a divulgação de informação governamental foram propostas com base nos resultados da pesquisa.

Palavras-chave: CRID-PHE, variáveis endógenas e exógenas, questionário em escala Likert, partes interessadas

JEL: I18, I28

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摘　要

本文以COVID-19为研究背景，从信号论的角度审视公共卫生事件的信息披露问题。目前，公共卫生事件信息由政府掌握，一般不会向公众公开，除非该事件已成为重大突发公共卫生事件。因此，政府与公众之间存在严重的信息不对称。 从信号论的角度来看，SARS 和 COVID-19 期间引发诸多争议的重大突发公共卫生事件信息披露问题，是由于信息不对称而产生的伪问题。

公共卫生事件全面实时信息公开（CRID-PHE）可以消除政府与公众之间的信息不对称。在 COVID-19 期间，政府每天都会披露最新的疫情信息，这可以视为 CRID-PHE 的雏形。通过考察 COVID-19 期间政府疫情信息公开的做法和效果，可以在一定程度上推断 CRID-PHE 对于消除信息不对称的作用和影响。

目前 CRID-PHE 尚未在实践中实施。 为了论证 CRID-PHE，本文首先采用文献研究法和德尔菲专家咨询法确定 CRID-PHE 的利益相关者，然后参考结构方程模型（SEM）的潜变量关系模型的思想建立 CRID-PHE 的类似 SEM 驱动模型来解释内源和外源因素。CRID-PHE 模型通过利益相关者之间的李克特量表问卷调查进行检验。最后，由于公共卫生事件的信息由政府掌握，CRID-PHE 也从政府信息公开的角度进行论证。

关键词：公共卫生事件的信息披露，内生和外生关系模型，李克特量表问卷，利益相关者

JEL: I18, I28

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Looking back on these years, there have been difficulties and challenges, as well as warmth and emotion. I have always been busy with work, and my child is still in high school. There are a lot of trivial matters in life that require a lot of energy. However, pursuing a PhD has brought me joy beyond work and family, and new challenges in the research project have motivated me to continue with my studies. Improving myself through learning and enriching myself through exploration has allowed me to improve my way of thinking, making me more purposeful with clearer logic. Pursuing a PhD has filled me with hope for the future, and I am grateful for my team's tolerance and support, which has enabled me to improve and progress.

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List of Abbreviations

COVID-19 = Coronavirus Disease 2019

CRID-PHE = Comprehensive and Real-time Disclosure of Public Heath Events

IHR = International Health Regulations

JHU = Johns Hopkins University

WHO = World Health Organization

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Chapter 1: Introduction

1.1 Research background

The COVID-19 pandemic, which lasted for more than three years, is an unprecedented catastrophe in human history. However, for those who are engaged in public health policy research, the COVID-19 pandemic has provided a unique research background, from which many new research topics of public health policy or services can be explored, and many existing theories and practices of public health can be rediscussed and reanalyzed (Rosen, 2021).

This thesis addresses the issue of information disclosure of public health events. There are three main reasons for choosing this research topic:

(1) First of all, the evolution of the COVID-19 pandemic, in a sense, is the development process of public health events. From the initial cases of pneumonia of unknown cause at the beginning, to the rapid increase and deterioration of similar cases, and finally to the outbreak of the pandemic, all of them are public health events. Furthermore, the daily new cases, new severe cases, and new deaths during the pandemic are all considered public heath events. Therefore, it can be said that the information disclosure of these public health events records the entire evolution of the pandemic.

(2) Secondly, the whole COVID-19 pandemic has been accompanied by the debate about information disclosure of public health events. In the early stage of the pandemic, whether the Wuhan government disclosed the pandemic information in a timely manner was controversial, and even questioned by the official media (CCTV Network, 2020). In the later stage of the pandemic, in order to adapt to the anti-pandemic policy adjustment, the National Health Commission (NHC, 2022) even stopped releasing daily pandemic reports , which also caused a lot of controversies (Cheng, 2022). These controversies provide contexts for the research of information disclosure of public health events.

(3) At present, the research on the information disclosure of public health events is mostly focused on the major public health emergencies, while there is little research on those ordinary public health events with limited or controllable impact. However, the number of major public health emergencies is far less than that of ordinary public health events. For example, in the past 14 years since 2009, the World Health Organization (WHO) has only identified a total of

seven public health emergencies that have received global attention (Wilder-Smith & Osman, 2020). Moreover, the issue of information disclosure of major public health emergencies is only addressed at the moment immediately before the outbreak of the crisis; there is no such information disclosure issue before or during the crisis. Usually, the public health events that occur in people's daily lives are ordinary events with limited or controllable impact. Therefore, it is meaningful to carry out research on information disclosure of ordinary public health events. Furthermore, since major public health emergencies are all evolved from ordinary public health events, research on information disclosure of ordinary public health events will also provide meaningful implications for the research on information disclosure of major public health emergencies.

1.2 Research problem

The research topic of this thesis is related to public health policy. The research objective is to propose a public health policy initiative, namely a Comprehensive and Real-time Information Disclosure of Public Health Events (CRID-PHE), by examining and analyzing the practice and effectiveness of public health event information disclosure during COVID-19.

At present, in China, the public health event information is held by the government. Unless there is a major public health emergency, the government generally will not disclose the public health event information to the public comprehensively and in real time. However, the public health events that often occur in daily life are self-limited or controllable. Although these events do not cause significant harm to the entire society like major public health emergencies, they can cause serious and even fatal harm to certain groups of the public. At present, because these public health events are not fully disclosed to the public in real time, the public is often exposed to the risks of these events because of ignorance. In particular, there is little literature that studies the comprehensive and real-time disclosure of these events. Searching for "public health events" on Google returns results that are almost all about major public health emergencies. Therefore, the research problem of thesis is pioneering and challenging.

In this thesis, we will use the public health theory, signaling theory, Delphi expert consultation method, natural experiment method and structural equation modeling method to qualitatively and quantitatively demonstrate the necessity, rationality, feasibility, and effectiveness of CRID-PHE in the context of COVID-19 to provide some innovative research results.

Furthermore, since public health event information is held by the government, the information disclosure of public health events is considered a part of government information disclosure. Inspired by the historical lessons learned from the 2003 SARS in promoting the reform of government information disclosure, in this thesis, we regard the study on the information disclosure of public health events during COVID-19 as a case study of government information disclosure, hoping to provide suggestions for its reform and improvement.

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Chapter 2: Literature Review

The theories used in this thesis include the stakeholder theory and the signaling theory. This chapter presents a literature review of these theories and their related applications.

2.1 Stakeholder theory

The stakeholder theory initially was put forward as the opposite or supplement to the shareholder primacy theory in corporate governance. After years of theoretical research and empirical verification, the stakeholder theory has been widely accepted and has been even recognized by the laws and regulations of some countries. For example, the title of Chapter 8 of the *Code of Corporate Governance for Listed Companies* issued by China Securities Regulatory Commission (2018) is "Stakeholders, Environmental Protection, and Social Responsibility".

The stakeholder theory has two main parts: the identification and the classification of stakeholders. We will review the related literature in the sections below.

2.1.1 Identification of stakeholders

The identification of stakeholders is to determine who are the stakeholders of the enterprise or what is the definition of stakeholders. This is the first step in stakeholder theoretical research and practical validation of the stakeholder theory. According to Freeman and Gilbert (1987), the definition of stakeholders was first provided by the Stanford Research Institute in 1963, in which a stakeholder is defined as a member of an organization without whose support the organization would cease to exist. However, Strand and Freeman (2015) further research showed that the initial concept of stakeholder might come from the Scandinavian scholars' work which is earlier than that of the Stanford Research Institute.

The definition by the Stanford Research Institute seems too narrow and absolute, which would exclude many organizations and individuals related to corporate governance. Freeman's influential book *Strategic Management: A Stakeholder Approach*, first published in 1984, is a landmark work in the stakeholder theory (Freeman, 1984), in which he provided a definition that has been widely cited by scholars: Stakeholders are any group or individual who can affect

or is affected by the achievement of the organization's objectives. Freeman's definition provides the connotation and extension of the concept of stakeholders in a more comprehensive manner. However, it seems too broad, with an overly large extension of the concept. For instance, "any group or individual who can affect or is affected by the achievement of the organization's objectives" can include almost all organizations and individuals in society. Nonetheless, Freeman's definition provides a general framework for the definition of stakeholders, and many scholars, including Freeman himself, subsequently put forward further definitions of stakeholders based on this framework. Mitchell et al. (1997) collected 27 representative definitions of stakeholders from the 1960s to 1990s and listed them in a table (see Table 2.1). It can be seen from Table 2.1 that the definition of stakeholders has become more and more specific and clear over time. For example, a more recent definition was put forward by Clarkson (1994): Stakeholders are groups or individuals who bear some form of risk as a result of having invested some form of capital, human or financial, or something of value, in a firm.

Table 2.1 Definition of stakeholders by various scholars

Scholars	Definition
Sandford memo (1963)	"those groups without whose support the organization would cease to exist." (cited in Freeman & Reed, 1983)
Rhennman (1964)	"are depending on the firm in order to achieve their personal goals and on whom the firm is depending for its existence" (citen Näsi, 1995)
Ahlstedt and Idhnukainen (1971)	"driven by their own interests and goals are participants in a firm, and thus depending on it and whom for its sake the firm is depending" (cited in Näsi, 1995)
Freeman and Reed (1983)	Wide: "can affect the achievement of an organization's objectives or who is affected by the achievement of an organization's objectives"; Narrow: "on which the organization is dependent for its continued survival"
Freeman (1984)	"can affect or is affected by the achievement of the organizations' objectives"
Freeman and Gilbert (1987)	"can affect or is affected by a business"
Cornell and Shapiro (1987)	"claimants" who have "contracts"
Evan and Freeman (1988)	"have a stake in or claim on the firm"
Evan and Freeman (1988)	"benefit from or are harmed by, and whose rights are violated or respected by, corporate actions"
Bowie (1988)	"without whose support the organization would cease to exist"
Alkhafaji (1989)	"groups to whom the corporation is responsible"
Carroll (1989)	"asserts to have one or more of these kinds of stakes" – "ranging from an interest to a right (legal or moral) to ownership or legal title to the company's assets or property"
Freeman and Evan (1990)	contract holders
Thompson et al. (1991)	in "relationship with an organization"
Savage et al. (1991)	"have an interest in the actions of an organization and ... the ability to influence it"

Scholars	Definition
Hill and Jones (1992)	"constituents who have a legitimate claim on the firm… established through the existence of an exchange relationship" who supply "the firm with critical resources (contributions) and in exchange each expects its interests to be satisfied (by inducements)"
Brenner (1993)	"having some legitimate, non-trivial relationship with an organization [such as] exchange transactions, action impacts, and moral responsibilities"
Carroll (1993	"asserts to have one or more of the kinds of stakes in business" – "may be affected or affect"
Freeman (1994)	participants in "the human process of joint value creation"
Wicks et al. (1994)	"interact with and give meaning and definition to the corporation"
Langtry (1994)	"the firm is significantly responsible for their well-being, or they hold a moral or legal claim on the firm"
Starik (1994)	"can and are making their actual stakes known" – "are or might be influenced by, or are or potentially are influencers of, some organization"
Clarkson (1994)	"bear some form of risk as a result of having invested some form of capital, human or financial, something of value, in a firm" or "are placed at risk as a result of a firm's activities"
Clarkson (1995)	"have, or claim, ownership, rights, or interests in a corporation and its activities"
Näsi (1995)	"interact with the firm and thus make its operation possible"
Brenner (1995)	"are or which could impact or be impacted by the firm/organization"
Donaldson and Preston (1995)	"persons or groups with legitimate interests in procedural and/or substantive aspects of corporate activity"

Source: Mitchell et al. (1997)

For Table 2.1, we have the following comments:

(1) The various definitions provided in Table 2.1 enable to deepen people's understanding of enterprises from the perspective of internal mechanisms and the external environment. Each definition of stakeholders is, in fact, a new perspective to understand the enterprise. Over time, with the deepening of research, the definition of stakeholders has become more and more comprehensive and specific. For example, in 1963, the Stanford Research Institute's definition of "those groups without whose support the organization would cease to exist" only takes into account the influence of stakeholders on the organization, while in 1984, Freeman's definition of "can affect or is affected by the achievement of the organization" considers both ways of influence. Further, in 1994, Clarkson's definition, "bear some form of risk as a result of having invested some form of capital, human or financial, something of value, in a firm" or "are placed at risk as a result of a firm's activities", provides specific descriptions on how stakeholders affect the organization and how the organization affects stakeholders.

(2) Some of the definitions listed in this table are from the same scholar (e.g., Freeman), which shows that scholars' understanding of stakeholders is also improving continuously.

(3) Despite the differences among the definitions in this table, their basic ideas are all based on the framework given by Freeman in his book *Strategic Management: A Stakeholder Approach* (Freeman, 1984). That is, stakeholders refer to those individuals or groups that can affect or are affected by organizational activities.

(4) Although the stakeholder theory originated in corporate governance, it has been applied in many other fields such as public project governance, government process reengineering, and regional social development planning. Each field has its own characteristics, and the definition of stakeholders may vary. However, by referring to the stakeholder definitions listed in the table above and the framework proposed by Freeman (1984), one can come up with a stakeholder definition according to the specific application context.

2.1.2 Classification of stakeholders

Stakeholder identification addresses who are the stakeholders. However, the roles played by different stakeholders are not the same, and thus it is necessary to distinguish between stakeholders based on their roles. Therefore, research on the classification of stakeholders is essential. Note that the individuals or organizations to be classified are the identified stakeholders.

The "multi-dimensional segmentation method" is commonly used for classifying stakeholders. A dimension is an attribute that a stakeholder either has or does not have. Thus, each dimension divides stakeholders into two categories. For example, Frederick et al. (1992) proposed the "directness" dimension, which divides stakeholders into two categories according to whether they have a direct interest in the business: direct stakeholders and indirect stakeholders. Scholars have also proposed other dimensions for stakeholder classification, some of which are listed in Table 2.2.

Table 2.2 Examples of stakeholder classification

Scholars	Classification Dimensions	Examples
Freeman (1984)	Ownership	Shareholders, including shareholders of public companies
	Economic dependence	Managers, employees, consumers, and suppliers
	Social tersest	Special groups, government, and media
Evan and Freeman (1988)	Direct interest group	Shareholders, employees, creditors, suppliers, and retailers
	Indirect interest group	Government, social organizations, media, and the public
Charkham (1992)	Contractual Stakeholders	Shareholders, employees, customers, lenders, suppliers, and distributors
	Community Stakeholders	Consumers, regulators, governments, pressure groups, media, and communities

Scholars	Classification Dimensions	Examples
Clarkson (1994)	Voluntary Stakeholders	Individuals or groups who have material capital and human capital investment in enterprises and voluntarily take risks
	Involuntary Stakeholders	Individuals and groups that passively take risks because of business activities
Clarkson (1995)	Primary Stakeholder	Those individuals and groups who are closely related to the enterprise. Without their participation, the enterprise cannot survive, such as shareholders, investors, employees, and customers.
	Secondary Stakeholder	Those individuals and groups who indirectly affect or are indirectly affected by the operation of the enterprise. They do not carry out transactions with the enterprise, and do not play a fundamental role in the survival of the enterprise, such as environmentalists, media, scholars and interest groups
Wheeler and Sillanpa (1998)	Primary social stakeholders	Local communities, suppliers, business partners, customers, investors, and managers
	Secondary Social Stakeholders	Government, trade unions, media, competitors, trade groups, and pressure groups
	Primary non-social stakeholders	Environment, non-human species, and human offspring
	Secondary non-social stakeholders	Environmental pressure groups and animal interest pressure groups

It should be pointed out that, for each dimension, a stakeholder will either have or not have this attribute. However, a stakeholder can have multiple dimensions simultaneously. For example, Wheeler and Sillanpa (1998) proposed the "sociality" dimension and combined it with the "closeness" dimension proposed by Clarkson (1995) to divide stakeholders into four categories: "closeness + sociality", referred to as primary social stakeholder; "non-closeness + sociality", referred to as secondary social stakeholder; "closeness + non-sociality", referred to as primary non-social stakeholder; and 'non-closeness + non-sociality', referred to as secondary non-social stakeholders.

Most scholars have proposed one dimension only, while some others have proposed multiple dimensions simultaneously. For example, Freeman (1984) proposed three dimensions: ownership, dependency, and social interest. Clarkson (1995, 1994) put forward two dimensions: voluntary and intimacy. Moreover, based on their proposed multiple dimensions, some scholars have classified stakeholders into several categories. The most renowned is Mitchell et al's (1997) three dimensions: legitimacy, power, and urgency, based on which, stakeholders who simultaneously possess all these three attributes are called definitive stakeholders; stakeholders who have only two of the attributes are referred to as expectant stakeholders; stakeholders with only one of these attributes are latent stakeholders (see Table 2.3). According to Mitchell, if an

individual or organization does not possess any of the three attributes, it is considered a non-stakeholder. This may lead to controversy as dimensions for stakeholder classification and the identification of stakeholders are different concepts.

Table 2.3 Mitchell's classification method

Mitchell's classification		
Attributes	Legitimacy	Stakeholders should have legal or moral claims on the enterprise.
	Power	Stakeholders should have the position, ability, and means to influence enterprise decision-making.
	Urgency	Stakeholders' demands can immediately attract the attention of enterprise management.
Classification (Salience)	Definitive Stakeholder	If a stakeholder candidate has the three attributes of legitimacy, power, and urgency at the same time, he is a definitive stakeholder.
	Expectant Stakeholders	If a stakeholder candidate has only two of above three attributes, he is an expectant stakeholder.
	Latent Stakeholders	If a stakeholder candidate has only one of the above three attributes, he is a latent stakeholder.

The proposed classification dimensions reflect the scholars' understanding and research results on enterprise strategic management. In practice, the classification dimensions proposed by different scholars can be combined to form the standards for stakeholder classification. However, it should be noted that, since the dimensions are independently proposed by different scholars, their contents may be overlapped. For example, the dimension of "social interest" proposed by Freeman (1984) and the dimension of "sociality" proposed by Wheeler and Sillanpa (1998) overlap in content. Therefore, in practice, it is necessary to pay attention to this possibility to ensure that there is no overlap in conceptual connotation between the dimensions used for classification.

Mitchell et al. (1997) noted that when determining whether a stakeholder has a certain attribute, there is often not a simple YES or NO answer, but a percentage between YES and NO. Therefore, he proposed a scoring method, in which a 5-point or 7-point scale is used to score a stakeholder. If the score reaches a certain threshold, the stakeholder is believed to have the attribute. Multiple experts are usually invited to score through questionnaires or interviews. The mean value of the experts' ratings is considered the final score. Mitchell's classification method, or scoring method, and is currently the most widely used stakeholder classification method (Miles, 2017).

In Mitchell's scoring method, scores can be converted into membership degrees, similar to fuzzy mathematics (Dernoncourt, 2013). For example, if a 7-point scale is used, the membership degree can be calculated as $\gamma = \frac{\alpha}{7}$, where α is the score. The membership degree represents the degree to which a stakeholder belongs to a certain dimension. It lays the foundation for stakeholder analysis using fuzzy mathematics. However, unfortunately, through the preset threshold, Mitchell's scoring method eventually turns the classification into a simple YES or NO question.

2.1.3 Application of the stakeholder theory to public services

The stakeholder theory originated from enterprise management. Various stakeholders have unequal status in an enterprise, with shareholders always being the most powerful ones. Therefore, at least in China, in the practice of enterprise management, the "shareholders first" theory or other likewise theories are dominant.

Although the stakeholder theory originated from and was initially mainly applied to enterprise management, in recent years, it has been increasingly applied to various public service sectors. In 2021, we searched for the doctoral dissertations with the title containing "stakeholder" in the China's graduate dissertation database of CNKI and found 182 in total. Among them, 75 doctoral dissertations involve enterprise management, accounting for 40% of the 182, and most of them were published before 2010. The other 60% are mainly about the theory's application in the governance of public service sectors, such as public health policy and management, high education development, and regional economic development planning. These statistics show that, on the one hand, the stakeholder theory originating from enterprise management has been relatively mature, and on the other hand, the governance of public service sectors has already become a main application context of the stakeholder theory. Different from enterprise management, the governance of public service sectors has no super stakeholders and therefore fits better to the basic idea of the stakeholder theory.

2.2 Signaling theory

At present, in China, the government is responsible for the monitoring and management of public health events. The government generally does not disclose the monitoring information of public health events to the public comprehensively and in real-time unless some events develop into major public health emergencies (that is, public health crises). As a result, there is

a serious information asymmetry between the government and the public regarding public health events. The signal theory is a theory that was put forward to address information asymmetry. This thesis will use the signal theory to study the issue of information disclosure of public health events.

It is generally accepted that the signaling theory has three main components: information asymmetry, signaling, and signal screening (Karasek III & Bryant, 2012). We will address these three in the following sections.

2.2.1 Information asymmetry

Information asymmetry is an objective phenomenon in market transactions and has received a lot of attention from scholars (Stiglitz, 2002). For example, the 1996 Nobel Prize in Economics was awarded to James Mirrlees and William Vickrey for their pioneering and fundamental contributions to stimulating economic theory under asymmetric information conditions (Sandmo, 1999).

Five years later, the Nobel Prize in Economic Sciences once again favored the signal theory. In 2001, George Akerlof, Michael Spence, and Joseph Stiglitz were awarded the Nobel Prize in Economic Sciences for their pioneering work on market information asymmetry (Rosser, 2003). Akerlof (1970) found that in an environment of information asymmetry, markets tend to make adverse selection, eventually leading to the so-called lemon market. Spence (1973) and Rothschild and Stiglitz (1976) proposed two methods to reduce information asymmetry, namely, signaling and screening, respectively. The former solution was proposed from the point of view of the informed party, and the latter was from the perspective of the uninformed party. The work of the three of them constitutes fundamental components of the signal theory (Löfgren et al., 2002). In this subsection, we will focus on the literature on information asymmetry.

Research on information asymmetry mainly addresses in what circumstances information asymmetry may exist and what information asymmetry can lead to in such circumstances. In the following, we will review the literature on information asymmetry from these perspectives.

2.2.1.1 Information asymmetry and adverse selection

Akerlof (1970) published the work titled “The market for lemons: Quality uncertainty and the market mechanism”, which was later recognized by the Royal Swedish Academy of Sciences as a landmark Nobel Prize work. Akerlof (1970) pointed out that in the used-car market, there is an information asymmetry between buyers and sellers in terms of the quality of used cars, with sellers being the informed party and buyers the uninformed party. As buyers cannot know

the actual quality of the used car, they can only bid according to their knowledge of the whole used-car market, and this price tends to be the price of average-quality cars in the used-car market. Sellers of poor-quality used cars naturally benefit from that, while sellers of good-quality used cars will suffer losses. In the long run, used cars with good quality will leave the market, making the quality of used cars in the market become worse and worse. This phenomenon of bad products driving out good products is called adverse selection, and this market is called the lemon market by this study.

Akerlof's (1970) work on information asymmetry and adverse selection has opened up new research directions for information economics and has been widely applied to other fields.

2.2.1.2 Information asymmetry and moral hazard

In addition to adverse selection, moral hazard is another consequence of information asymmetry that scholars have studied extensively (Dembe & Boden, 2000).

Between the two parties of information, if one has low moral standards but the other is unaware of it, information asymmetry will occur. This kind of information asymmetry may produce negative consequences, which are known as moral hazard (Pauly, 1968). For example, in the insurance market, people who have purchased car insurance may drive carelessly, leading to frequent accidents for insurance companies to cover, and in some cases, they may even falsify accidents (Winter, 2000). Another example is the principal-agent relationship, where the agent may take advantage of the relationship to collect information without informing the principal and use this information to do things that are harmful to the principal (Dutta & Radner, 1994; Eisenhardt, 1989). In market regulation, companies are more aware of regulatory loopholes than market regulatory authorities, and unscrupulous companies may exploit these loopholes for profit.

It should be pointed out that in the current signal theory, moral hazard is regarded as a neutral term and does not necessarily have negative connotations. Moral hazard is manifested as actions taken by one party in favor of themselves after signing a transaction contract due to the additional information they have obtained related to the contract (Pauly, 1968).

Some scholars have put forward methods to address moral hazard. For example, insurance companies can choose not to provide full coverage contracts, forcing customers to pay a portion of the cost. Moreover, insurance companies can offer rewards to customers with good records, such as premium reduction in the renewed contract (Eisenhardt, 1989).

2.2.1.3 Other scenarios

The signal theory originated from research in the field of economics but currently is also widely applied in other fields, such as management. Connelly et al. (2011) paid attention to the application of the signal theory in management in their influential review thesis "Signaling theory: A review and assessment", detailing the phenomenon and the potential consequences of information asymmetry in many application scenarios in management (e.g., strategic management, corporate management, organizational management).

In this thesis, we pay special attention to the application of the signal theory in political science, such as social and public governance. Lightfoot and Wisniewski (2014) argued in their work titled "Information asymmetry and power in a surveillance society" that government surveillance of many aspects of society can also lead to information asymmetry, and in many cases, this information asymmetry is deliberate. These authors discussed the potential negative effects of information asymmetry in this scenario.

In addition, as mentioned in the literature review on moral hazard above, it is common that the principal-agent relationship leads to information asymmetry. From the perspective of political science and constitutionalism, the relationship between the public and the government is like a principal-agent relationship, where the public can be regarded as the principal and the government as the agent – the government is entrusted by the public to engage in social governance.

2.2.2 Signaling

Signaling was originally proposed by Spence (1981) as a method to address information asymmetry, and the term "signaling" has been redefined by him in the signal theory. Signaling refers to the content included in the signal and the information conveyed by the act of sending a signal.

2.2.2.1 Spence's work

Spence received his PhD in Economics from Harvard University in 1972, and in the following year, he published the work titled "Job market signaling" (Spence, 1973), which presents the research results of his doctoral dissertation. According to him, there is information asymmetry in the job market, where the employer is the informed party, and the applicant is the uninformed party. In order to induce the employer to make decisions that are favorable to the applicant, applicants should send information (signals) to the employer, indicating their abilities, with the education diploma being the most important signal.

Spence (1973) believes that in the job market, a person's productive capabilities is an invisible characteristic since he/she has not worked for the organization yet, whereas this person's education level is a visible index that can serve as a signal of productive capabilities. Thus, Spence inferred a positive relationship between education level and wage. At the beginning, Spence's conclusion sparked some controversy and seemed to be overturned by an empirical experiment from Layard and Psacharopoulos (1974). However, subsequent statistical analyses based on data from the *Current Population Survey (1978)* in the United States confirmed Spence's conclusion (Heywood, 1994; Hungerford & Solon, 1987). In fact, a person's education level is definitely an observable index of productive capabilities, especially in countries like China where education is highly valued. In the job market, the employer's offers to applicants are indeed associated with applicants' educational background. However, it is not surprising that after joining the company, some hired applicants may not outperform the employees with lower education level. These studies showed that the difference had no statistical significance.

It should be pointed out that the function of signals is not only to eliminate information asymmetry but, more importantly, to achieve signaling equilibrium, that is, to distinguish different objects. In the job market, applicants provide their educational diplomas to distinguish themselves from other applicants. If most job applicants have educational qualifications, even if the employer does not have related information yet, education is not considered a valuable signal.

2.2.2.2 Theoretical framework of signaling

Spence's work opened up the research on signaling, which constitutes a main component of the signal theory. Connelly et al. (2011) constructed a theoretical framework of signaling with signaling timeline as the main axis, as shown in Figure 2.1. This framework involves four elements: signaler, receiver, signal, and signaling environment. As mentioned earlier, "signaling" not only includes the signal itself, but also the behavior and environment of sending signals.

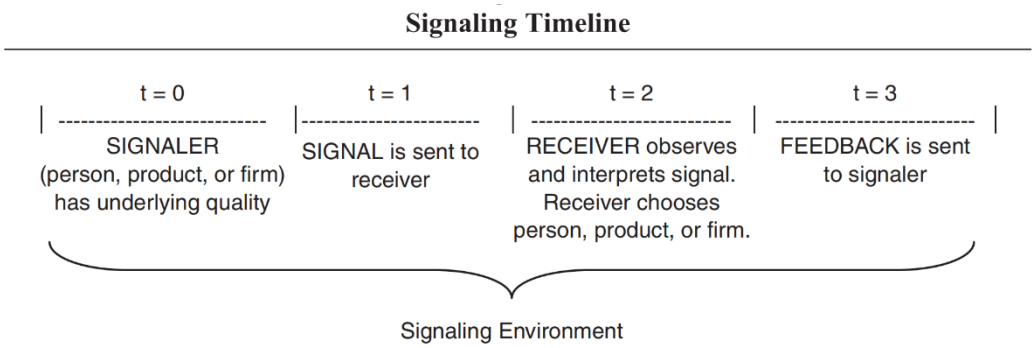

Figure 2.1 Theoretical framework of signaling

Source: Connelly et al. (2011)

The signaler and the receiver are on the two opposite sides of information asymmetry, with the signaler being the informed party and the receiver the uninformed party. By sending signals to the receiver, the signaler induces the receiver to make choices in favor of the signaler.

In different application scenarios, the signaler and the receiver are different. For example, in the scenario of human resources, the candidate is the signaler while the employer is the receiver; in strategic management, the company's senior management is the signaler, while the external stakeholders are the receiver. Connelly et al. (2011) included a table indicating the signaler and the receiver in various application scenarios, which has a significant reference value.

However, even in the same scenario, the roles of the signaler and the receiver are not static. For example, in the job market, applying and hiring are two-way choices. On the one hand, employers want to gain more information about the applicant to determine whether he/she meets their needs. In this case, the applicant is the signaler, while the employer is the receiver (Spence, 1973). On the other hand, applicants also want to know more about the employer to see whether the employer will be a good boss. In this case, the applicant is the signal receiver, while the employer is the signaler (Rynes et al., 1980).

It is the same case with feedback. On the one hand, the signaler sends the signal to the receiver, and on the other hand, the signaler expects the receiver's feedback on signal reception. In this case, the role of the signaler has turned into a receiver, and the earlier receiver has become a signaler (Gupta et al., 1999). This switch of signaler and receiver roles often occurs in commercial or political transactions that require multiple rounds of engagement (Srivastava, 2001).

Signal is perhaps the core of the whole signal theory. It is the carrier of information exchange between the signaler and the receiver. It is also the most explored topic in the literature of the signal theory. Besides the content of the signal, the way of signaling can also convey

information. In particular, under certain conditions, by not sending any signal, information is transmitted. For example, in the model proposed by Kirmani and Rao (2000), if high-quality firms send signals but low-quality firms do not, signaling equilibrium is achieved, enabling outsiders to distinguish between them.

2.2.3 Screening

Besides signaling, screening is another method of reducing information asymmetry. The most important difference between the signaling and screening is that screening is initiated by the uninformed party, while signaling is initiated by the informed party. The same as signaling, screening was also first proposed by Spence (1973). However, Stiglitz (1975)provided a more thorough discussion on screening.

Rothschild and Stiglitz (1976) published their work "Equilibrium in competitive insurance markets: An essay on the economics of imperfect information". They found that there was also an information asymmetry in the insurance market, where policyholders are the informed party because they know their health risk, while insurance companies are the uninformed party. The authors proposed that insurance companies can provide a variety of insurance contracts with different insurance premiums for policyholders to choose from. Through the policyholders' choices, insurance companies can induce the policyholders' health risk scope, thus reducing the information asymmetry to a certain extent.

Stiglitz (1975) pointed out that besides the insurance market, the job market can also use the screening method to reduce information asymmetry. Stiglitz and Weiss (1983) even indicated specific ways for screening: application review, aptitude testing and assessment, and interviews.

2.2.4 Relevance of the signal theory to this thesis

As can be seen from the literature review above, the signal theory is mainly composed of three components: adverse selection, signaling, and screening. These three are all centered on information asymmetry: adverse selection is the consequence of signal asymmetry, and both signaling and screening aim to eliminate information asymmetry. In the following, we will present the relevance of the signal theory to this thesis.

2.2.4.1 Information asymmetry and public health event information disclosure

Traditional economics believe that the free market would facilitate information exchange. However, Akerlof (1970) found that there is information asymmetry in the market, which

challenged the traditional economics. At that time, his findings were disregarded. These findings were initially rejected several times because they were considered too simple. Now it is acknowledged that his findings have significance, laying an essential foundation of information economics.

As for the topic of this thesis, according to the search on Google Scholar, there seem to be no research on the application of the signal theory to public health event information disclosure. We believe that the key reason why public health event information disclosure becomes a problem lies in the information asymmetry between the government and the public. Information asymmetry will be a new perspective to the research on the information disclosure of public health events.

2.2.4.2 Adversary selection and major public health emergencies

According to Akerlof's reasoning, the existence of information asymmetry forces the market to make adverse choices, resulting in a "lemon market" in which "bad money drives out good money". Similarly, as to public health events, due to the commonly existing information asymmetry, people fail to properly respond when major public health emergencies occur, which is evidenced by some failures during SARS and COVID-19.

2.2.4.3 Signaling and CRID-PHE

Among the three parts of the signal theory, signaling has received the most attention with a lot of research outcomes. In particular, we are most inspired by the literature on signal costs in signaling.

Signaling refers to the practice in which the informed party takes the initiative to send signals to the uninformed party to eliminate the information asymmetry between them. The informed party's cost of sending the signal is an important reference for the uninformed party to judge the sincerity and authenticity of the signal. For example, in the job market, job applicants usually provide their education diplomas to employers. However, in fact, education does not necessarily represent the productive capabilities of the applicant; it is a high-cost signal because the applicant has to spend time and money to obtain the degree. This example was first put forward by Spence and has since been cited and expanded by many scholars. In the following, we present a recent example to demonstrate the role of signal cost.

Xiaomi is one of the most well-known mobile phone manufacturers in China. Three years ago (early 2021), Xiaomi announced the manufacturing of cars. At the end of 2023, Xiaomi held a press conference to introduce the progress of car manufacturing. During the entire press conference, only PowerPoint slides were shown, without any display of the manufacturing site

or production line, let alone physical display. Xiaomi obviously hoped to send a positive signal to the market through the press conference, but the cost of such a signal is very low – we name it a "PPT signal" cost. After Xiaomi's press conference, the market had varied reactions, with some criticism. The main reason was that the cost of the PPT signal was too low, making it difficult to persuade Xiaomi's investors and customers. If Xiaomi had displayed a car manufacturing site or production line, we would call it a "production signal". The production signal has a higher cost than the PPT signal and the information it conveys to the market is more positive. Finally, if Xiaomi could have showcased the finished vehicles, we would call it the "achievement signal". Achievement signals have higher costs than production signals and will be the most effective for Xiaomi's investors or customers. From PPT signals to production signals, and then to achievement signals, the signal cost is getting higher, and the signal feedback will be more positive.

Inspired by the theory of signal cost, we intend to study the information disclosure of public health events from this perspective. Public health event information disclosure is the information disclosed by the government to the public. Then, what is the cost for the government to send public health event information? Is it the human and logistic cost of sending such information? That is certainly a part of the costs, but we do not think it is the most important cost for the government. Since SARS in 2003, in order to prevent the recurrence of any SARS-like pandemics, China has built the world's most extensive network and largest system to comprehensively and real-time monitor the occurrence and development of all types of public health events.

Costs are to be paid. What should the government pay if it discloses information about public health events comprehensively and in real time? It is something the government is unwilling to pay, which is why it has been delaying the comprehensive and real-time information disclosure of public health events. We all know that the function of government is to govern. Many government officials believe that in order to ensure the execution of government governance, it is necessary to maintain the information advantage of the government to the public. For example, in the post-COVID-19 period, the government adjusted its anti-pandemic policy from "dynamic zero clearance" to "herd immunity". Suddenly, the number of infected cases in society increased dramatically, and everyone was at risk. In order to ensure the implementation of the "herd immunity" policy as soon as possible, the National Health Commission of China stopped the daily pandemic update notification that had been running consistently for three years, which turned information sharing between the government

and the public into an information advantage for the government over the public regarding the pandemic.

In the signal theory, the purpose of signaling is to eliminate information asymmetry. With respect to public health, the comprehensive and real-time disclosure of information about public health events can completely eliminate the information asymmetry between the government and the public, thus removing the information advantage of the government over the public, thereby weakening the execution power of government governance. The government's duty is to govern. If weakening the execution of government governance is the cost of sending signals, it is a cost that the government considers unaffordable.

2.2.4.4 Screening and self-media public opinion

In the signal theory, screening refers to the practice of the uninformed party taking the initiative to induce the informed party to release information (or take actions) in the context set by the uninformed party. Screening was initially proposed by Spence (1973), but Rothschild and Stiglitz (1976) later elaborated it thoroughly by using the insurance market as an example. According to Stiglitz, the insurance company is the uninformed party, and the customer is the informed party. In order to know more about the customers, insurance companies can provide various insurance contracts for customers to choose from, thereby obtaining more information about the customers.

As far as the research topic of this thesis is concerned, the information on public health events is controlled by the government. The government is the informed party, while the public is the uninformed party. Unless the government takes the initiative to release information, it is almost unimaginable for the public to induce the government to release information through the screening method.

However, nothing is impossible. The emergence of self-media may change this. The so-called self-media is a way for ordinary people to share facts and ideas by connecting the global knowledge system through digital technology (Bowman & Willis, 2003). Until now, self-media has surpassed traditional media and become the main platform for public information acquisition and exchange. Since the public can freely express themselves on the "self-media", the public opinion formed by all speeches often causes the concern of the government. At present, the government has a dedicated agency to pay attention to the self-media public opinion, to which it often makes quick responses. Therefore, self-media public opinion can actually be considered a method for the public, the uninformed party, to screen the signals of the government, the informed party. This suggests that we can combine self-media public opinion

with screening to study the information disclosure of public health events from the public's perspective. By the way, it was through self-media that Dr. Li Wenliang revealed some of the initial information about COVID-19 and immediately received a response from relevant government authorities, although the response was negative (Green, 2020).

In subsequent studies of the signal theory, many scholars, including Stiglitz, summarized many specific screening methods that can be adopted by uninformed parties (Chiappori & Salanie, 2000; Stiglitz & Weiss, 1983). In public affairs, perhaps in the future, self-media public opinion will also be a screening method that can be adopted by the public as the uninformed party.

2.3 Natural experiments

The Nobel Prize in Economic Sciences for 2021 was awarded to David Card, Joshua D. Angrist, and Guido W. Imbens for their outstanding work in the methodology and application of natural experiments (Shymanska, 2022), which has made natural experiments widely-known. Although natural experiments have been around for a long time (Diamond & Robinson, 2010), there seems to be no clear description of what natural experiments are, and various expressions are available (Ren, 2008; Titiunik, 2021). For example, some emphasize natural events (Craig et al., 2012), statistical comparison (Diamond & Robinson, 2010), or random grouping (Dunning, 2012). In this thesis, based on the literature review of natural experiments, especially the work of the Nobel Prize winners, we provide our understanding or definition of natural experiments as follows:

A natural experiment is an experiment that researchers construct as close as possible to a randomized controlled experiment (RCT) by using natural events according to their own research objectives. For this reason, natural experiments are sometimes called quasi-RCT experiments.

In this definition, there are two basic elements: natural events and RCT.

(1) Natural events. Natural events are events that occur in nature or in human society that are not designed by researchers and are not subject to their control or intervention. For example, the COVID-19 outbreak is a natural event that occurs in nature. For another example, in 1980, the Mariel boatlift, which resulted from the rapid surge of the workforce in Miami due to a sudden change in the Cuban government's immigration policy (Card, 1990), is, in our view, a natural event that occurs in human society.

(2) RCT experiment. An RCT experiment randomly divides the experimental subjects into two groups according to the research objectives, the experimental group and the control group, and then intervenes in the experimental group and compares the different responses of the two groups to evaluate the intervention effects (Scriven, 2008). The most widely known RCT experiments are the trials to evaluate drug effects. Patients are randomly assigned to receive either the drug (experimental group) or a placebo (control group). Then the effect of the drug is examined. The purpose of an RCT experiment is to examine causality. For example, in a drug effect evaluation experiment, the cause is the drug, and the effect is the drug's efficacy. Therefore, RCT experiments require strict exclusion of factors that may affect the evaluation of causality. For example, in trials evaluating drug effects, the group assignment is strictly randomized to ensure that the physical conditions of patients in the two groups are not different as a whole. In addition, since psychological factors can also affect treatment effectiveness, the control group should be given a placebo, making patients in both groups believe that they are receiving the drug.

The requirement for RCT experiments is very strict, and it is not easy to fulfill in research practice, especially research on social and economic topics with wide coverage. Thus, the method of natural experiment came into being. Interestingly, the work that won the 2019 Nobel Prize in Economic Sciences used the RCT method to study global poverty reduction (Guérin & Roubaud, 2020), while the work awarded the 2021 Nobel Prize in Economic Sciences used the natural experiment to study labor economics.

The following literature review on natural experiments mainly focuses on two aspects:

a) For the work awarded the 2021 Nobel Prize in Economic Sciences, we will focus on how they used natural events to construct natural experiments for their research projects, and will not elaborate on the economic implications of their work.

b) Application of natural experiments in the public health sector.

2.3.1 Nobel Prize work in 2021

As stated before, the 2021 Nobel Prize in Economic Sciences was awarded to David Card, Joshua D. Angrist, and Guido W. Imbens. All of them were awarded for their use of natural experimental methods in research on economic problems. The Royal Swedish Academy of Sciences expressed in the award speech that:

a) The contributions of the three Nobel laureates in the early 1990s showed that using natural experiments (rather than designed experiments such as RCT experiments) could help to answer important questions related to causality.

b) Their contributions complement and reinforce each other: Angrist and Imbens' insights into natural experiment methodology and Card's application of this method to important problems have opened a research path for other researchers.

2.3.1.1 Minimum wage and employment

It is generally believed that raising the minimum wage will increase production costs and thus affect employment. Obviously, whether or not to provide a minimum wage is the result of a tripartite game between trade unions, capital, and the government and involves many aspects of society, none of which is under researchers' control. In the early 1990s, New Jersey raised its minimum wage in the fast food sector while its neighbor, Pennsylvania, kept the minimum wage unchanged. David Card used this natural event to construct a natural experiment, with fast food companies in New Jersey as the experimental group and those in Pennsylvania as the control group. By investigating the changes in the employment status of these two groups, Card and Krueger (1993) reached a conclusion different from that of traditional economics.

2.3.1.2 Migration and the labor market

Intuitively speaking, a large influx of immigrants will certainly impact the local labor market. When Cuba suddenly liberalized its port control in 1980, approximately 150,000 Cubans illegally immigrated to Florida, with 50% settling in Miami, increasing the local workforce by 7%. Historically, this event is known as the "Mariel boatlift". For scholars who study the impact of migration on the labor market, the "Mariel boatlift" is a natural event, that is, an event that is not designed or controlled by the scholars but provides a natural experiment environment for their research. David Card seized this opportunity. Taking Miami as the "experimental group" and several neighboring areas less affected by immigration as the "control group", through empirical analysis of labor market data, Card and Peri (2016) found that the influx of Cuban immigrants did not have a significant impact on the wages and employment of non-Cuban workers.

2.3.1.3 Return on education

The return on education is a classic research topic in economics. In the United States, a child can go to school if he/she reaches the age of six in the same year. In other words, regardless of the child being born on January 1 or December 31, they can enter school in the same year. According to regulations in the United States, a child is not allowed to drop out of school until he/she reaches 16. That means, among the children who drop out of school at this age, those born on December 31 will have an extra year of schooling than those born on January 1. This

difference is the result of U.S. education policy. Angrist used it to construct a natural experiment, taking children born in the fourth quarter of a particular year as the experimental group and children born in the first quarter of the next year as the control group. Therefore, the experimental group receives one year more education than the control group. Since children in the experimental group and the control group had similar birth dates, the two groups could be considered to basically have no difference except for the number of years of education. By investigating the earnings of the two groups after drop-out, Angrist and Krueger (1991) found that the children in the experimental group received more return on education.

2.3.2 Application of natural experiments in public health and the enlightenment to our research

The application of natural experiments in the field of public health started much earlier than in empirical economics. As we mentioned earlier, natural experiments are derived from RCT, with its well-known application in the evaluation of drug efficacy. Evaluating the efficacy of drugs is not only a medical topic but also a public health topic because drugs are widely used in society. Some scholars dedicated to the history of science believe that Darwin's experiments on finches on the Galapagos Islands are actually natural experiments (Sulloway, 1982). It is currently recognized that the earliest and most renowned natural experiment is John Snow's mapping of cholera transmission in 1854. At that time, there was an outbreak of cholera in the United Kingdom, and Snow found a big difference in prevalence between people living near clean water sources and those near contaminated water sources and thus found that contaminated domestic water was the media of cholera spread. The cholera outbreak in the United Kingdom was clearly not of Snow's design and was definitely a natural event, but Snow used it to design his natural experiment (Hempel, 2013). In 2012, the UK Medical Research Council specifically issued guidelines on the use of natural experiments, which greatly promoted the application of natural experiments in the public health field (Craig et al., 2012).

COVID-19 is a major disaster for human beings. However, for scholars engaged in public health research, it provides a unique environment for natural experiments, in which many research topics can be studied (Thomson, 2020). In recent years, a lot of related scientific literature has emerged. For example, the work titled "Pandemic upheaval offers a huge natural experiment" found that during COVID-19, the preterm birth rate in developed countries such as Ireland and Denmark dropped significantly, while that in underdeveloped countries such as Nepal increased significantly, which naturally constructed an experimental group and a control group in natural experiments for preterm birth research. By investigating the two groups' anti-

pandemic measures during COVID-19, the author attempted to explain their difference in preterm birth rates (Rosen, 2021).

This thesis focuses on information disclosure of public health events. During normal times (non-pandemic periods), the government usually does not disclose the information of public health events comprehensively and in real time; however, during the pandemic period (such as Covid-19), the government releases the latest pandemic information to the public on a daily basis. Thus, the government's different practices during the pandemic period and normal times can be taken as the experimental group and the control group for natural experiments. Our research aims to find out how the government responded to a major public health emergency in the experimental group and the control group. Definitely, we hope that our results will indicate that the experimental group has better responses.

Note: The timeline of the normal group (i.e., the control group) should include the moment of the outbreak of the major public health emergency, while the timeline of the experimental group starts after the moment of the outbreak. The COVID-19 pandemic lasted three years, during which, although the whole society was in the midst of the pandemic, the pandemic change was slow most of the time, with several major ups and downs, which could be regarded as major public health emergencies. Therefore, both the experimental group and the control group have the target events that we want to observe.

2.4 Government Information Disclosure

As an important part of modern government governance, government information disclosure plays an irreplaceable role in enhancing government transparency, promoting citizen participation, and promoting the construction of democracy and rule of law. In recent years, with the rapid development of information technology and the continuous improvement of citizens' awareness of rights, government information disclosure has gradually become the focus of academic and practical circles. The purpose of this section is to review the literature on government information disclosure, in order to provide a useful reference for the research in Chapter 7, "Information Disclosure of Public Health Events - a Case Study of Government Information Disclosure."

2.4.1 Basic concepts and theory of government information disclosure

2.4.1.1 Basic concepts of government information disclosure

Government information disclosure means that government agencies, in accordance with legal procedures, proactively or upon request disclose government information produced or obtained in the course of performing their duties to citizens, legal persons or other organizations (Wall, 1975). Government information disclosure is not only a legal obligation of the government, but also an important way to protect citizens' rights to know, participate, express and supervise. Through government information disclosure, we can effectively promote the openness and transparency of government decision-making, promote the democratization and legalization of government governance, and enhance the government's credibility and execution capabilities.

Government information disclosure also faces challenges in information security, privacy protection and other aspects, and it is necessary to find a balance between protecting citizens' rights and interests and safeguarding national interests.

Looking to the future, government information disclosure will play an even more important role in improving government governance capabilities and governance levels. At the same time, we also need to pay attention to the problems and challenges that may arise in the process of government information disclosure, constantly improve relevant systems and mechanisms, and ensure that government information disclosure can be promoted continuously, healthily, and orderly.

Government information disclosure is not only an obligation of the government, but also an important way for citizens to participate in social governance. Through government information disclosure, citizens can understand the basis, process and results of government decision-making, and then put forward opinions and suggestions on government work. This process of interaction and participation helps to enhance citizens’ trust and support for the government and promotes good relations between the government and citizens. At the same time, government information disclosure can also help promote social supervision and prevent the occurrence of abuse of power and corruption (Hu, 2008).

As an important channel for information dissemination, the media plays an irreplaceable role in government information disclosure. The media can guide the public to pay attention to government work and promote the transparency and fairness of government decision-making by reporting and commenting on government information. At the same time, the media can also supervise government work, reveal existing problems and deficiencies in government work, and promote government improvement. Therefore, there is a mutually reinforcing relationship

between government information disclosure and media supervision (Cuadrado-Ballesteros et al., 2014).

2.4.1.2 Right to know and government information disclosure

Government information disclosure is a requirement of the public's right to know, and the public's right to know is a constitutional right enjoyed by the public (Parks, 1957). The constitutions of many countries directly recognize the public's right to know in their constitutional provisions. For example, Article 58 of the 1997 Thai Constitution stipulates: "A person shall have the right to obtain public information from state agencies. For state-owned enterprises or local government organizations, unless the disclosure of such information will affect national security, public safety or interests of other people, must abide by the provisions of this law." Another example is Article 41, Paragraph 2, of the Bulgarian Constitution: "The public may obtain information that is not state or official secrets from official agencies and groups based on legitimate interests, but this cannot interfere with the rights of others." In some countries, although the public's right to know is not directly written in the constitutional provisions, but the public's right to know is implicit. For example, the Chinese Constitution states that citizens have the right to participate in the management of state affairs. Some scholars believe that this implies the public's right to know, because if the public does not have the right not to know, how can they participate in state management (Liu & Lv, 2003)?

The concept of the right to know first appeared after World War II. At that time, there was a bureaucratic tendency within the U.S. federal government agencies to treat the disclosure of government information negatively and arbitrarily expand confidentiality authority. In response to this situation, in January 1945, Cooper (1945), the then president of the Associated Press, said in a speech: Citizens have the right to know what they should know, and the state should confirm and protect citizens' access to information to the greatest extent possible, especially the right to access government information. Cooper actively called on officials to "respect the public's right to know" and suggested that from the perspective of democratic politics, the right to know should be elevated to a constitutional right. This may be the earliest statement that the right to information is a constitutional right enjoyed by the public.

In modern society, the right to know has broad and narrow meanings. The right to know in a broad sense refers to the freedom and right of the public (natural persons, legal persons and other organizations) to seek and receive government or government information in accordance with the law. The right to know in a narrow sense refers to the right that the public enjoys in accordance with the law to know the information held by the government. Therefore, the main

difference between the right to know in the broad sense and the right to know in the narrow sense is the scope of the subjects who possess the information. The former includes the government and other social organizations outside the government, while the latter mainly refers to the government (Emerson, 1976). The right to know mentioned in this thesis refers to the right to know in a narrow sense, that is, the public's right to know the information held by the government.

Furthermore, there are two ways for the public to exercise their right to know: freedom to know and right to know (Raikka, 1998). In order to protect the public's freedom to know, the government must proactively and comprehensively disclose the information it possesses, allowing the public to freely choose the information they want to know. The government cannot overstep its authority in deciding what information the public needs to know. The choice of what to be informed lies with the public. In order to protect the public's right to know, the government must promptly respond to the public's requests for information disclosure. The "Regulations of the People's Republic of China on Government Information Disclosure" also regulates government information disclosure from these two aspects. The comprehensive and real-time information disclosure of public health events advocated in this thesis is precisely to achieve the public’s freedom to know the public health event information.

2.4.1.3 Privacy right and government information disclosure

Privacy right refers to personal information, personal affairs or personal areas that the persons do not want others to know or that are inconvenient for others to interfere. There are three forms of personal privacy: first, personal information, which is intangible privacy, such as citizens’ personal files, etc (erase etc) and is prohibited from dissemination and use; second, personal private affairs, which is dynamic privacy, such as private activities, and illegal interference is prohibited; third, the personal realm is tangible privacy, such as a private residence, where trespassing is prohibited (Rubenfeld, 1989).

Originally, the right to know is a political right, while the right to privacy is a civil right. These two rights are obviously different and operate in different fields. They would not conflict originally, but government information disclosure has linked these two rights, because government information contains a large amount of personal information, especially information requested to be disclosed. Therefore, we often see in practice that the right to privacy is often used as an excuse to hinder the disclosure of government information. The conflict between the right to privacy and the right to know is essentially a conflict of interests between different groups of the public (D. Gorman, 1978). Some Chinese scholars have

proposed that if the public interest reflected by the right to know is significantly greater than the private interest protected by the right to privacy, then such information can be disclosed; otherwise, it will not be disclosed (C. Yang & Shi, 2022).

Interestingly, the right to know is not always in opposition to the right to privacy. The U.S. Privacy Act of 1976 stipulates that any individual can apply to see materials about himself or herself held by the federal government. Personal information retained by federal government agencies must be accurate, comprehensive, timely, and reasonably relevant, federal agencies must obtain relevant information directly from the owner of the material, and information collected for one purpose must not be used for any other purpose. From this perspective, American citizens can use their right to know to ensure that the government will not preserve black materials that they do not know about, thereby protecting their privacy (Beverage, 1976).

2.4.1.4 New technology and government information disclosure

In recent years, high and new technologies such as big data, Internet and cloud computing have provided a new environment for government information disclosure. Many literature also discuss the integration of government information disclosure and these new technologies, and explore how to use new technologies to improve the efficiency and effect of information disclosure (Zinnbaur, 2007).

At the practical level, government agencies disclose government information through official websites, press conferences, government blogs and other channels to facilitate citizens' access to and use of government information. At the same time, the government also actively promotes the combination of government information disclosure and data opening to promote the sharing and utilization of government data (Hardy & Maurushat, 2017).

At present, in the events such as natural disasters, accidents, public health and social security, the network platforms have become the most important means of information disclosure (Yates & Paquette, 2011). The use of the Internet to open government information can better communicate and exchange with the public than the traditional media, so as to achieve a good interactive relationship between the government and the public (Fujiwara & Watanabe, 2005).

With the continuous progress of information technology and the constant change of social governance needs, government information disclosure will show the following trends: First, informatization and intelligence will become an important means of government information disclosure, and the efficiency and accuracy of information disclosure will be improved through big data, artificial intelligence and other technical means; Second, diversification and

individuation will become important features of government information disclosure to meet the information needs of different public groups (Kosajan et al., 2018).

With the advent of the era of big data, the connection between government information disclosure and data governance has become increasingly close. Government information disclosure provides rich data sources for data governance, and data governance can improve the efficiency and accuracy of government information disclosure through technical means. Through data mining and analysis, we can better understand social needs and livelihood issues, and provide a scientific basis for government decision-making. At the same time, data governance also helps to ensure information security and privacy protection, ensuring compliance and security of government information disclosure (Hardy & Maurushat, 2017).

2.4.2 Progress of government information disclosure at home and abroad

Comparing the literatures on the systems and practices of government information disclosure in different countries and regions, these literatures help us to understand the differences and common points in the government information disclosure in different countries, and provide reference and inspiration for the government information disclosure in our country.

Different countries and regions have different practical experience and system design in government information disclosure. By comparing the systems and practices of government information disclosure in different countries, we can find out their advantages and shortcomings, which can provide useful reference and inspiration for our country's government information disclosure. For example, some countries have relatively mature experience and practices in the construction of legal systems for government information disclosure, the scope and depth of information disclosure, and the ways and channels of information disclosure, which are worth learning and reference.

2.4.2.1 Progress of government information disclosure abroad

It must be admitted that the United States is in the forefront of the world in terms of government information disclosure, whether it is theoretical research or practical implementation, and is a model for other countries to learn and study.

The First Amendment to the United States Constitution states that Congress shall make no law abridging the freedom of speech or the press. As an important addition to the First Amendment to the Constitution, the Copyright Act of 1976 explicitly prohibits the federal government from invoking copyright laws to protect federal information, and stipulates that copyright protection does not apply to any document of the United States federal government.

Any federal document is in the public domain. Anyone can copy it and sell it and federal open data can be made available online. In recent years, with the increase in digital technology and the spread of the Internet, copyright law has seemed prescient in restricting federal government information (R. A. Gorman, 1977).

In 1966, the Freedom of Information Act enacted by the United States is the most important and comprehensive law on government information disclosure. Countries more or less refer to the U.S. Freedom of Information Act when formulating their own laws and regulations on government information disclosure (Cate et al., 1994). Search "U.S. Government Information Disclosure" on Google Scholar, and most of the search results returned are about the Freedom of Information Act.

Although the purpose of the Freedom of Information Act is to make government information public, the Freedom of Information Act also stipulates that up to nine types of government information may not be disclosed. The nine categories of non-public government information are as follows:

(1) Confidential documents

In the United States, the secrecy system is established by the President by executive order. Therefore, if a document is classified under a presidential executive order, then the document is not public government information. Confidential documents have a confidentiality period. In addition, the public can apply to the court to lift confidentiality.

(2) Internal personnel rules and systems of government agencies

This type of information refers to information that is purely administrative and has basically nothing to do with public interests, such as internal agency regulations on lunch time, or internal work manuals of administrative agencies, etc.

(3) Information exempted from disclosure by other laws

The Freedom of Information Act is not a superior law like the Constitution, but is on an equal legal footing with many other laws. Therefore, when formulating the Freedom of Information Act, in order to avoid legal entanglements, the Freedom of Information Act respects exemptions from information disclosure stipulated in other laws.

(4) Trade secrets and commercial financial information

This part of the information actually belongs to the "personal privacy" of enterprises. In order to protect a fair market competition environment and to encourage enterprises to provide accurate and reliable information to the government with confidence, the Freedom of Information Act stipulates that the "personal privacy" of enterprises controlled by the government does not belong to the scope of government information disclosure.

(5) Internal contacts of the government

This type of information involves memos or letters between government agencies and within government agencies. The purpose is to protect the integrity of the government decision-making process, encourage full discussions among government staff, and prevent the information of government decision-making process from being asked to go public before decisions are made.

It is important to note here that the Freedom of Information Act stipulates that if internal government communications involve purely factual information, this purely factual information must be disclosed unless this purely factual information is indistinguishable from the decision-making process. In Chapter 7 of this thesis, when studying the disclosure of government information, it is proposed that the information of objective events, unless it involves personal privacy or national security, should be fully disclosed in real time. The so-called objective event information is actually a reference to the pure factual information mentioned here.

(6) Personal privacy

The United States is a country that advocates individualism, and the scope of personal privacy is very wide. Common types of personal privacy include marital status, legitimacy of children's status, welfare benefits, family disputes and reputation, physical health, birth date, religious beliefs, national status, social security number, criminal history, history of U.S. citizens serving prison sentences abroad, sexual orientation and economic income, and now also include personal biometrics (such as those used in face recognition).

(7) Law enforcement documents

Freedom of Information laws allow law enforcement agencies to retain law enforcement materials in order to protect the law enforcement process from interference. This type of material consists of six components: material likely to influence law enforcement proceedings; Information likely to affect a person's right to a fair trial; law enforcement materials that may affect the privacy of individuals; material likely to reveal law enforcement sources; material that could reveal law enforcement techniques or procedures or lead to circumvention of the law; material that may affect the safety or life of any individual.

(8) Financial system

According to the Freedom of Information Act, all materials prepared for or by financial supervisory agencies, such as evaluation operations or status reports, are classified as government information that cannot be disclosed, such as federal administrative agency inspection reports of banks and all related documents, and even information about banks that have been closed.

(9) Geological information

This information includes geological and geophysical information, data and drilling maps, etc. Now, many countries even have included this type of information as important information related to national security.

From the above simple list, we can see that these nine categories cover a wide range and the types are also very complex. Government information that citizens apply for disclosure may fall within the scope of non-disclosure if they are not careful. To this end, the Freedom of Information Law also stipulates that if the government information applied for disclosure falls within the scope of non-disclosure, the government bears the burden of proof to prove that the information citizens apply for disclosure falls into these nine categories of government information that cannot be disclosed and cannot be perfunctory. If citizens are dissatisfied, they can also file a lawsuit in court (Snell, 2006).

In addition, it should be noted that the government may not disclose these nine types of information, but it does not mean that the government cannot disclose it. The discretion to disclose lies with the government. If under certain circumstances the government deems it appropriate to do so, it can do so.

The Freedom of Information Act enacted in 1966 was the first statutory law in the United States to provide the public with the right to obtain government information. Prior to the promulgation of the Freedom of Information Act in 1966, the disclosure of government information in the United States was regulated by the Federal Administrative Procedure Act. However, instead of giving the green light to the disclosure of government information, this law was more likely to hinder the disclosure of government information through cumbersome administrative procedures (Nathanson, 1946).

There are a total of 7 articles in the Freedom of Information Act. Article 1 stipulates that the government must voluntarily disclose information. For example, administrative agencies must publish in the Federal Register their agency organization, functions, procedures, substantive rules, and general policy statements, as well as records of certain administrative work, such as when deciding cases. Final opinions and rulings, certain policy statements, certain employee procedures, etc., must be made available to the public for frequent inspection and copying. In the past, this kind of information could usually be viewed and copied in the reading rooms of administrative agencies. Now, this kind of information can be viewed on the official websites of government departments.

Article 2 is the nine types of government information mentioned above that cannot be disclosed. Article 3 was newly added when the Freedom of Information Act was amended in

1986. In addition to the 9 types of government information that can be withheld under Article 2, Article 3 added 3 types of special government information related to law enforcement that can be withheld to avoid specific losses. Requests for disclosure relating to these three types of information can be rejected by the government on the pretext that the information does not appear to actually exist.

Article 4 provides that the provisions of Articles 2 and 3 shall not be abused to withhold information from Congress or its committees. Article 5, which was added when the Freedom of Information Act was amended in 1996, requires each government department to provide an annual report on its disclosure of government information, which must be made available on the Internet.

Article 6 defines concepts covered by the Freedom of Information Act such as "agency" and "record". Article 7, which was added when the Freedom of Information Act was amended in 1996, provides that for the convenience of information requesters, an agency must prepare the Freedom of Information index guide, describing its information systems and methods of requesting information.

Carefully analyzing the structure and content of the Freedom of Information Act, it is not difficult to find that the laws and regulations on government information disclosure in many countries, including our country's "Regulations of the People's Republic of China Government Information Disclosure", have the shadow of the Freedom of Information Act.

In general, from the perspective of government information disclosure, government information is divided into three categories: (1) Information automatically disclosed by the government. In the past, this kind of information used to be available in the public reading rooms of various government departments. Now, this kind of information can be viewed on the official websites of various government departments or in public databases. (2) Information that the government has not disclosed but can be disclosed upon application. (3) Information that the government only has not disclosed but also will not disclose upon request. As you can imagine, the disclosure of this kind of information will inevitably lead to many disputes. In order to avoid these disputes, the Freedom of Information Act spends a lot of space regulating the procedures for applying for government information disclosure.

Finally, it must be noted that the Freedom of Information Act only addresses the issue of how citizens obtain government information. However, after citizens obtain government information, they are not free to use and control the obtained government information. The United States also has other laws regulating how citizens use government information (Gorelick & Enzinna, 1991).

In the process of collecting and learning literature about the U.S. Freedom of Information Act, we have gained a lot of useful inspiration. For example, when studying government information disclosure in Chapter 7 of this thesis, it was proposed that government information should be divided into two categories: information of objective events and government affairs information. Information of objective events, as long as it does not involve personal privacy or national security, should be made available to the public in a comprehensive and real-time manner, while the government affairs information, which are generated from government administrative activities, can be disclosed or not be disclosed as appropriate. The information of objective events we are talking about is actually purely factual information described in Article 2, where it is clearly stipulated that purely factual information should be distinguished from government internal information and should be disclosed unconditionally. Furthermore, the government affairs information of we are talking about includes the government internal information described in Article 2, which does not have to be disclosed. Obviously, our proposal is somewhat consistent with Article 2 of the Freedom of Information Act.

Although the United Kingdom and the United States have the same ideology, the United Kingdom is a country advocating elite politics, ignoring the role of public participation in national governance, and naturally not active in government information disclosure. But in the early 1980s, under the push of the Campaign for Freedom of Information (CFI), a non-governmental organization, a number of laws related to the disclosure of government information have been drawn up (Tant, 1990). For example, the Local Government Act 1984 gave the public greater access to local council meetings, reports and papers. The Access to Personal Files Act 1987 gave the public the right to information about their own social security, housing and academic studies. The Environment and Safety Information Act 1988 provides for the public's right to information and action when an organization or institution breaches an environmental protection or safety law. However, the situation is stronger than people. Under the influence of the disclosure of information by the US government and the rising demand of its own people, the British government began to formulate the "Disclosure of Information Act". This bill was drafted in 1994 and passed in November 2000, which took nearly seven years. The Freedom of Information Act establishes the principle that anyone has the right to receive government information. Like the Freedom of Information Act of the United States, the British Freedom of Information Act also lists the government information that can be not disclosed and specifies the government information that must be disclosed and the government information that can be disclosed at discretion. When citizens apply to the government for disclosure of certain government information, the government should answer whether the information is

available and whether it belongs to the scope of disclosure (Hazell et al., 2010). The UK's Freedom of Information Act is 34 years behind the US Freedom of Information Act!

2.4.2.2 Progress of government information disclosure at home

After 1978, China carried out reform and opening up. Opening up is not only opening up to the outside world, but also opening up to the inside. Controls in all areas of social life are gradually being deregulated, and government information disclosure is no exception. However, SARS in 2003 had a landmark role in promoting the reform of government information disclosure (Rana, 2015).

The evolution of SARS and the time node of information disclosure

According to the collected literature (Beijing News, 2013; Rana, 2015), the process of SARS in 2003 is roughly as follows (here we mainly focus on the occurrence of the events and the time point of information disclosure):

It is now confirmed that the first case of SARS occurred in Foshan City, Guangdong Province on November 16, 2002. One month later, on December 17, the second SARS case was confirmed in Guangzhou City, Guangdong Province.

In early 2003, the cases of SARS infection among medical staff began to appear in some places in Guangdong Province. This actually indicates that the SARS virus can be transmitted from person to person. On January 23, 2003, the Guangdong Provincial Department of Health notified all health and medical units across the province on the status of SARS. However, it should be noted that this is an internal notification within the health system and is not a disclosure to the public.

As of February 9, 2003, Guangzhou City had treated more than 100 SARS patients, many of whom were medical staff. Since there was no official news, rumors spread widely in the society, and there was even a panic buying trend on the February 10.

On the next day, February 11, 2003, the Guangzhou Municipal Government held a press conference to announce the SARS situation in Guangzhou, but saying that the conditions of all patients were under control, and emphasized that for a big city like Guangzhou with a population of tens of millions, more than 300 people getting sick is a very small percentage.

This is the first official disclosure of SARS since SARS outbreak, and the disclosure appears to have been forced by the situation. Because rumors had already been circulating in society (in fact, the so-called rumors are not rumors), and even triggered panic buying in the market. In order to comfort the public, in this disclosure, the authorities intentionally or unintentionally downplayed the severity of SARS.

This is the first time that the authorities have disclosed the SARS information since the outbreak of SARS, and this disclosure seems to be forced by the situation. Because at this time, there had been rumors (actually not rumors) in the society, and even panic buying has occurred in the market. In order to comfort the public, in this official disclosure, the authorities intentionally or unintentionally downplayed the severity of SARS.

It now appears that the government's downplaying of the SARS pandemic has had serious consequences, causing the entire society to relax its vigilance and fail to take preventive measures in a timely manner. For example, on February 12, 2003, the friendly match between the Chinese football team and the world champion Brazilian football team still went on as planned, with more than 50,000 fans watching the game. On February 18, the "2003 Luo Dayou Guangzhou Concert" was also held as planned. This obviously accelerated the spread of the pandemic.

On February 12, 2003, the day after the Guangzhou press conference, the head of the China Centers for Disease Control and Prevention claimed in an interview with reporters that there would be no widespread pandemic of respiratory infectious diseases in the country in the near future. It was around the Spring Festival, a traditional Chinese festival, and the Chinese Center for Disease Control and Prevention's judgment led the government to fail to take measures to prevent the Spring Festival travel season from becoming an important way for the spread of the pandemic.

Subsequently, SARS overflowed from Guangzhou to other regions. On February 21, 2003, an infected retired professor from Guangzhou went to Hong Kong to visit his relatives, triggering the Hong Kong pandemic. Subsequently, Hong Kong became a transit point for the SARS virus. In late February, an American businessman from Shanghai traveled to Vietnam via Hong Kong, triggering the SARS outbreak in Vietnam. On March 15, an elderly man in Beijing returned to Beijing from Hong Kong, triggering the SARS pandemic in Beijing. On March 27, the World Health Organization declared Beijing a pandemic area and issued a travel warning on April 2.

On the second day (April 3) after the World Health Organization declared Beijing a pandemic area, the then Minister of Health Zhang Wenkang announced at the State Council press conference that SARS had been effectively controlled, and "It is safe to work, live and travel in China", and even said that "it is safe in Beijing no matter whether you wear a mask or not". Zhang Wenkang's speech was obviously intended to slap the World Health Organization in the face. However, Zhang Wenkang's speech caused dissatisfaction from a doctor at the Chinese People's Liberation Army General Hospital. He believed that the actual situation he

came into contact with was completely inconsistent with the situation announced by the then Minister of Health Zhang Wenkang. He directly wrote a letter to the American "Time" magazine to expose the pandemic in Beijing. On April 8, Time magazine published the interview online, putting Beijing in a whirlpool of public opinion. The Chinese government has also been under tremendous international pressure, giving the impression that the Chinese government seems to deliberately conceal the truth about the pandemic.

On April 19, the Standing Committee of the Political Bureau of the Central Committee of the Communist Party of China held a meeting to discuss the responses to the SARS pandemic. The next day (April 20), it was announced that Health Minister Zhang Wenkang and Beijing Mayor Meng Xuenong had been dismissed from their posts. Wen Jiabao, then Prime Minister, warned that all officials who failed to report or concealed infection cases would face serious consequences.

From April 26 to the end of the SARS pandemic on June 24, the Ministry of Health broadcast the latest SARS information every day through CCTV. China has since established a mechanism for comprehensive and real-time disclosure of pandemic information to the public.

Research on government information disclosure in post-SARS period

Compared with COVID-19, SARS was actually much smaller both in duration and scale of harm. However, the practices of some officials in disclosing pandemic information embarrassed the Chinese government, making others think that the Chinese government seemed to be deliberately concealing the facts. Therefore, for a long time after SARS, government information disclosure became an important research topic for Chinese scholars (Jiang et al., 2021). Since the 2003 SARS, government information disclosure has become a hot topic.

According to a search from the China Zhizhi Resource Database, within eight years before "SARS" (1994-2002), there were only 37 precise search results when searching with the keyword "Government Information Disclosure", while within the year of SARS outbreak (2003) there were 47 precise search results when searching with the keyword "Government Information Disclosure", exceeding the total of the previous eight years. More exaggeratedly, within five years after SARS (2004~2009), there were 717 precise search results when searching with the keyword "Government Information Disclosure" . It can be seen that before 2003, although the issue of government information disclosure had been studied, the research results were not many; during the SARS pandemic in 2003, the issue of government information disclosure had attracted great attention from the academic community, and research on government information disclosure had also gained great development (Li, 2008).

For example, China scholar Xie (2021) has noticed that although the "Law on the Prevention and Control of Infectious Diseases" has certain provisions on the disclosure of pandemic information, there is still room for unclear implementation. In fact, both in SARS and COVID-19, this issue has repeatedly appeared and caused controversy. Local governments have repeatedly used the "Law on the Prevention and Control of Infectious Diseases" as a shield to justify their failure to fully disclose pandemic information in a timely manner. It is suggested that legislation should be improved, a hierarchical and clearly classified mechanism for pandemic information disclosure should be established, and the content and time limit of information disclosure should also be clarified. A social participation mechanism for pandemic information disclosure should be established to avoid embarrassing incidents like Dr. Li Wenliang disclosing pandemic information on social media and the retired doctor from PLA general Hospital disclosing pandemic information to foreign media.

China scholars Yang and Shi (2022) believed that the debate on the disclosure of pandemic information during COVID-19 exposes the problems of the legal norms regulating the government's disclosure of pandemic information, such as the lack of the principle of full disclosure, the excessive principle of legal rules, and the inconsistency of the subjects of disclosure responsibility, which need to be solved as soon as possible from the legal level .

China scholar Xiao (2020) specifically listed the shortcomings of current government information disclosure laws and regulations when applied to pandemic information disclosure:

(1) There is a lack of applicable laws for the prevention and control of new and emerging infectious diseases. For example, the Law on the Prevention and Control of Infectious Diseases applies only to notifiable infectious diseases, and new and emerging infectious diseases are often not notifiable when they first break out. For example, neither SARS nor COVID-19 were notifiable infections at the time of their outbreak. In addition, the classification of notifiable infectious diseases is fixed, with a total of three categories: class A, Class B and Class C. There are statutory prevention and control measures for each class of infectious disease. Therefore, we see that COVID-19 was initially identified as a Class B infectious disease, but it was controlled according to the prevention and control measures for Class A infectious diseases. Later, along with the adjustment of pandemic prevention and control policy, COVID-19 was identified as the so-called "Class B and Class B treatment", which gave people the impression of playing word games.

(2) There is a direct conflict between the allocation of prevention and response powers stipulated by different laws. For example, according to the Law of the People's Republic of China on Response to Emergencies, the power of crisis prevention and response is mainly

vested in local governments, that is, local governments are the first person in charge of local pandemic prevention and control. Local governments should closely monitor the occurrence and development of public health events, and make prompt decisions and take resolute measures to control and eliminate the pandemic once there are signs of an pandemic. However, according to the Law of the People's Republic of China on the Prevention and Control of Infectious Diseases, a large part of the power of crisis prevention and response rests with the central government, while local governments are mainly responsible for timely reporting of the outbreaks of infectious diseases to the central government.

(3) The subject of public release of crisis information is unclear. Who has the authority to release pandemic information to the public? This problem has occurred during both SARS and COVID-19. Local governments often argued that it is the state who is the main body to release pandemic information to the public, so as to defend their failure to disclose pandemic information to the local public in a timely manner.

(4) During the pandemic period, some pandemic prevention and control measures belong to scope of measures of emergency state or even war state . For example, during the pandemic period, many local governments often lock down a city, close markets, and restrict traffic and travel. According to the law, measures of emergency state war state can be implemented only when the government has officially declared a state of emergency or a state of war.

China scholar Lai (2013) conducted an empirical study on the issue of local government crisis information disclosure. He believes that the relationship between the public and the higher-level government and local government is that of principal and agent. Here, the higher-level government and the public are the principals, and the local government is the entrusted agent to manage local government affairs. He puts forward 7 research hypotheses, namely:

H1: The degree of disclosure of local government crisis information is positively related to whether the local government handles the crisis appropriately, that is, the more open the crisis information is, the more appropriately the crisis is handled;

H2: The degree of disclosure of local government crisis information is positively related to the transparency of local government, that is, the more transparent the local government is, the more open the crisis information is;

H3: The degree of disclosure of local government crisis information is negatively related to the severity of the crisis, that is, the more serious the crisis is, the less open the crisis information is.

H4: The degree of disclosure of local government crisis information is negatively related to the local government's control, that is, the stronger the local government's control is, the less open the crisis information is;

H5: The degree of disclosure of local government crisis information is related to whether the higher-level government intervenes. Under the framework of the principal-agent relationship, this is expected. After all, local governments must obey the superior government.

H6: The degree of disclosure of local government crisis information is related to the type of crisis. When a major crisis occurs, the degree of disclosure of crisis information is generally more open. After all, the responsibility is heavy and one dare not hide it.

H7: The degree of disclosure of local government crisis information is related to media attention.

Lai (2013) exploited 97 public crisis case data from 2009 to 2011 to conduct a linear regression test on the above 7 research hypotheses, and all of them were basically confirmed. In the collected literature on the research on government information disclosure, such quantitative empirical research is relatively rare. We believe that the structural equation model (Tarka, 2018) may be exploited in further improving the depth and breadth of the this research.

From the perspective of government information disclosure, Duan and Wang (2006) divide Chinese history into four periods: closed (before 1949), confidential (1949-1978), semi-open (1978-2003) and open (after 2003). It is worth noting that the "semi-open" period is the period of reform and opening up, while the "open" period is the period after SARS in 2003. SARS in 2003 was only a public health event, not a political event, but it had an unexpected effect on government information disclosure. Wen Jiabao, who served as Premier of the State Council during the SARS period, published an article ten years after SARS (2013), summarizing the impact of SARS on all aspects of social life: "The 'SARS' pandemic and the resulting changes in our governance philosophy, and a series of major economic and social policy adjustments are a landmark event, both for our country's economic and social development and for government reform and construction" (Beijing News, 2013).

Now, academic circles generally agree that SARS in 2003 greatly promoted the reform of government information disclosure. The landmark event was the "Regulations of the People's Republic of China on Government Information Disclosure" issued in 2007. This regulation had been brewing for ten years before 2003 with no results. However, the SARS outbreak in 2003 and the government's mistakes in pandemic information disclosure quickly promoted the issue of the "Regulations on the Disclosure of Government Information of the People's Republic of China" (Zhou, 2008).

2.4.3 Information disclosure of major public health emergencies from the perspective of government information disclosure

In China, the information of public health events is monitored, collected, and managed by the government. Therefore, the information disclosure of public health events belongs to the category of government information disclosure. However, at present, the government only discloses the information of major public health emergencies and will not disclose the information of other public health events in a comprehensive and real-time manner. Therefore, a lot of research literature focus on the research of information disclosure of major public health emergencies. Therefore, this subsection also only reviews the literature on information disclosure of major public health emergencies and government information disclosure.

To study the information disclosure of major public health emergencies from the perspective of government information disclosure, British crisis public relations expert Regester (1989) put forward the famous 3T principles of crisis information disclosure in his famous book Crisis Management: Tell your own tale, Tell it fast and Tell it all. The 3T principle requires the information publisher (in our research topic, the information publisher is the government) to take the initiative in information disclosure to release the true information in a timely and comprehensive manner, and not to be forced by the situation, and not to be secretive when disclosing information. From the review of the process of SARS information disclosure in Section 2.4.2.2, it can be seen that if we had followed the 3T principle at that time to release SARS information, those embarrassing scenes would not have occurred.

In recent years, the theory and practice of digital government have flourished. Digital government refers to the reshaping of government information management architecture, business architecture, and technical architecture with the support of new generation information technology. By constructing new mechanisms, platforms, and channels driven by big data, it further optimizes and adjusts the internal organizational structure, operational procedures, and management services of the government. The purpose of digital government is to comprehensively improve the government's ability to perform its duties in economic regulation, market supervision, social governance, public services, ecological environment and form a modern governance model of "using data to dialogue, using data to make decisions, using data to serve, and using data to innovate". Digital government provides a natural platform for government information disclosure, which eliminates many theoretical and technical obstacles in the original procedure of government information disclosure. It can be predicted that with

the help of digital government, government information disclosure will be greatly improved (Zinnbaur, 2007).

In general, digital government is an innovation in government governance in the information age. It promotes the transformation of government governance towards digitalization and intelligence through the use of modern information technology, in order to better meet the needs of the people for efficient, convenient, fair, and just government services (Fountain, 2004).

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Chapter 3: Research Designs and Methods

3.1 Research designs

3.1.1 Research design of CRID-PHE stakeholders

Comprehensive and Real-time Information Disclosure of Public Health Events (CRID-PHE) is a major public health service project. The decision-making and implementation of such projects require consulting stakeholders for their support. Therefore, it is necessary to determine who are the stakeholders of CRID-PHE. The research design of this thesis is as follows:

(1) Based on the literature review and the meaning of CRID-PHE, a theoretical model of CRID-PHE stakeholders is proposed and demonstrated.

(2) Through Chinese literature research and Delphi expert consultation method (Thangaratinam & Redman, 2005), the empirical model of CRID-PHE stakeholders is constructed.

Theoretical model demonstration and empirical model construction are separate and independent of each other. In order to ensure the objectivity of the empirical model and taking into account China's practical situation, the construction of the empirical model follows the following rules:

(1) When determining the initial candidates of CRID-PHE stakeholders according to the Chinese literature on the application of the stakeholder theory in the field of public health, we only set the literature search rules and the candidate selecting rules, based on which the process automatically determines the initial candidates of CRID-PHE stakeholders without our interference;

(2) Following the process of Delphi expert consultation, Chinese industry experts are invited to determine the final stakeholders of CRID-PHE from the initial candidates identified above. Similarly, the experts independently determine the final stakeholders of CRID-PHE according to the process of Delphi expert consultation without our interference.

Referring to Mitchell's stakeholder classification method, we propose that information advantage is one of the attributes for CRID-PHE stakeholder classification.

3.1.2 Research design for the demonstration of CRID-PHE

We demonstrate CRID-PHE not only theoretically and qualitatively, but also empirically and quantitatively:

(1) The necessity, rationality, feasibility, and effectiveness of CRID-PHE will be first demonstrated based on public health theories and other relevant government governance theories.

(2) The structural equation model (SEM, Bentler, 1980) is used, with the necessity, rationality, feasibility, and effectiveness of CRID-PHE as the latent variables and the arguments as the measurable variables. It provides a basis for the quantitative demonstration of CRID-PHE. At present, the SEM model is not only used in economic research, but also in research on public policy (Koning, 2016). In fact, the CRID-PHE itself can be considered a public health policy.

(3) Likert scale (Jebb et al., 2021) is used as the tool for SEM measurement, and measurement data are collected through questionnaire survey (Nemoto & Beglar, 2014).

(4) The reliability and validity of the data collected through Likert scale are tested in order to determine the availability of the data. Since we use the Likert scale to collect the measurement data, the principle and effectiveness of using SPSS to test the data's reliability and validity is the same as that of using AMOS.

(5) Conduct a variety of statistical analyses on the data tested for reliability and validity, including correlation analysis, difference analysis, and impact relationship analysis, and discuss the corresponding results.

3.1.3 Research design of the information disclosure of major public health emergencies based on the signal theory and natural experiments

New theories and methods are used to study the information disclosure of public health events:

(1) The information disclosure of public health events refers to the information disclosure to the public, not the report of events by subordinates to superiors. The reason why information disclosure of public health events is a problem lies in a serious information asymmetry between the government and the public. The signal theory is a theory that addresses information asymmetry in economics. According to a Google Scholar search, so far, there seems to be no research work on the application of the signal theory to information disclosure of public health events. This thesis attempts to use the signal theory to study the issue of information disclosure of public health events.

(2) At present, the government discloses relevant information to the public only when major public health emergencies occur. Therefore, we particularly focus on the information disclosure of major public health emergencies, and find out the causes and solutions of the problem using the signal theory.

(3) The problem of information disclosure of major public health emergencies is caused by information asymmetry, which can be reduced by CRID-PHE. We attempt to construct a natural experiment environment based on the government's practice in information disclosure and its effect during COVID-19 to prove the positive role of CRID-PHE implementation in mitigating the dilemma of information disclosure during major public health emergencies.

3.1.4 Study of information disclosure of public health events as a case study of government information disclosure

Since the information of public health events is held by the government, the information disclosure of public health events is a part of government information disclosure. We thus take the study of information disclosure of public health events as a case study of government information disclosure. By investigating the practice and effect of government pandemic information disclosure during COVID-19, we will draw conclusions and put forward suggestions to improve government information disclosure.

3.2 Delphi expert consultation and the method for initial value determination

In accordance with the research design (See §3.1.1), we used the Delphi expert consultation method to identify the stakeholders of CRID-PHE. In particular, we will present the method to determine the initial reference value for Delphi expert consultation.

3.2.1 Delphi expert consultation method

The Delphi method is an expert survey method pioneered and used by RAND Corporation in the 1960s (Gordon & Pease, 2006; Hasson et al., 2000). The steps of the Delphi method are generally as follows:

(1) Identify the questions to investigate, such as "What organizations or individuals are stakeholders of CRID-PHE?".

(2) Invite a group of experts in the relevant field.

(3) Experts answer questions based on their professional knowledge and practical experience.

(4) Collect and analyze the answers of the experts, compile a new list of questions and answers, and send them back to the experts for reference. Ask the experts to answer the questions again, and at this time, they can revise their previous answers.

(5) Collect and analyze the responses from the experts again, send a compiled list of questions and answers back to them for reference, and ask the experts to answer again. Repeat this process until the answers from all experts are consistent, or until the experts no longer revise their answers even though their answers are not consistent.

In Delphi consultation, the experts' answers are the result of their independent, thorough, and repeated thinking after considering other (anonymous) experts' answers. Ideally, after multiple rounds of consultation, the experts' opinions can be consistent. In the case of failure, after multiple rounds of consultation, the experts still hold different opinions and insist on not changing their answers.

3.2.2 The method for initial value determination in Delphi consultation

The Delphi method is somewhat similar to iterative solution methods for solving objective functions, such as Newton's iteration method (Kelley, 1999), in which each iteration builds on the previous iteration, and eventually stabilizes at an extreme value. The iterative solution method attaches great importance to the selection of initial values, which largely determines whether the iterative process converges and whether it will fall into local extrema, as well as the speed of iteration.

However, the Delphi method itself does not seem to have the concept of iterative initial values. In the first round of Delphi consultation, no reference answers are provided, and experts respond to the questions solely based on their own understanding. It may have two problems:

(1) Since the experts provide their answers without mutual consultation, the answers may be divergent. Thus, the reference answers produced based on these divergent answers for the second round of Delphi consultation may be quite biased, making it difficult to converge in subsequent rounds.

(2) Some experts may, out of concern for their own face, insist on their initial answers in subsequent rounds of consultations. Even if they realize that their initial answers are somehow biased, they may still be unwilling to make major revisions, thus making it difficult for answers to converge in subsequent rounds of Delphi consultation.

Given the problem in identifying CRID-PHE stakeholders, this thesis proposes a literature research method to determine the initial value in Delphi consultation:

(1) Step 1: Literature collection

The literature includes scientific Theses published in scientific journals and graduate dissertations.

Rules for literature collection: Relevant Theses and dissertations are searched in CNKI's journal database and dissertation database. The keyword combinations for search are "stakeholder + public health" or "stakeholder + public program". The searched fields include "Subject", "Title", "Keywords", and "Abstract". That means if both "stakeholder" and "public health" or both "stakeholder" and "public program" are included in the search fields, the corresponding thesis or dissertation is considered valid literature. For example, both "stakeholder" and "public health" are included in the title of the literature "Analysis of the governance model of public health emergencies from the perspective of the stakeholder theory"; therefore, it is considered valid literature. The publication year does not affect the validity of the literature.

(2) Step 2: Literature screening and selection

Screen and select Theses or dissertations from the valid ones.

The valid Theses and dissertations are screened based on the following rules:

a. Remove duplicated Theses and dissertations. Since the searches are conducted in the fields "Subject", "Title", "Keywords", and "Abstract" at the same time, there must be many duplicated results. The duplicated Theses and dissertations should be removed.

b. The Theses or dissertations should be about the application of the stakeholder theory to sectors of public health or public service.

c. The results will be listed in a table.

In China, scientific journals are divided into core journals and regular journals, similar to the SCI and JCR partition; universities are informally divided into three levels, including "985 universities", "211 universities", and ordinary universities, where "985 universities" are the top universities in China, similar to the Ivy League Universities in the United States, and "211 universities" are considered relatively good universities in China.

The stakeholders mentioned in the selected Theses and dissertations are taken as the stakeholder candidates of CRID-PHE.

(3) Step 3: Assignment and ratings of personalized experts

In a personalized manner, this thesis takes doctoral dissertations from "985 universities" as Expert 1, doctoral dissertations from "211 universities" as Expert 2, doctoral dissertations from

ordinary universities as Expert 3, Master's theses as Expert 4, Theses from core journals as Expert 5, and other literature as Expert 6. These personalized experts score the stakeholder candidates on a 7-point scale. We will illustrate the scoring process taking "Government" and Expert 1 (doctoral dissertations from "985 universities") as an example:

a) Let B be the number of "985 university" doctoral dissertations that take "Government" as a stakeholder;

b) Let A be the total number of "985 university" doctoral dissertations, and calculate the frequency of "Government" as a stakeholder in "985 university" doctoral dissertations: $\gamma = \frac{B}{A}$;

c) Convert the frequency of "Government" in the "985 university" doctoral dissertations into a score on the 7-point scale:

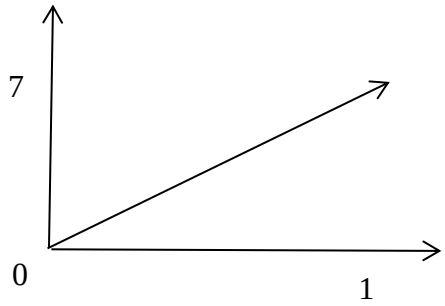

Figure 3.1 The curve of the frequency converted into a 7-point score

(4) Step 4: Weight the scores based on the importance of experts

The personalized experts have different levels of importance; for example, Expert 1 ("985 university") is understandably more important than Expert 2 ("211 university"). In this thesis, the experts' different levels of importance of are represented by different weights, as shown in Table 3.1.

Table 3.1 Different weights of the experts

	Expert 1	Expert 2	Expert 3	Expert 4	Expert 5	Expert 6
Weight	$\boldsymbol{\omega_1 = \frac{1.8}{6}}$	$\boldsymbol{\omega_2 = \frac{1.5}{6}}$	$\boldsymbol{\omega_3 = \frac{1}{6}}$	$\boldsymbol{\omega_4 = \frac{0.5}{6}}$	$\boldsymbol{\omega_5 = \frac{1}{6}}$	$\boldsymbol{\omega_6 = \frac{0.2}{6}}$

Finally, a stakeholder's score is the weighted average of its scores from the six experts:

$$\boldsymbol{\lambda = \omega_1\lambda_1 + \omega_2\lambda_2 + \omega_3\lambda_3 + \omega_4\lambda_4 + \omega_5\lambda_5 + \omega_6\lambda_6} \quad \text{.....(3.1)}$$

where λ_i is the score of the stakeholder given by the i^{th} expert, and λ_i can be zero.

At this stage, the initial value of Delphi expert consultation has been determined. Unlike the usual practice, these initial values are not provided by the engaged experts, but calculated based on the relevant literature. This in fact expands the scope of experts for Delphi consultation.

3.3 CRID-PHE stakeholder classification using Mitchell scoring method

We have presented Mitchell's scoring method in the chapter of literature review. In this section, we will mainly explain how to use Mitchell's scoring method to classify CRID-PHE stakeholders.

3.3.1 Determination of classification dimensions

According to Mitchell's scoring method, the first step is to determine the dimensions (attributes) for stakeholder classification. Referring to the classification dimensions proposed by various scholars in §2.1.2 and considering the specific application of CRID-PHE, we propose three classification dimensions: influence, benefits, and resources.

(1) Influence

Influence refers to having influence on the implementation of CRID-PHE. For example, the government has the decision-making power conferred by law over the implementation of public health programs, which is a kind of influence. The research of scholars, the voice of the media, and the advocates of public welfare organizations also have an influence on government decision-making, thus influencing on the implementation of public health programs. The "influence" dimension is similar to the "ownership" dimension proposed by Freeman (1984) and the "legitimacy" and "power" dimensions proposed by Mitchell et al. (1997). However, if we adopt their dimensions, scholars, media, and public welfare organizations would be excluded, and an additional dimension would be needed. Too many dimensions will result in an overly detailed classification of stakeholders with too few stakeholders in each category.

(2) Benefits

Benefits means that the stakeholder will benefit from the implementation of CRID-PHE. For example, through the implementation of CRID-PHE, the public will know about the ongoing public health events that may affect their health, the community will improve public health governance quality, and the public health big data center will improve data utilization and expand the scope of data application. The "benefits" dimension here includes the dimensions of economic dependence and social benefit proposed by Freeman (1984).

(3) Resources

Resources refers to whether the stakeholder has the resources required for CRID-PHE implementation. For example, unlike medical big data, public health big data are owned by the government. Companies engaged in high-tech such as big data application, Internet, and

artificial intelligence possess the technical resources (including related intellectual property rights) needed for the implementation and upgrade of CRID-PHE. To use the commonly used terminology in the stakeholder theory, these companies invest both technical and human capital in the implementation of CRID-PHE.

3.3.2 Scoring by experts

As mentioned in §2.1.2, Mitchell's method is essentially a scoring method, in which a stakeholder is scored based on whether it has a certain characteristic. When its score exceeds the preset threshold, the stakeholder is determined to have the corresponding attribute.

We invited the same group of experts who participated in Delphi expert consultation (10 experts in total) to participate in the classification of CRID-PHE stakeholders. For a stakeholder and an attribute, experts were asked to give their rating based on whether the stakeholder has this characteristic. The score ranges between 1 and 7. If the experts' mean score is equal to or greater than 4, the stakeholder is deemed to have this attribute, as illustrated in Table 3.2.

Table 3.2 Scoring table for stakeholder classification

	Expert 1	.....	Expert 10	Mean
Stakeholder A	Score 1	.....	Score 10	$\mathbf{av}_A = \frac{1}{10}\sum_{i=1}^{10} \mathbf{score}_i$
Stakeholder B	Score 1	.....	Score 10	$\mathbf{av}_B = \frac{1}{10}\sum_{i=1}^{10} \mathbf{score}_i$
Stakeholder C	Score 1	.....	Score 10	$\mathbf{av}_C = \frac{1}{10}\sum_{i=1}^{10} \mathbf{score}_i$

3.3.3 Classification standards

According to Mitchell's method, stakeholders with all three attributes are called definitive stakeholders, those with only two attributes are called expectant stakeholders, and stakeholders with only one attribute are called latent stakeholders.

3.4 Questionnaire survey and Likert scale

According to the study design (see §3.1.2), Likert scale was used as the measurement tool for CRID-PHE SEM model, and the data was collected through questionnaire survey.

3.4.1 Questionnaire survey

The questionnaire survey is a classic and the most used research method in sociological studies (Gault, 1907). In a questionnaire survey, researchers select the respondents, distribute questionnaires among them, and ask them to respond to the questions included in the questionnaire (Boynton & Greenhalgh, 2004). Generally speaking, there are two types of questionnaire survey: open and closed.

In open questionnaire surveys, questions are asked without the provision of answers. Respondents can answer the questions based on their knowledge and personal experience. The advantage of open questionnaire surveys is that from the answers of the respondents, researchers can discover something they did not know, thus enriching the original research plan. The disadvantage is the difficulty of conducting quantitative analysis. In addition, the open questionnaire survey requires more time and energy from the respondents, which makes it difficult to carry out the survey on a large scale.

In closed questionnaire surveys, various possible answers to a question are prepared and provided, and the respondents are only asked to choose the answers they agree with. The advantage of the closed questionnaire survey is that it does not require much preparation and time from the respondents, making it suitable to be conducted on a large scale. In particular, if scales are used in closed survey questionnaires, various quantitative analyzes can be performed on the results. In this thesis, we use the Likert scale in the CRID-PHE survey questionnaire.

3.4.2 Likert scale

A Likert scale includes several basic elements (Joshi et al., 2015):

(1) Forms: Likert scales are used in the form of questionnaires, where questions are listed for respondents to answer.

(2) Subjects and themes: In the Likert scale, all questions should be designed around the same subject; for example, the subject of our questionnaire is CRID-PHE's demonstration. A subject can be further divided into several themes; for example, CRID-PHE's demonstration (the subject) can be divided into the demonstration of necessity (a theme), the demonstration of rationality (a theme), and the demonstration of feasibility (a theme). In the Likert scale, themes are also called dimensions. Thus, the subject corresponds to the scale, and the themes of the subject correspond to the dimensions of the scale. Each dimension consists of several items. Each item is usually a statement that expresses a point of view. Respondents simply need to indicate the extent to which they agree or disagree with the statement.

(3) Items: The items can be objective or subjective. For example, for the theme of community public health, one may design the following objective item:

Item A1: The phenomenon of littering in the community

Answer: Rarely (5 points), occasionally (4 points), not sure (3 points), common (2 points), very common (1 point)

Respondents will respond to this item according to their actual observations. In addition, one may design the following subjective item:

Item A2：Garbage sorting helps improve community public health

Answer: Totally agree (5 points), agree (4 points), indifferent (3 points), disagree (2 points), strongly disagree (1 point)

Respondents will respond to this subjective item according to their own understanding and cognition because garbage sorting has not yet been implemented.

(4) Scores: If different items on the same theme have the same attitudinal tendency, the order of the preset scores should also be consistent. For example, the above two items, A1 and A2, are both about the theme of community public health and have the same attitudinal tendency: "no littering" and "garbage sorting" are both conducive to improving community public health. Therefore, their scores are designed to go from high to low. However, if the scores of the garbage sorting item are designed as follows:

Item A3：Garbage sorting helps improve community public health

Answer: Totally agree (1 point), agree (2 points), indifferent (3 points), disagree (4 points), strongly disagree (5 points)

Such a score setting is fine for a stand-alone item but would disrupt the statistical analysis of the entire scale when the scores of other items on the same theme are taken into account. For example, if A1 and A2 are on the same scale, the score of A1 is 5, and the score of A2 is 5, then the score of the entire scale is 10. If A1 and A3 are on the same scale, the score of A1 is 5 points, and the score of A3 score 1 point, then the score of the entire scale is 6 points. Although the scales A1+A2 and A1+A3 express the same attitude, the resulting scores are quite different.

3.5 Reliability and validity tests of Likert scale data

Data collected through Likert scale should be examined before use to ensure the availability of the data. The main tests include reliability test and validity test.

Note: Since we use the Likert scale as the measurement tool of the SEM model, the dimensions of the Likert scale correspond to the latent variables of the SEM model, and the

items for the dimensions of the Likert scale correspond to the measurement variables associated with the latent variables of the SEM model. Therefore, the results of the reliability and validity analysis of Likert scale data are consistent with that of the measurement data of the SEM model.

3.5.1 Reliability test

The primary motivation of the reliability test is that if a respondent gives different answers to the same item at different times, and the differences are quite significant, it indicates that the respondent did not answer the questions carefully, and his/her answers are not reliable.

Its implication to our examination of the scale data is that if we regard all interviewees as one virtual person, and their responses to the same item can be taken as different responses to the same item by the virtual person. If these responses differ greatly and are too dispersed, it indicates that this virtual person's responses are unreliable, or, in other words, the answers do not show good consistency or, in short, reliability. Reliability can be considered in this way for answers to one single item, answers to the items for one dimension, or answers to all items on the entire scale.

In statistics, to determine whether the distribution of a data set is dispersed, it is usually measured by variance: the smaller the variance, the better. Cronbach's coefficient, which is commonly used in reliability test, is essentially a reflection of the variance of the data set. Cronbach's coefficient was first proposed by Cronbach (1951) and has become the most widely used indicator for reliability analysis (Brown, 2002). Cronbach's coefficient is calculated as follows:

$$\boldsymbol{\alpha = \frac{k}{k-1}\left(1 - \frac{\sum_{j=1}^{n} g_j^2}{g_t^2}\right)} \quad \text{.....(3.2)}$$

where k is the number of respondents, n is the number of items contained in the scale, g_j^2 is the variance of all respondents' ratings on the j^{th} item, and g_t^2 is the variance of all respondents' ratings on the entire scale. A respondent's rating on the entire scale is the sum of his scores about each item of the scale. It can be seen from the Cronbach's coefficient formula that $\frac{\sum_{j=1}^{n} g_j^2}{g_t^2}$ reflects the variance. The smaller the variance, the greater the Cronbach's coefficient. Therefore, in reliability analysis, a greater Cronbach's coefficient indicates better reliability. In general, $\alpha \geq 0.7$ indicates good reliability, and $0.5 \leq \alpha \leq 0.7$ indicates acceptable reliability.

In practice, we calculated Cronbach's coefficients for each dimension of the scale, rather than for the entire scale, because different dimensions correspond to different categories of questions, and naturally the respondents' responses should differ.

3.5.2 Validity test

The validity test mainly aims to analyze whether the data collected through the scale conforms to the objectives of the scale design. Generally speaking, a scale is divided into different dimensions, with each dimension representing a theme. The items for the same dimension are all designed around this theme. For example, a scale of social public health governance may have two themes: one is citizens' public health awareness, and the items for this dimension may be about citizens' public health knowledge or willingness to participate in public health voluntary activities; the other theme is public health environment in the community, for which the items can be about the sanitary status of public places or the allocation of sanitation workers and equipment in the community.

Validity testing is to cluster the data collected through a scale based on its statistical characteristics, and then test whether the clustering results are consistent with the dimensional design of the scale. For example, if a scale has five dimensions, but the data is not clustered into five but four or six categories, or although the data is clustered into 5 categories, the data that should belong to the same dimension fall into different categories, such situations indicate that the collected data may not have achieved the intended objectives of the scale, or the items for the same dimension are not closely related to that theme (e.g., the dimension related to citizens' public health awareness included items about public health environment in the community).

There are three types of validity tests: content validity, criterion validity, and structural validity, among which, structural validity is the most commonly used. A complete structural validity analysis consists of three steps: correlation analysis, exploratory factor analysis, and confirmatory factor analysis.

3.5.2.1 Correlation analysis before validity analysis

The basis for data clustering is the statistical characteristics of the data, with correlation being the most important characteristic. There should be a certain correlation in the data; otherwise, there would be no basis for clustering. Therefore, before clustering, it is necessary to examine the correlation of the data, with KMO and Bartlett's sphericity test being the main indicators. The formula for KMO is as follows (Shrestha, 2021):

$$\boldsymbol{KMO} = \frac{\sum_{i \neq j} r_{ij}^2}{\sum_{i \neq j} r_{ij}^2 - \sum_{i \neq j} p_{ij}^2} \quad \text{.....(3.3)}$$

where r_{ij} is the correlation coefficient between the i^{th} item and the j^{th} item, while p_{ij} is the partial correlation coefficient between them, namely the correlation coefficient when keeping other items constant. Usually, KMO > 0.6 is required.

Bartlett's sphericity test (Nkansah, 2011) is a hypothesis test with the null hypothesis that the correlation coefficient matrix is an identity matrix, that is, the data is completely uncorrelated to each other. Under this null hypothesis (non-correlation hypothesis), construct a statistic A that follows the distribution Φ, substitute the collected data into the statistic A to get a numerical value, and then calculate the probability of the statistic A taking this value based on the distribution Φ. If the probability is very small, according to the principle that a small probability event will not occur in the first experiment, it indicates that statistic A does not actually follow the probability distribution Φ. Since the hypothesis of statistic A following the probability distribution Φ is from the null hypothesis, the null hypothesis (or the non-correlation hypothesis) is rejected. Usually, $p < 0.05$ is required.

3.5.2.2 Exploratory factor analysis

Exploratory factor analysis and confirmatory factor analysis are actually two aspects of the same question. Exploratory factor analysis verifies whether the scale conforms to the data; if not, it is necessary to consider revising the scale. However, exploratory factor analysis verifies whether the data conforms to the scale; if not, it is necessary to consider modifying the data collection method. When conducting factor analysis in practice, the difference between the two lies in whether the number of clustering categories is preset.

For cluster analysis on a data set, the number of clustering categories is an important parameter. It can be preset or automatically determined by the clustering algorithm. In exploratory factor analysis, the number of clustering categories is not preset but determined by the principal component analysis algorithm, while in confirmatory factor analysis, it is necessary to preset the number of clustering categories.

The data clustering results of an exploratory factor analysis include the number of categories and the data included in each category. If the number of categories does not match the number of dimensions of the scale, or even if the numbers are consistent, the data collected from the items for the same dimension fall into different categories, which indicates that there is some problem with the scale design. We can modify the scale to match the data, which means

modifying the theoretical model behind the scale – that is, a data-driven or evidence-based modification.

3.5.2.3 Confirmatory factor analysis

Confirmatory factor analysis verifies the scale by forcibly clustering the collected data according to the number of dimensions of the scale. The clustering results are measured through some indicators.

If most of the indicators in confirmatory factor analysis reach the reference values, the following three important indicators of validity analysis can be calculated: convergent validity, composite reliability, and discriminant validity.

(1) Convergent validity (AVE) and composite reliability (CR, Bartko & Carpenter, 1976): Both indicators measure the correlation of data in the same dimension of the scale. A higher correlation means better results.

$$\boldsymbol{AVE = \frac{1}{N}(\sum_i \lambda_i)^2 > 0.5, CR = \frac{(\sum_i \lambda_i)^2}{(\sum_i \lambda_i)^2 + \sum_i \varepsilon_i} > 0.7} \quad \text{.....(3.4)}$$

where λ_i is the standardized factor load, which can be calculated for each item in the dimension, and ε_i is the corresponding error. SPSS or AMOS can be used for calculation. N is the number of items in the dimension.

(2) Discriminant validity: Discriminant validity measures the discriminability between different dimensions. There is no calculation formula for discriminant validity. It is examined mainly by checking whether the correlation of data in each dimension is greater than the correlation between that dimension and other dimensions. The correlation of data in each dimension is measured by the square root of AVE, while the correlation between different dimensions is measured by the correlation coefficient between them.

3.6 Structural equation modeling (SEM)

3.6.1 Basic concepts of SEM

According to the research design (see § 3.1.2), the structural equation modeling (SEM) method was used to model CRID-PHE, establishing a qualitative and quantitative platform for its demonstration.

The SEM method was applied to research of social science as early as 1975 (Ploch, 1975) and has been widely promoted since then. In social science, we often encounter some semantic

variables that cannot be directly measured, and they are thus also called latent variables, for example, “someone has a strong ability to learn” and “someone has a strong ability to work”. SEM provides us with a method to study the relationship between these latent variables. Some key points of SEM are briefly introduced as follows (Bollen, 1989; Hoyle, 1995):

There are two prerequisites for SEM:

(1) First, there must be some causal relationship between latent variables. For example, “Someone has a strong ability to learn” has some causal connection with “someone has a strong ability to work”, but little with “someone loves world peace”. It must be pointed out that although SEM is also called causal modeling (Bentler, 1980), SEM itself does not create causal relationships. These causal relationships must first be set by researchers, and SEM is only a model for calculating the strength of these causal relationships.

(2) Second, although latent variables themselves cannot be directly measured, they can be indirectly measured through some measurable variables. For example, “Someone has a strong ability to learn” can be indirectly measured by “test scores”. These variables are also called measurement variables or explicit variables.

3.6.2 SEM structure diagram

In SEM, the relationship between variables is usually represented by a structure diagram. Figure 3.2 is an example of a SEM structure diagram.

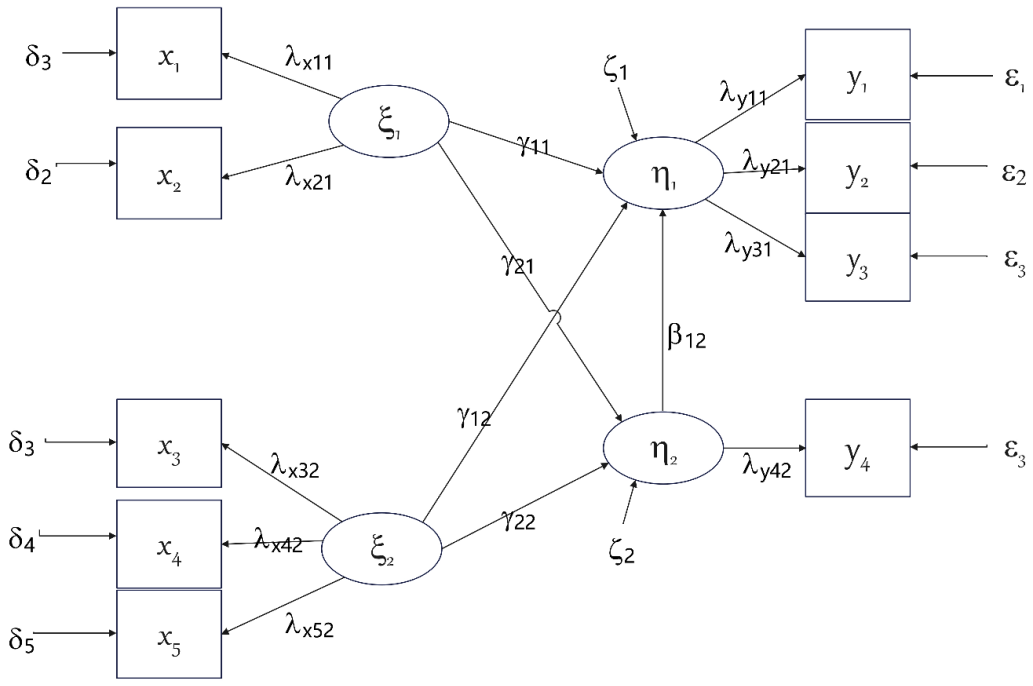

Figure 3.2 Example of a SEM diagram

In an SEM structure diagram, the ellipses usually represent latent variables, while the rectangles represent measurement variables. For example, in Figure 3.2, η_1, η_2, ξ_1, and ξ_2 represent latent variables, while x_1, x_2, x_3, x_4, x_5, y_1, y_2, y_3, and y_4 represent measurement variables. The lines between the variables represent the dependencies between them, and the variables pointed by the arrows are dependent on the variables from which the lines start. For example, the latent variable η_1 depends on latent variables η_2, ξ_1, and ξ_2; the measurement variable y_4 depends on the latent variable η_2. In SEM, if a latent variable is dependent on other latent variables, this latent variable is called an endogenous latent variable; otherwise, it is called an exogenous latent variable. For example, in Figure 3.2, η_1 and η_2 are endogenous latent variables, while ξ_1 and ξ_2 are exogenous latent variables. Endogenous latent variables can be considered to be generated from exogenous latent variables.

Generally speaking, the relationships between variables are nonlinear. However, in SEM, these nonlinear relationships are all simplified as linear relationships, and that is why SEM is also called linear structural equation modeling (Graham, 2008). However, the approximation to nonlinearity with linearity will certainly produce errors. For example, the endogenous latent variable η_1 is dependent on the endogenous latent variable η_2 and the exogenous latent variables ξ_1 and ξ_2. The linear regression to η_1 with η_2, ξ_1, and ξ_2 produces error ζ_1. Similarly, the endogenous latent variable η_2 is dependent on the exogenous latent variables ξ_1 and ξ_2. The linear regression to η_2 with ξ_1 and ξ_2 produces error ζ_2. For another example, the measurement variable x_1 is dependent on the exogenous latent variables ξ_1, and the linear regression to x_1 with ξ_1 produces error δ_1.

The weights of the lines connecting the latent variables and their measurement variables are called factor loads, which represent the dependence of the measurement variables on the latent variables. The weights of the lines connecting the latent variables are called path coefficients, representing the dependence of the endogenous latent variables on the exogenous latent variables. In SEM, the factor loads and path coefficients are estimated by using the measurement data collected through the measurement variables and the SEM equations, so as to determine the strength of dependence between the variables.

For specific calculations, SEM requires that the validity of the measurement data collected through the measurement variables should be first analyzed to ensure the availability of the data.

The validity analysis mainly consists of correlation analysis and confirmatory factor analysis. Only when the validity test is passed can the measurement data and SEM equations be used to estimate the factor loads and path coefficients.

3.6.3 Statistical principles of SEM

SEM can also be illustrated by equations, including structural equations and measurement equations. For example, for the Figure 3.2, the related equations are as follows:

(1) Structural equations. Structural equations only describe the relationships between latent variables:

$$\begin{bmatrix}\eta_1\\ \eta_2\end{bmatrix}=\begin{bmatrix}\gamma_{11} & \gamma_{12}\\ \gamma_{21} & \gamma_{22}\end{bmatrix}\begin{bmatrix}\xi_1\\ \xi_2\end{bmatrix}+\begin{bmatrix}0 & \beta_{12}\\ 0 & 0\end{bmatrix}\begin{bmatrix}\eta_1\\ \eta_2\end{bmatrix}+\begin{bmatrix}\zeta_1\\ \zeta_2\end{bmatrix}$$

$$\Rightarrow \begin{bmatrix}1 & 1-\beta_{12}\\ 0 & 1\end{bmatrix}\begin{bmatrix}\eta_1\\ \eta_2\end{bmatrix}=\begin{bmatrix}\gamma_{11} & \gamma_{12}\\ \gamma_{21} & \gamma_{22}\end{bmatrix}\begin{bmatrix}\xi_1\\ \xi_2\end{bmatrix}+\begin{bmatrix}\zeta_1\\ \zeta_2\end{bmatrix}$$

$$\Rightarrow \begin{bmatrix}\eta_1\\ \eta_2\end{bmatrix}=\begin{bmatrix}1 & 1-\beta_{12}\\ 0 & 1\end{bmatrix}^{-1}\left(\begin{bmatrix}\gamma_{11} & \gamma_{12}\\ \gamma_{21} & \gamma_{22}\end{bmatrix}\begin{bmatrix}\xi_1\\ \xi_2\end{bmatrix}+\begin{bmatrix}\zeta_1\\ \zeta_2\end{bmatrix}\right) \quad \text{.....(3.5)}$$

(2) Measurement equations. Measurement equations describe the relationships between latent variables and the corresponding measurement variables:

$$\begin{bmatrix}x_1\\ x_2\\ x_3\\ x_4\\ x_5\end{bmatrix}=\begin{bmatrix}\lambda_{x11} & 0\\ \lambda_{x21} & 0\\ 0 & \lambda_{x32}\\ 0 & \lambda_{x42}\\ 0 & \lambda_{x52}\end{bmatrix}\begin{bmatrix}\xi_1\\ \xi_2\end{bmatrix}+\begin{bmatrix}\delta_1\\ \delta_2\\ \delta_3\\ \delta_4\\ \delta_5\end{bmatrix},\ \begin{bmatrix}y_1\\ y_2\\ y_3\\ y_4\end{bmatrix}=\begin{bmatrix}\lambda_{y11} & 0\\ \lambda_{y21} & 0\\ \lambda_{y31} & 0\\ 0 & \lambda_{y42}\end{bmatrix}\begin{bmatrix}\eta_1\\ \eta_2\end{bmatrix}+\begin{bmatrix}\varepsilon_1\\ \varepsilon_2\\ \varepsilon_3\\ \varepsilon_4\end{bmatrix} \quad \text{.....(3.6)}$$

Rearranging the measurement equations, we have

$$\begin{bmatrix}\xi_1\\ \xi_2\end{bmatrix}=\begin{bmatrix}\lambda_{x11} & 0\\ \lambda_{x21} & 0\\ 0 & \lambda_{x32}\\ 0 & \lambda_{x42}\\ 0 & \lambda_{x52}\end{bmatrix}^{+}\left(\begin{bmatrix}x_1\\ x_2\\ x_3\\ x_4\\ x_5\end{bmatrix}-\begin{bmatrix}\delta_1\\ \delta_2\\ \delta_3\\ \delta_4\\ \delta_5\end{bmatrix}\right),\ \begin{bmatrix}\eta_1\\ \eta_2\end{bmatrix}=\begin{bmatrix}\lambda_{y11} & 0\\ \lambda_{y21} & 0\\ \lambda_{y31} & 0\\ 0 & \lambda_{y42}\end{bmatrix}^{+}\left(\begin{bmatrix}y_1\\ y_2\\ y_3\\ y_4\end{bmatrix}-\begin{bmatrix}\varepsilon_1\\ \varepsilon_2\\ \varepsilon_3\\ \varepsilon_4\end{bmatrix}\right) \quad \text{....(3.7)}$$

where $\begin{bmatrix}\lambda_{x11} & 0\\ \lambda_{x21} & 0\\ 0 & \lambda_{x32}\\ 0 & \lambda_{x42}\\ 0 & \lambda_{x52}\end{bmatrix}^{+}$ and $\begin{bmatrix}\lambda_{y11} & 0\\ \lambda_{y21} & 0\\ \lambda_{y31} & 0\\ 0 & \lambda_{y42}\end{bmatrix}^{+}$ represent their pseudo-inverse. By substituting the rearranged measurement equation into the structural equations, we get

$$\begin{bmatrix}\boldsymbol{\lambda_{y11}} & \mathbf{0}\\ \boldsymbol{\lambda_{y21}} & \mathbf{0}\\ \boldsymbol{\lambda_{y31}} & \mathbf{0}\\ \mathbf{0} & \boldsymbol{\lambda_{y42}}\end{bmatrix}^{+}\left(\begin{bmatrix}\boldsymbol{y_1}\\ \boldsymbol{y_2}\\ \boldsymbol{y_3}\\ \boldsymbol{y_4}\end{bmatrix}-\begin{bmatrix}\boldsymbol{\varepsilon_1}\\ \boldsymbol{\varepsilon_2}\\ \boldsymbol{\varepsilon_3}\\ \boldsymbol{\varepsilon_4}\end{bmatrix}\right)=\begin{bmatrix}\mathbf{1} & \mathbf{1}-\boldsymbol{\beta_{12}}\\ \mathbf{0} & \mathbf{1}\end{bmatrix}^{-1}\begin{bmatrix}\boldsymbol{\gamma_{11}} & \boldsymbol{\gamma_{12}}\\ \boldsymbol{\gamma_{21}} & \boldsymbol{\gamma_{22}}\end{bmatrix}\begin{bmatrix}\boldsymbol{\lambda_{x11}} & \mathbf{0}\\ \boldsymbol{\lambda_{x21}} & \mathbf{0}\\ \mathbf{0} & \boldsymbol{\lambda_{x32}}\\ \mathbf{0} & \boldsymbol{\lambda_{x42}}\\ \mathbf{0} & \boldsymbol{\lambda_{x52}}\end{bmatrix}^{+}\left(\begin{bmatrix}\boldsymbol{x_1}\\ \boldsymbol{x_2}\\ \boldsymbol{x_3}\\ \boldsymbol{x_4}\\ \boldsymbol{x_5}\end{bmatrix}-\begin{bmatrix}\boldsymbol{\delta_1}\\ \boldsymbol{\delta_2}\\ \boldsymbol{\delta_3}\\ \boldsymbol{\delta_4}\\ \boldsymbol{\delta_5}\end{bmatrix}\right)$$

$$+\begin{bmatrix}\mathbf{1} & \mathbf{1}-\boldsymbol{\beta_{12}}\\ \mathbf{0} & \mathbf{1}\end{bmatrix}^{-1}\begin{bmatrix}\boldsymbol{\zeta_1}\\ \boldsymbol{\zeta_2}\end{bmatrix} \quad \text{.....(3.8)}$$

There are usually certain statistical assumptions about the error variables, such as mutual independence, zero mean, and unit variance. In order to facilitate the illustration, we assume that the error is zero here, so the above equation can be simplified as:

$$\begin{bmatrix}\boldsymbol{\lambda_{y11}} & \mathbf{0}\\ \boldsymbol{\lambda_{y21}} & \mathbf{0}\\ \boldsymbol{\lambda_{y31}} & \mathbf{0}\\ \mathbf{0} & \boldsymbol{\lambda_{y42}}\end{bmatrix}^{+}\begin{bmatrix}\boldsymbol{y_1}\\ \boldsymbol{y_2}\\ \boldsymbol{y_3}\\ \boldsymbol{y_4}\end{bmatrix}=\begin{bmatrix}\mathbf{1} & \mathbf{1}-\boldsymbol{\beta_{12}}\\ \mathbf{0} & \mathbf{1}\end{bmatrix}^{-1}\begin{bmatrix}\boldsymbol{\gamma_{11}} & \boldsymbol{\gamma_{12}}\\ \boldsymbol{\gamma_{21}} & \boldsymbol{\gamma_{22}}\end{bmatrix}\begin{bmatrix}\boldsymbol{\lambda_{x11}} & \mathbf{0}\\ \boldsymbol{\lambda_{x21}} & \mathbf{0}\\ \mathbf{0} & \boldsymbol{\lambda_{x32}}\\ \mathbf{0} & \boldsymbol{\lambda_{x42}}\\ \mathbf{0} & \boldsymbol{\lambda_{x52}}\end{bmatrix}^{+}\begin{bmatrix}\boldsymbol{x_1}\\ \boldsymbol{x_2}\\ \boldsymbol{x_3}\\ \boldsymbol{x_4}\\ \boldsymbol{x_5}\end{bmatrix}\Rightarrow \Phi_y Y\ \Psi\Phi_x X$$

.....(3.9)

where

$$\Phi_y=\begin{bmatrix}\boldsymbol{\lambda_{y11}} & \mathbf{0}\\ \boldsymbol{\lambda_{y21}} & \mathbf{0}\\ \boldsymbol{\lambda_{y31}} & \mathbf{0}\\ \mathbf{0} & \boldsymbol{\lambda_{y42}}\end{bmatrix}^{+},\Phi_x=\begin{bmatrix}\boldsymbol{\lambda_{x11}} & \mathbf{0}\\ \boldsymbol{\lambda_{x21}} & \mathbf{0}\\ \mathbf{0} & \boldsymbol{\lambda_{x32}}\\ \mathbf{0} & \boldsymbol{\lambda_{x42}}\\ \mathbf{0} & \boldsymbol{\lambda_{x52}}\end{bmatrix}^{+},\Psi=\begin{bmatrix}\mathbf{1} & \mathbf{1}-\boldsymbol{\beta_{12}}\\ \mathbf{0} & \mathbf{1}\end{bmatrix}^{-1}\begin{bmatrix}\boldsymbol{\gamma_{11}} & \boldsymbol{\gamma_{12}}\\ \boldsymbol{\gamma_{21}} & \boldsymbol{\gamma_{22}}\end{bmatrix},$$

$$Y=\begin{bmatrix}\boldsymbol{y_1}\\ \boldsymbol{y_2}\\ \boldsymbol{y_3}\\ \boldsymbol{y_4}\end{bmatrix},X=\begin{bmatrix}\boldsymbol{x_1}\\ \boldsymbol{x_2}\\ \boldsymbol{x_3}\\ \boldsymbol{x_4}\\ \boldsymbol{x_5}\end{bmatrix} \quad \text{.....(3.10)}$$

In the above formula, Y and X represent the measurement data of SEM and are known, while Φ_x and Φ contain the factor loads and Ψ the path coefficients, which are unknown. We need to use the measurement data (X,Y) to solve for the factor loads and path coefficients (Φ_x,Φ_y,Ψ). Such equations can only be solved using statistical methods. We consider the measurement variable as a random variable and the measurement data as an instance of this random variable. In order to estimate the statistical characteristics of the measurement variable, the measurement variable must be sampled multiple times, and then the statistical mean (statistical characteristics) is estimated through the sample mean value. For example, if the Likert scale is used as a measurement tool, it is necessary to interview multiple respondents, and each respondent's response is an instance of the measurement variable as a random variable. Generally, the number of respondents should be at least 20 times the number

of items. Therefore, if a Likert scale contains 10 items, at least 200 respondents should be interviewed. When the statistical characteristics of the measurement variables are known, the factor loads and path coefficient scan be solved according to the following statistical equation:

$$\min_{(\boldsymbol{\Phi_x},\boldsymbol{\Phi_y},\boldsymbol{\Psi})} \boldsymbol{E}\left[\left|\boldsymbol{\Phi_x Y}-\boldsymbol{\Psi\Phi_y X}\right|^{\boldsymbol{2}}\right] \quad (3.11)$$

where $E[\bullet]$ is the statistical mean. Obviously, the SEM method is a statistical method. It has been regarded as one of the three major advances in statistics in recent years (Tarka, 2018).

3.6.4 The principle of SEM covariance matrix solution algorithm

Equation (3.11) can be solved in many ways. The covariance matrix solution algorithm is one of them. it is said that AMOS software also uses the covariance matrix solution method to solve the load factors and path coefficients of SEM. We use the examples given in 3.6.2, 3.6.3 and 3.6.4 to illustrate the principle of the SEM covariance matrix solution algorithm.

As mentioned before, (X,Y) represents the measurable variables of SEM in which X are usually called independent variables because they are produced by exogenous latent variables (ξ_1,ξ_2), while Y are called dependent variables because they are produced by endogenous latent variables (η_1,η_2). Further, we denote $Cov(X,Y)$ as the covariance matrix of X and X, that is,

$$\boldsymbol{Cov(X,Y)}=\frac{\boldsymbol{E[(X-E[X])(Y-E[Y])]}}{\sqrt{\boldsymbol{E[(X-E[X])^2]}}\sqrt{\boldsymbol{E[(Y-E[Y])^2]}}} \quad (3.12)$$

where $E[\bullet]$ represents the statistical average. Computing statistical average requires knowing the probability distributions of random variable, which is usually unknown. Therefore, in statistics, the sample average of a random variables is usually used to approximate its statistical average. For example, by measuring the random variable X multiple times, we can obtain the samples $x_1,\cdots,x_N$ of X, so the mean value of X can be approximated as follows:

$$\boldsymbol{E[X]}\approx\frac{\boldsymbol{1}}{\boldsymbol{N}}\sum_{\boldsymbol{n=1}}^{\boldsymbol{N}}\boldsymbol{x_n} \quad (3.13)$$

In the SEM calculation, (X,Y) represents the measurable variables of SEM and are measured through multiple measurements, and the measured data are then the samples of the (X,Y). Using these samples, we can calculate $Cov(X,Y)$. Therefore, once the SEM

measurement data are obtained, $Cov(X,Y)$ is then a known quantity. In the covariance matrix solution algorithm, $Cov(X,Y)$ is an invariant and is being approximated iteratively.

Given a guess $(\tilde{\Phi}_x,\tilde{\Phi}_y,\tilde{\Psi})$ for the load factor and path coefficient (Φ_x,Φ_y,Ψ), an approximation $(\tilde{X},\tilde{Y})$ to (X,Y) can be obtained using the following equation:

$$\min_{(\tilde{X},\tilde{Y})} \boldsymbol{E}\left[\left|\widetilde{\boldsymbol{\Phi}_y}\widetilde{\boldsymbol{Y}} - \widetilde{\boldsymbol{\Psi}}\widetilde{\boldsymbol{\Phi}_x}\widetilde{\boldsymbol{X}}\right|^2\right] \quad (3.14)$$

Note that although Equation (3.14) is the same in form as Equation (3.11), but the variables to be optimized are different.

Once $(\tilde{X},\tilde{Y})$ is obtained from Equation (3.14), we can further calculate their covariance matrices $Cov(\tilde{X},\tilde{Y})$, and the error between $Cov(\tilde{X},\tilde{Y})$ and $Cov(X,Y)$:

$$\boldsymbol{\Lambda} = \boldsymbol{Cov}(\boldsymbol{X},\boldsymbol{Y}) - \boldsymbol{Cov}(\widetilde{\boldsymbol{X}},\widetilde{\boldsymbol{Y}}) \quad (3.15)$$

The principle of the covariance matrix solution algorithm is to continuously update $(\tilde{\Phi}_x,\tilde{\Phi}_y,\tilde{\Psi})$ so as to make the error Λ as small as possible.

Therefore, the covariance matrix solution algorithm is an iterative optimization algorithm. In the AMOS, the upper limit of the number of iterations is 50. If the error Λ cannot reach the preset minimum value after 50 iterations, AMOS will consider the SEM adaptation to have failed.

3.7 Summary

(1) From a mathematical point of view, the Delphi method is essentially an iterative solution of the objective function. In the iterative solution of the objective function, each iteration is built on the previous iteration and finally stabilizes at an extreme value, while in the Delphi method, the experts revise their previous answers at each round of consultation until the opinions of all the experts reach consistency. This iterative solution method depends very much on the selection of the initial values of the iteration, which largely determines whether the iteration process converges, whether it falls into local extrema, and the iteration speed. Unfortunately, however, the Delphi method itself does not seem to have the concept of initial values. In the first round of consultation, no reference answers are provided, and the experts respond to the questions solely based on their understanding. This not only causes mathematic problems such as iterative convergence but also problems in social psychology. In general, the invited experts

all have a certain social status. Some may be concerned with their own face and thus are not willing to significantly modify their answers in the first round of consultation, making it difficult for the experts' opinions to converge. In this chapter, we put forward a method to determine the initial values in Delphi consultation, so that experts' opinions are less dispersed from the beginning.

(2) In the stakeholder theory, stakeholder identification and classification are two processes. It is necessary to first identify the stakeholders before their classification. Since stakeholders are not equally important to the enterprise, it is necessary to classify the stakeholders according to the specific situation of the enterprise and identify the stakeholders that are more important for the enterprise. Mitchell's method is the most commonly used stakeholder classification method at present. Mitchell identified three attributes. If a stakeholder has all three attributes, it is considered the most important stakeholder; if it has two attributes, it is the secondary important stakeholder; if it only has one attribute, it is a marginal stakeholder; if it has none of the three attributes, it is a non-stakeholder. However, Mitchell's method, though widely applied, has two theoretical flaws that seem to have never been pointed out:

First of all, Mitchell's method is a stakeholder classification method, instead of a stakeholder identification method. Therefore, it should not discuss who is not a stakeholder.

Secondly, the definition of stakeholders may vary. Many scholars have proposed stakeholders' definitions, each of which actually represents a stakeholder attribute. These attributes are not mutually exclusive and can produce many combinations. Therefore, the three attributes proposed by Mitchell, no matter how they are combined, cannot cover the full definition of stakeholders.

(3) In SEM, the structural equation represents the relationship between latent variables, while the measurement equation represents the relationship between latent variables and measurement variables. Through these two equations, latent variables can be eliminated, and a linear equation about measurement variables can be obtained, that is, the formula (3.9) derived in this chapter. The elements of the coefficient matrix of this equation are the path coefficient and factor load, which are what the SEM needs to solve. Formula (3.9) cannot be solved directly, but we can treat the measurement variable as a random variable, and thus, Formula (3.9) is converted into the statistical equation shown in formula (3.11), which is the statistical principle of SEM.

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Chapter 4: CRID-PHE Stakeholders

4.1 Research purposes

CRID-PHE is a policy initiative involving a wide range of public health. If implemented, it will be an important basic public health service. Therefore, it is very necessary to clarify the stakeholders of CRID-PHE during the stage of policy argumentation. However, stakeholder theory is mainly proposed by Western scholars and is mainly used in the strategic management of enterprises. The research purpose of this chapter is to determine the stakeholders of public health services, especially the stakeholders of CRID-PHE proposed in this thesis. These stakeholders are in line with China's national conditions.

4.2 Theoretical model of CRID-PHE stakeholders

In this section, based on the stakeholder theory and related literature reviewed in §2.1, considering the application scenario of public health, a theoretical model of CRID-PHE is preliminarily constructed. The stakeholder candidates and the rationale for their selection are as follows:

1) Government

The government is the funder, builder, and operator of all public service programs. As CRID-PHE is a public health service project, the government is naturally a stakeholder of CRID-PHE. The government may support or go against CRID-PHE. There is a reason for both possibilities.

A. Rationale for support:

The implementation of CRID-PHE is conducive to enhancing the level of social public health governance and thus helps to improve the performance of government social governance. In particular, the government is not an abstract concept, and it is composed of government officials. The improvement of the government’s social governance performance is also conducive to relevant officials’ career development. Therefore, the government should be supportive of CRID-PHE in general.

B. Rationale for objection or hesitation:

First, the implementation of public service programs requires financial support. Therefore, any public service program will need to go through a rigorous assessment of social and economic benefits. Before the results of the assessment are released, the government will generally take a cautious wait-and-see attitude, especially for those public service programs that are not initiated by the government itself, such as CRID-PHE in this thesis.

Second, the implementation of CRID-PHE may promote the process of public health governance to be more data-driven and evidence-based decision-making, which will inevitably limit or reduce some of the government powers, such as the right to publicly disclose the status of public health in society. Governments may be instinctively opposed to initiatives that may potentially affect their power.

2) Scholars or academic research institutions

In an environment with respect for knowledge, experts and scholars play an increasingly important role in the decision-making and implementation of public service programs. For instance, many major innovative public service programs are proposed or demonstrated by scholars. Scholars' opinions have great influence on government decision-making and public advocacy.

3) Centers for Disease Control and Prevention (CDC)

In China, the Centers for Disease Control and Prevention (CDC) is a public welfare institution instead of a government department, but is directly supervised and funded by government health authority. Since SARS in 2003, the CDC has established a relatively comprehensive real-time monitoring system for public health events, namely, the Direct Reporting System for Infectious Diseases (Ma et al., 2006). In addition, the collection, storage, and utilization of public health big data are essential responsibilities of the CDC. Therefore, if CRID-PHE is implemented, it will definitely be the responsibility of the CDC or a third party entrusted and supervised by the CDC. The implementation of CRID-PHE will surely promote the utilization of public health big data. In particular, in order to ensure the real-time disclosure of public health events, CRID-PHE is designed to require that the unit responsible for monitoring public health events must also be the unit that discloses information, so that the whole process from monitoring to information disclosure is automatically realized. However, according to current Chinese law, the competent authority to disclose public health events is the government's health authority or even the central government, not the CDC, which is an issue that needs to be addressed in the CRID-PHE stakeholder analysis.

4) The public

In principle, the public is the direct beneficiary of public service programs. It meets the criteria for stakeholders, according to the definition that stakeholders are groups or individuals affected by the organization's activities. In this regard, the public in public services is somewhat like the consumers in markets. However, due to the differences in backgrounds, experiences, and identities, the public may have varied attitudes towards the same thing. For example, the COVID-19 vaccination program is a public health service, but in some workplaces, the mandatory vaccination requirement has aroused antipathy among some public groups. Protests against mandatory vaccination broke out in many countries. In the view of public health authority, although the implementation of CRID-PHE can keep the public informed of ongoing public health events around them, it can also cause dissatisfaction among some public groups. For example, both AIDS and hepatitis B are infectious diseases that must be reported. They are almost lifelong once infected. In China, there is quite a big number of AIDS patients, and the number of hepatitis B patients is nearly 10% of the total population. These patients are already under enormous psychological pressure. If the prevalence, severity, and death rate of these infectious diseases are reported frequently, it may cause discrimination against these patients in society. Therefore, the implementation of CRID-PHE should fully consider the different interests and demands of various stakeholders, which is the original intention of the stakeholder theory.

5) Social welfare organizations

Social welfare organizations refer to the non-governmental and non-profit organizations engaged in social welfare activities. The non-government nature enables these organizations to speak up for some groups of the public without much hesitation, while the non-profit nature gives these organizations a certain moral high ground in the conduct of their activities. In the stakeholder analysis of enterprises, social welfare organizations, as part of the external environment of enterprise operation, are often regarded as the enterprises' stakeholders. However, they are usually classified as marginal stakeholders rather than core stakeholders. Contrastingly, in public service programs, social welfare organizations often have great influence on the approval or rejection of a project.

6) Communities

What CRID-PHE discloses is mostly public health events occurring in local communities, because people's public health concerns primarily focus on the communities in which they live. Therefore, if the public wants to inquire about the public health events around them, they must first identify which community they are currently in, and then inquire about the public health

events in this community. The implementation of CRID-PHE not only can improve the level of community public health governance, but also can increase the community identity of residents.

7) Media

Media is the medium of information transmission. Media includes traditional media (e.g., newspapers, radio, and television) and new media (e.g., self-media and websites). Although the media is not the direct beneficiary of public service programs, it can mobilize public sentiment through their reports, thereby affecting the government's decision-making on public service programs.

8) High-tech enterprises

In essence, CRID-PHE is a digital public health project in which high-tech enterprises will play an important role. Therefore, high-tech enterprises engaged in the Internet, big data, and artificial intelligence are all stakeholders of CRID-PHE. That is because a) these high-tech enterprises have the technical resources required for the implementation of CRID-PHE, and b) the implementation of CRID-PHE provides business opportunities for these companies. However, these high-tech enterprises usually do not participate in government decision-making on CRID-PHE. Their role in CRID-PHE is a bit like the role of suppliers for enterprises.

To sum up, the theoretical model of CRID-PHE stakeholders is as follows (see Figure 4.1):

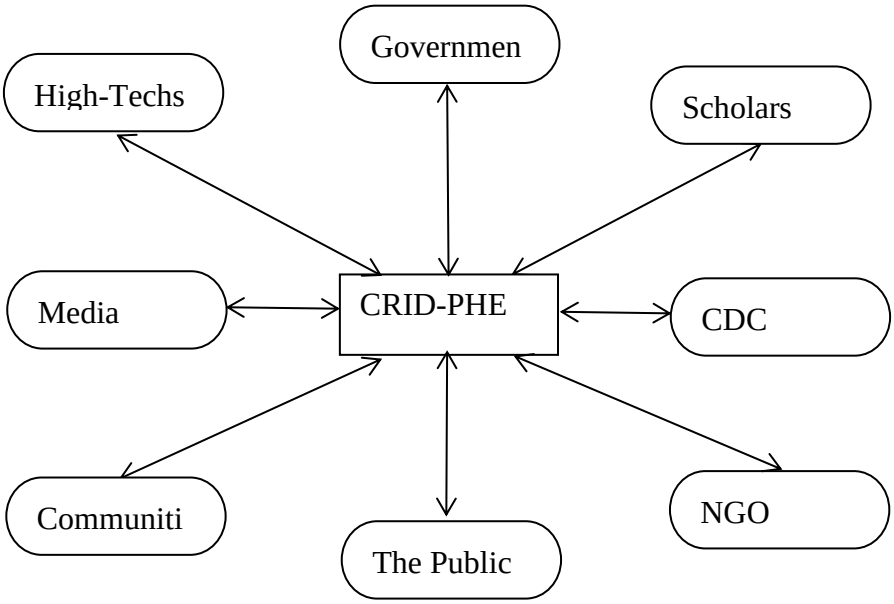

Figure 4.1 Theoretical model of CRID-PHE stakeholders

4.3 The empirical model: initial values of Delphi expert consultation

The theoretical model of CRID-PHE stakeholders is proposed based on the stakeholder theory and the literature review presented in §2.1. In this section, we will establish an empirical model

of CRID-PHE stakeholders by using the Delphi expert consultation method. The process consists of two stages: first, the initial values of Delphi consultation are determined through the literature research method, and then the experts are consulted following the Delphi consultation procedure.

The literature research was conducted on CNKI. CNKI is currently the largest dissertation and journal database in China, and probably the world's largest Chinese dissertation and journal database. Since we are the first to propose and study CRID-PHE, no directly related dissertation or thesis has been found in CNKI. Therefore, considering CRID-PHE falls into the category of public health, we used the combination of "stakeholders + public health" as the keywords in the subject field to search for dissertations and journal Theses in CNKI and found 32 related Theses and 22 postgraduate dissertations, which are listed in Annex A and B.

Among the 32 Theses, 18 are valid literature as they indeed applied the stakeholder theory to a certain field of public health. The literature effective rate is 56%. The other 14 invalid Theses are research in the field of public health but without explicit application of the stakeholder theory. These invalid Theses appeared in our search result on CNKI because they contained the word "stakeholder" somewhere in the Theses.

The stakeholders mentioned in the 18 valid Theses are listed in the first table of Annex C, where the second column indicates the number of literatures mentioning the stakeholder A listed in the first column. The score was calculated according to Formula 4.1, and the highest score was 7.

$$\boldsymbol{score} = \frac{\boldsymbol{the\ number\ of\ literatures\ mentioning\ A\ being\ stakeholder}}{\boldsymbol{the\ total\ number\ of\ literatures}} \quad \text{.....(4.1)}$$

Among the 22 postgraduate dissertations, 17 are valid as they indeed have applied the stakeholder theory in their research, with an effective rate of 77%. Among the five invalid dissertations, two applied the stakeholder theory to pharmaceutical enterprise management and are research in the field of enterprise management, having nothing to do with public health. The remaining three invalid dissertations are not research on stakeholders; they appeared in our search result because the word "stakeholder" was included in these dissertations.

The stakeholders mentioned in the 17 valid dissertations are listed in the second table of Annex C, where the second column indicates the number of dissertations mentioning the stakeholder A listed in the first column. The score was also calculated according to Formula 4.1, and the highest score was 7.

Combining the first two tables of Annex C, we obtained the initial stakeholders determined by using the literature research method, as shown in the third table of Annex C.

Note: However, in the literature search, it was found that many postgraduate dissertations were published in the form of scientific Theses before or after their submission as dissertations. Therefore, in the first two tables of Annex C, when an thesis author and a dissertation author are identical, the scores of their identified stakeholders are considered equally important, and the mean score was taken as the final score.

The stakeholders listed in the third table of Annex C served as initial references for Delphi expert consultation, allowing experts to express their opinions on a common basis.

4.4 The empirical model: the results of Delphi expert consultation

4.4.1 The invited experts

In Delphi expert consultation, there is no fixed requirement on how many experts should be invited. In general, for a medium or large number of questions, inviting around 30 experts may be appropriate (Hasson et al., 2000). Since the number of our questions is relatively small, a total of 10 experts were invited to take part in the Delphi expert consultation to identify and classify the CRID-PHE stakeholders. Information of the 10 invited experts can be found in Annex D.1. Among them, the first eight experts in the list have been long engaged in public health management or scientific research; as to the other two, one is engaged in government science and technology management, and the other in government data statistics.

Prior to the consultation, a letter was sent to each expert introducing the background of the project, the concept of stakeholders, the process of the Delphi method, and the meaning of each column in the expert consultation form (see Annex D.2).

4.4.2 Results of each round of consultation

After three rounds of scoring, the experts' ratings no longer change. Tables 4.1, 4.2, and 4.3 show the scoring results of the first, second, and third round of experts' consultation, respectively. The specific scores of each expert in the three rounds are provided in Annex E.

Note: The mean scores of the previous round serve a reference for experts' rating in the next round.

Table 4.1 Scoring results of the first round of expert consultation

Stakeholder candidates	from Literature Review (identification)	Mean scores by experts in this round (Identification)	Mean scores by experts in this round (stakeholders' salience)		
			Influence	Benefits	Resources
Government	7	7	7	0	5
The public	7	6	0	6	0
Medical or public health institutes	6	5	4	3	4
Enterprises	5	3	0	2	3
Communities	2	4	2	4	0
Social or public welfare organizations	3	4	4	0	0
Scholars	0	3	4	0	0
Media	3	3	3	2	0

Table 4.2. Scoring results of the second round of expert consultation

Stakeholder candidates	Mean scores by experts in the previous round (identification)	Mean scores by experts in the previous round (stakeholders' salience)			Mean scores by experts in this round (identification)	Mean scores by experts in this round (stakeholders' salience)		
		Influence	Benefits	Resources		Influence	Benefits	Resources
Government	7	7	0	5	7	7	2	6
The public	6	0	6	0	7	0	6	0
Public health institutes	5	4	3	5	6	5	2	5
Internet, big data, and other high-tech enterprises	3	0	2	3	5	0	3	4
Communities	3	2	4	0	5	2	5	0
Social or public welfare organizations	4	4	0	0	4	4	0	0
Scholars	3	4	0	0	3	4	0	0
Self-media or new media	3	3	2	0	4	3	2	4

Table 4.3. Scoring results of the third round (the last round) of expert consultation

Stakeholder candidates	Mean scores by experts in the previous round (identification)	Mean scores by experts in the previous round (stakeholders' salience)			Mean scores by experts in this round (identification)	Mean scores by experts in this round (stakeholders' salience)		
		Influence	Benefits	Resources		Influence	Benefits	Resources
Government	7	7	2	6	7	7	2	7
The public	7	0	6	0	7	0	7	0
Centers for Disease Control and Prevention (CDC)	6	5	2	5	7	6	0	5
Internet, big data, and other high-tech enterprises	5	0	3	4	5	0	5	5
Communities	5	2	5	0	6	0	6	0
Social groups or welfare organizations	4	4	0	0	5	5	0	0
Scholars	3	4	0	0	5	5	0	0
Self-media or new media	4	3	2	4	6	3	5	5

4.5 The empirical model of CRID-PHE stakeholders

Based on the results of the last round of Delphi expert consultation, we built the empirical model of CRID-PHE stakeholders, as shown in Figure 4.2. The empirical model presents experts' ratings for each stakeholder, which show their recognition of an individual or organization as a stakeholder of CRID-PHE. The maximum score is 7. In addition, experts' ratings of each stakeholder's influence, benefits, and resources in the establishment and implementation of CRID-PHE are also provided.

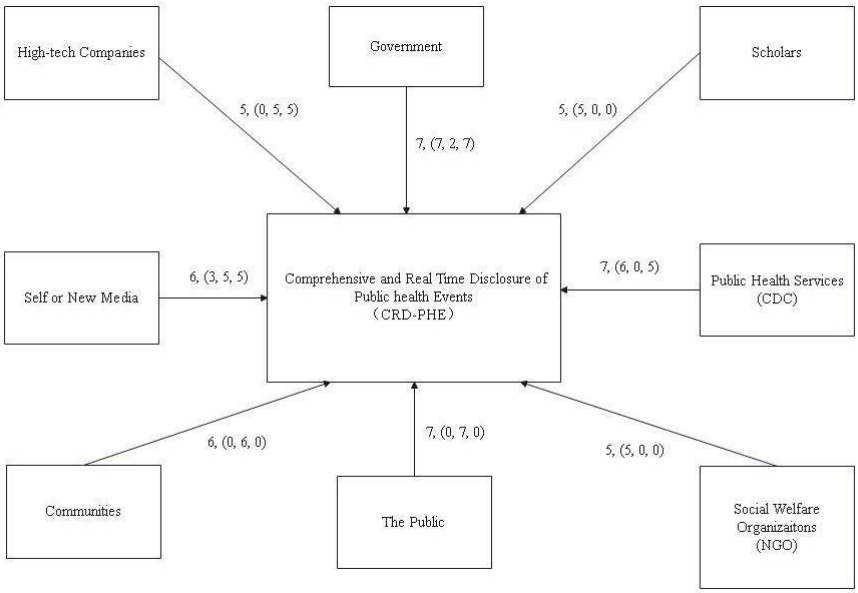

Figure 4.2 The empirical model of CRID-PHE stakeholders

4.6 Discussion on the results of CRID-PHE stakeholder modeling

4.6.1 The relationship between the theoretical and empirical models of CRID-PHE stakeholders

So far, we have obtained two models of CRID-PHE stakeholders: a theoretical model and an empirical model. The theoretical model was derived theoretically by studying the stakeholder theory and related literature while taking into account the specific application scenarios of CRID-PHE. The empirical model was obtained through the Delphi expert consultation method. The differences between these two models are as follows:

(1) In the theoretical model, the literature involved is mainly international literature, namely, the literature reviewed in §2.1 of this thesis, and the application scenarios are mostly business management in other countries. However, in the empirical model, the literature involved is all Chinese literature, and the application scenarios are public health management or governance in China (we suggest CRID-PHE be implemented in China, and therefore, Chinese literature is more likely in line with China's national conditions).

(2) The theoretical model is purely a theoretical demonstration, while the empirical model has a certain empirical basis, which is indirectly from the experience of the Delphi consultation experts, who answered the questions based on their long-term hands-on work experience. Many

of the Chinese literature referred to in the process of determining the initial values of Delphi consultation are also based on the authors' practical work experience.

(3) The empirical model was established completely independent of the theoretical model, and they are based on different literature. After determining the principles and procedures, the empirical model was obtained automatically without my interference. Therefore, the empirical model provides an empirical basis for verifying the theoretical model to a certain extent.

4.6.2 The results of the initial value of Delphi expert consultation

The initial values of Delphi consultation were obtained by collecting and sorting out Chinese postgraduate dissertations and scientific Theses and were not from Delphi consultation experts themselves. During the Delphi expert consultation, these initial values were only used as a reference in the first round, and we repeatedly reminded the experts that the stakeholders of CRID-PHE are not limited to these initial values, and that they can propose other stakeholders. In practice, however, the experts did not propose additional stakeholders; instead, they suggested narrowing or clarifying the concept of some of the stakeholders listed in the initial values. For example, some experts suggested that the "enterprises" in the initial values should be narrowed down to "Internet, big data, and other high-tech enterprises" because other enterprises have little to do with the establishment and implementation of CRID-PHE. For another example, the "media" in the initial values should be limited to "self-media or new media" because in China, traditional media (e.g., newspapers and TV) are generally official media, which mainly communicate government policies rather than drive government decision-making. After narrowing down these concepts, the Delphi consultation answers quickly converged. This empirical model provides a valuable reference for other research topics related to stakeholders in the field of public health.

4.6.3 The results of CRID-PHE empirical model

As mentioned earlier, the CRID-PHE empirical model was obtained through the review of Chinese literature and the consultation of Chinese experts. Therefore, through a discussion of the empirical model, the characteristics of Chinese CRID-PHE stakeholders can be obtained.

A. Discussion on the stakeholders – government, the public, and communities

a) Identification

CRID-PHE is a public health service program. Like other public service programs, one end of the program is the provider of public service – the government, and the other end is the

recipient of public service – the public. Without the government or the public, public service programs would be meaningless. Therefore, in the empirical model, the stakeholder identities of the government and the public were highly recognized (7 points). Communities are the localized public. People living in the same community often share the same concerns about public health. In the empirical model, the stakeholder identity of communities was also recognized (5 points).

b) Salience (influence, benefits, resources)

In the empirical model, the government's influence and resources were highly recognized and received the highest scores (7 and 6 points respectively). This may be because, in China, the government has decision-making power over public service programs and is also the main provider of funds. The government scored lower on benefits, probably because of the not-for-profit nature of public service programs. However, since the implementation of CRID-PHE is conducive to social public health governance, it is favorable to the government's performance appraisal, and thus, the government's score of benefits was not zero (2 points).

Both the public's influence and resources scored zero, indicating that in China, the public has little voice in the decision-making of public service programs and only passively enjoys the public services provided by the government.

B. Discussion on the stakeholders – scholars and social welfare organizations

Here, scholars refer to individuals or institutions engaged in academic research, while social welfare organizations refer to non-profit NGOs, professional or industry associations, and other social welfare organizations.

a) Identification

In China, it has become a common practice that major public service programs must be first demonstrated by scholars. Therefore, scholars' opinions have a greater influence on government decision-making. Sometimes, social welfare organizations may also influence government decision-making due to their public welfare and professional nature. For example, the Red Ribbon (refer to those very influential organizations that care for AIDS patients, and the first ladies of many countries are figure ambassadors for these organizations) has advocated many public health service programs for AIDS patients. CRID-PHE is a major public health service program and is currently in the pre-research stage, which requires the active engagement of scholars and social welfare organizations. Therefore, in the empirical model, the stakeholder identities of scholars and social welfare organizations were recognized to some extent (5 points).

b) Salience (influence, benefits, resources)

The influence scores of scholars and social welfare organizations were both 5 points, while their benefits and resources scores were all zero, indicating that scholars and social welfare organizations have a certain influence on the government's decision-making, but do not benefit from nor possess the resources for the implementation of CRID-PHE.

C. Discussion on the stakeholders – enterprises and media

During the Delphi expert consultation, according to the experts' suggestions, "enterprises" was further limited to "Internet, big data, and other high-tech enterprises", and "media" were limited to Internet-based new media.

a) Identification

In terms of implementation, CRID-PHE is essentially a digital public health service program that relies on high technologies such as the Internet, cloud computing, and big data. Furthermore, the large amount of information that CRID-PHE discloses can hardly be handled by traditional media. At present, new media and self-media have in fact replaced traditional media as the main channel for information dissemination in society. Therefore, besides relying on high-tech companies to collect and manage public health big data, the future implementation of CRID-PHE will also rely on new media and self-media to broadcast information about the ongoing public health events to the public. Therefore, in the empirical model, the stakeholder identities of both high-tech enterprises and new media received high recognition (5 and 6 points respectively).

b) Salience (influence, benefits, resources)

The influence scores of enterprises and media were 0 and 3, respectively, indicating that enterprises have little influence on government decision-making. During Delphi expert consultation, some experts expressed that the media could be divided into official media and self-media. The function of official media is to communicate government decisions instead of influencing government decision-making. Official media can be regarded as a part of the government, while self-media has become a main channel for the government to collect public opinion. Therefore, self-media has a certain influence on the government's decision-making (3 points); however, in China, it is almost impossible to force the government's decision-making through self-media.

The scores of benefits and resources were 5 points for both enterprises and media. That may be because enterprises have the technical resources needed for CRID-PHE implementation, while the media play the role of medium for CRID-PHE broadcasting. In addition, since the developer of CRID-PHE must be an enterprise, and the operator of CRID-PHE may also be an enterprise through service outsourcing, the implementation of CRID-PHE will benefit the

enterprises to a certain extent. Moreover, the implementation of CRID-PHE will definitely bring dynamics to and enrich the public topics in self-media.

D. Discussion on the stakeholders – public health institutes

In the first round of Delphi expert consultation, some experts suggested that, in view of the public health nature of CRID-PHE, the stakeholder "medical or public health institutes" in the empirical model can be limited to public health institutes only. In the second round of consultation, some experts further suggested that, in view of CRID-PHE's public health big data requirements and the current pre-research status, it is better to specify the public health institutes as the Centers for Disease Control and Prevention (CDC), because other public health institutes (e.g., health and pandemic prevention stations) have little role in CRID-PHE's promotion.

a) Identification

The COVID-19 pandemic has highlighted the role of public health institutes (e.g., the U.S. Centers for Disease Control and Prevention, CDC). In China, CDC also function as scientific research institutions providing professional guidance for the social public health governance. Therefore, CDC have a significant influence on the promotion of CRID-PHE. In particular, in China, CDC are responsible for the collection, management, and utilization of public health big data, while CRID-PHE is in essence a project presenting public health big data to the public. In the future, CDC will certainly be the main actor in CRID-PHE's construction and operation, just as the U.S. CDC is responsible for broadcasting the U.S. Morbidity and Mortality Weekly Report (MMWR). During the Delphi expert consultation, the CDC's ratings increased round by round and finally reached the highest score (7 points).

b) Salience (influence, benefits, resources).

The influence score of CDC was 6 points, higher than that of the scholars, which may be because CDC are scientific research institutions specialized on public health. CDC's resources score was 5 points, the same as that of enterprises, which may be because CDC have the public health big data resources, while enterprises have the technical resources. CDC's benefits score was lowest (0 point), which may be because CDC are public welfare institutions that enjoy full financial allocation and cannot benefit from their public services.

4.7 Summary

In this chapter, two CRID-PHE stakeholder models have been established, a theoretical model and an empirical model. The theoretical model was established through theoretical

demonstration based on the stakeholder literature, while taking into account the specific meaning of CRID-PHE. Since the main theories of stakeholders were proposed by international scholars, and the related literature we reviewed is mostly in English, the theoretical model established in this chapter is mainly based on the theories and practices of international scholars.

Since the empirical model was established based on Chinese scientific literature and the experience of Chinese scholars, it is more suitable for China's national conditions. In particular, in order to ensure the objectivity and substantiality of the model, we did not interfere in the modeling process except setting rules. The model was built automatically based on the knowledge provided by the Chinese literature and the Chinese experts' independent judgment according to the pre-set rules. The rules we set are as follows:

a) Rules for Chinese literature: Use "stakeholder" & "public health" as the keywords to search Chinese scientific Theses and graduate dissertations on CNKI, and the stakeholders mentioned in these studies are considered as stakeholder candidates for the empirical model;

b) Rules for Chinese experts: Based on the stakeholder candidates, Chinese experts determine the stakeholders of the empirical model following the Delphi expert consultation process.

Chapter 5: Argumentation of CRID-PHE Based on SEM and Likert Scale

5.1 Research purposes

CRID-PHE is essentially a public health policy initiative, therefore, the argumentation for CRID-PHE falls within the category of policy argumentation. At present, policy argumentation is mainly in the form of theoretical argumentation, with very little empirical argumentation. The research purposes of this chapter are mainly twofold:

(1) Propose a framework for policy argumentation based on SEM and Likert scale, explain how to set the latent variables and measurable variables of SEM in policy argumentation, and how to use Likert scale as a SEM measurement tool to consult experts or the public for policy argumentation. This framework must have a certain degree of universality.

(2) Use the policy argumentation framework proposed in this chapter to demonstrate CRID-PHE proposed in this thesis.

5.2 A framework for policy argumentation based on SEM and Likert scale

In general, policy arguments should include (but are not limited to) the following:

(1) Rationality: the rationality of the policy content;

(2) Necessity: why such policies should be formulated;

(3) Feasibility: whether there are conditions to implement such a policy;

(4) Effectiveness: what are the effects of implementing such policies;

(5) Opinions from experts or the public on policy arguments.

In this thesis, we will propose a general framework for policy argumentation based on SEM and Likert scales that involve the aspects mentioned above. SEM and Likert scales have already been introduced in Chapter 3. In the following, we will explain how this framework is constructed (see Figure 5.1):

(1) The above-mentioned aspects of policy arguments (rationality, necessity, feasibility, and effectiveness) are set as latent variables of SEM;

(2) As the various aspects of policy arguments have been set as latent variables, the arguments supporting these aspects are set as measurement variables associated with the corresponding latent variables;

(3) The Likert scale is used as the measurement tool for SEM, and the measurement variables of SEM are set as the items of the Likert scale. In particular, the measurement variables associated with the same latent variable are set as items for the same dimension in the Likert scale. Then, the Likert scale was used to collect opinions from experts or the public on the policy arguments.

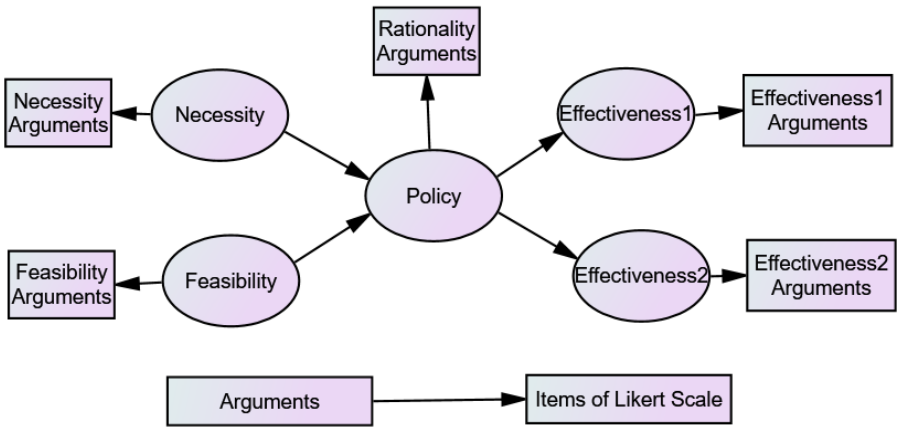

Figure 5.1 General framework for policy argumentation based on SEM and Likert scale

Figure 5.1 presents the SEM model of policy argumentation drawn using AMOS. Following the conventions of SEM, ellipses represent latent variables, and rectangles represent measurement variables. From the relationship between the latent variables in this graph, we can see that the necessity and feasibility of the policy drive policy approval, and thus, they are considered as exogenous latent variables in the SEM model. The policy itself is set as an endogenous latent variable that relies on the two exogenous latent variables – policy necessity and feasibility, which reflects that policy approval is forced by the situation and is necessary. In addition, the implementation of policies will definitely have some positive effects (i.e., policy effectiveness), and therefore, the effectiveness of policies is set as an endogenous latent variable that relies on the latent variable “policy”. The positive impact of policy implementation may be multifaceted. For example, since CRID-PHE is a public health policy, its implementation will definitely have a positive impact on public health, but it can also have spillover effects on other aspects, such as government information disclosure. Therefore, in Figure 5.1, multiple latent variables were set for policy effectiveness.

Further, we used the Likert scale as a measurement tool for the SEM model of policy argumentation. The measurement variables of SEM were directly set as the items of the Likert scale. The Likert scale was used to collect the opinions of scholars or the public towards the policy arguments. This approach has the following advantages:

(1) By conducting exploratory factor analysis on the data collected from the Likert scale, we can determine whether the dimension design of the Likert scale is reasonable so as to further determine whether the measurement variables in the SEM model are reasonable and can support the corresponding argumentation needs.

(2) By conducting SEM model path analysis on the data collected from the Likert scale, we can determine the impact of different aspects of policy argumentation on policy approval and further strengthen the weaker aspects.

(3) Through the items of the Likert scale, some numerical arguments can be transformed into judgment questions. For example, when arguing the necessity of CRID-PHE, there is an argument: “In China, over 40 million people are bitten by pets every year, ranking second in the world. Among them, 10 million require immediate treatment for rabies.” When converted into a Likert scale item, this argument may become: “These data are shocking and should be promptly communicated to the public, so that both pet owners and non-pet owners can remain aware of that.” The interviewees can express their opinions by making a choice among “strongly agree”, “agree”, “do not know”, “disagree”, and “strongly disagree”.

5.3 SEM modeling of CRID-PHE

We will use our proposed framework for policy argumentation to demonstrate CRID-PHE. Based on this framework, we will first establish an SEM model for CRID PHE argumentation. SEM consists of two models: structural model and measurement model. The structural model establishes the relationship between latent variables, while the measurement model establishes the relationship between latent variables and their corresponding measurement variables. In this section, the structural model of CRID-PHE is first established, then the measurement model is established, and finally the two models are combined to form the SEM model.

5.3.1 The SEM structural model of CRID-PHE

In the SEM structural model, we set CRID-PHE itself (the rationality), the necessity and feasibility of promoting CRID-PHE implementation, and the positive effects of CRID-PHE implementation on public health governance (the effectiveness) as latent variables. The

relationships between them are shown in Figure 5.2, where the ellipses represent the latent variables. From the relationship between the latent variables, it can be seen that:

(1) The necessity and feasibility of CRID-PHE drive the establishment and implementation of CRID-PHE, or in other words, the latent variable of "CRID-PHE implementation" relies on the latent variables of necessity and feasibility;

(2) CRID-PHE is an important basic public health service that involves a wide range of aspects. Its implementation will certainly have positive impact on public health governance and even other aspects of society. These potential impacts are also factors driving the establishment and implementation of CRID-PHE. We categorize them as latent variables of public health awareness, public health big data, public health crisis early warning, and government information disclosure, which depend on the latent variable of "CRID-PHE implementation".

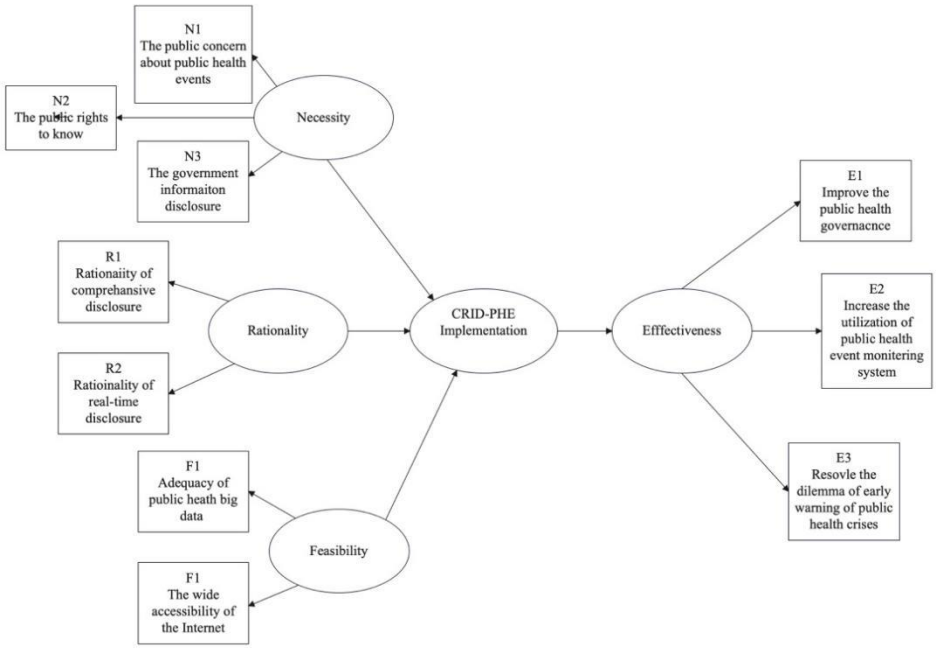

Figure 5.2 The SEM model of CRID-PHE

5.3.2 The SEM measurement model of CRID-PHE

The SEM structural model (composed of ellipses) in Figure 5.2 shows that we plan to demonstrate CRID-PHE from the aspects of necessity, feasibility, rationality, and effectiveness. However, these aspects are conceptual (therefore set as latent variables) and need to be substantiated through arguments. To determine whether these arguments are valid or not, it requires argumentation, which constitutes the main content of the CRIS-PHE theoretical argumentation.

The SEM structural model presents the relationships between the latent variables and their measured variables, as shown by lines between ellipses and rectangles in Figure 5.2.

5.3.2.1 Arguments in support of CRID-PHE necessity

Latent variable: Necessity of CRID-PHE

The necessity argumentation is to demonstrate the external driving factors of CRID-PHE implementation. Naturally, argumentation requires arguments and evidence as support. Therefore, in our proposed argumentation framework, the rationality of CRID-PHE is set as a latent variable of SEM, more specifically, an exogenous latent variable, while the arguments are set as measurement variables associated with the latent variable. The arguments on the necessity of CRID-PHE are presented (but are not limited to) the following.

[Argument of Necessity 1 (N1)]

At present, when it comes to public health events, they usually refer to major public health emergencies. However, in real life, many other types of public health events occur every day. These events may not trigger a public health crisis in society, but their harm may be serious or even fatal for some public groups. The implementation of CRID-PHE can enable the public to obtain the information of these events in a timely manner.

[Argument of Necessity 2 (N2)]

According to statistics, the prevalence of AIDS in some countries is as high as 30% of the total population. If you travel to these countries or regions for business or tourism, it means that one in three people you meet may be an AIDS patient. Before you leave for these countries, you may want to know about the current local AIDS transmission status. The spread of AIDS is a public health event. The implementation of CRID-PHE can allow you to check the current AIDS spread status in the region just as you can check the local weather forecast.

[Argument of Necessity 3 (N3)]

In China, AIDS has replaced tuberculosis and rabies as the main cause of death among adolescents aged 14-22 (Y. Dong et al., 2020). As a parent of a child in this age group, you may be worried about the AIDS spread status in your child's school district. The implementation of CRID-PHE will enable the parents to inquire about the spread of AIDS in their children's learning and living environment at any time.

[Argument of Necessity 4 (N4)]

In China, over 40 million people are bitten by pets every year, ranking second in the world. Among them, 10 million require immediate treatment for rabies, and the mortality rate of rabies is almost 100%. Nowadays, keeping pets is popular, and you can find people walking their dogs

everywhere on the streets. The implementation of CRID-PHE will allow people to check the status of rabies in their community or city at any time.

[Argument of Necessity 5 (N5)]

The flu season occurs every year. However, not many people are aware of the high mortality rate of flu. In the United States, 25,000 to 69,000 people die from flu each year, and even former U.S. President Trump expressed that he was shocked when hearing this number. The implementation of CRID-PHE can enable people to know the incidence rate, severity rate, and mortality of flu in real time.

[Argument of Necessity 6 (N6)]

Due to the impact of public health events on the physical and mental health of the public, according to the principle of the right to information, the public has the right to know the truth about these events, and the government has the obligation to inform (UNESCO, 2020). In real life, because of being uninformed, the public is often exposed to public health risks and may even get contracted as a result. The implementation of CRID-PHE can make the public's right to information be realized and protected in practice.

[Argument of Necessity 7 (N7)]

Currently, in China, public health event information is monitored and managed by the government. The government generally does not disclose information about public health events to the public in real time unless certain events deteriorate rapidly and evolve into major public health emergencies. According to the theory of government information disclosure (Emerson, 1976) and the *Regulations on Government Information Disclosure of the People's Republic of China*, the principle of "government information disclosure is the norm, and non-disclosure is the exception" was established. Obviously, all information on public health events should be disclosed to the public comprehensively and in real-time, as long as it does not threat personal privacy or national security.

5.3.2.2 Arguments in support of CRID-PHE feasibility

Latent variable: Feasibility of CRID-PHE

The feasibility argumentation aims to demonstrate that the external conditions for implementing CRID-PHE are already in place. Therefore, the feasibility of CRID-PHE is taken as an exogenous latent variable of SEM, while the arguments supporting CRID-PHE feasibility are set as measurement variables associated with this latent variable. The arguments on the feasibility of CRID-PHE are presented (but not limited to) as follows.

[Argument of Feasibility 1 (F1)]

Since the SARS outbreak in 2003, China has built multiple comprehensive real-time monitoring systems for public health events, such as the “Network Direct Reporting System”, and achieved comprehensive and real-time monitoring of public health events. That means, the public health big data resources required for the implementation of CRID-PHE are already available.

[Argument of Feasibility 2 (F1)]

Traditional media (e.g., television, radio, and newspapers) not able to handle real-time disclosure of massive amounts of information. However, the development of Internet portal technology has made real-time disclosure of massive information possible, and currently, the government is disclosing massive government information to the public in real time through Internet portal websites. Therefore, the communication media required for the implementation of CRID-PHE are already available.

[Argument of Feasibility 3 (F3)]

At present, in China, the construction of the Internet and mobile Internet has made the network accessible throughout the entire country, with no region left out. The widely application of computers and mobile phones has made network terminal devices cover all places. Therefore, the communication technology required for the implementation of CRID-PHE is already in place.

[Argument of Feasibility 4 (F4)]

During the COVID-19 pandemic, Johns Hopkins University (JHU) disclosed global information about the COVID-19 pandemic (e.g., new cases, severe cases, and deaths) twice a day on its relevant portal website. At the peak of the pandemic, 4 billion people visited the JHU website every day. The public has developed a habit of checking daily update about public health events every day. Therefore, the public education required for the implementation of CRID-PHE is already in place.

5.3.2.3 Arguments in support of CRID-PHE rationality

Latent variable: Rationality of CRID-PHE

The argumentation for rationality is to demonstrate the rationality of CRID-PHE in terms of its content, which refers the comprehensive and real-time disclosure of public health event information. Therefore, the argumentation for rationality is to explain why comprehensive and real-time information disclosure is necessary. In our proposed argumentation framework, the rationality of CRID-PHE is set as an endogenous latent variable of SEM that depends on the latent variables of necessity and feasibility of CRID-PHE. The necessity and feasibility of

CRID-PHE are both exogenous latent variables, and their driving effect on CRID-PHE is imperative under the circumstances. The arguments for the rationality of CRID-PHE are set as measurement variables associated with this latent variable. The arguments are presented (but not limited to) as follows.

[Argument of Rationality 1 (R1)]

Information about public health events needs to be comprehensively disclosed. The public is composed of different groups, and each group has different public health concerns. Only by fully disclosing information on public health events can we satisfy the needs of different groups regarding public health concerns to the maximum extent.

[Argument of Rationality 2 (R2)]

Information about public health events should be fully disclosed. What to be disclosed and what not to be disclosed should not be decided by only a few people. That is because the right to public health should be in the public's control, and others should not take over.

[Argument of Rationality 3 (R3)]

The relationship between the public and the government is essentially a relationship between principals and agents. The government is entrusted by the public to manage public affairs, which is essentially the same as property management companies being entrusted by property owners to manage residential areas. According to the signal theory, if an agent takes advantage of the principal's commission to collect information without truthfully informing the principal, it can lead to moral hazard. In fact, according to a report by The New York Times, then U.S. President Trump deliberately concealed the severity of COVID-19 due to the election.

[Argument of Rationality 4 (R4)]

Public health event information should be disclosed in real time to enable the affected public to take timely preventive measures and avoid contracting diseases due to lack of knowledge.

[Argument of Rationality 5 (R5)]

At present, some public health authorities regularly release data of some public health event, such as the United States CDC's MMWR (Morbidity and Mortality Weekly Report). However, these data are statistics of public health events that have occurred over a period of time, rather than real-time data on ongoing public health events. These statistical data from past periods of time may be helpful for academic research or government decision-making, but they rarely attract public attention as the public is more concerned about the current public health risks. Therefore, timely information disclosure of public health event should be distinguished from statistics of events over a period of time.

[Argument of Rationality 6 (R6)]

Real-time disclosure is different from real-time notification. Disclosure refers to the government's disclosure to the external, while notification refers to the government's internal notification. The "Network Direct Reporting System for Infectious Diseases" that China has built since SARS in 2003 is an information notification system, instead of an information disclosure system. At present, China does not have a system for real-time information disclosure of public health event.

5.3.2.4 Arguments in support of CRID-PHE effectiveness – public health awareness

Latent variable: Effectiveness of CRID-PHE – public health awareness

The effectiveness argumentation of CRID-PHE is to demonstrate what is the positive impact if CRID-PHE is implemented. The positive impact may be multifaceted. The "effectiveness of CRID-PHE – public health awareness" is mainly to demonstrate what positive effects CRID-PHE will have in the field of public health once it is implemented. Therefore, "effectiveness of CRID-PHE – public health awareness" is set as an endogenous latent variable of SEM that depends on the implementation of CRID-PHE, that is, on the latent variable of CRID-PHE rationality. The arguments supporting "effectiveness of CRID-PHE – public health awareness" are thus set as the measurement variables associated with this latent variable. The arguments of "effectiveness of CRID-PHE – public health awareness" include but are not limited to the following.

[Argument of Effectiveness – public health awareness 1 (E11)]

The implementation of CRID-PHE enables the daily disclosure of the latest public health event information to the public, which will provide continuous public health topics for the public's daily social interaction, making people always aware of the ongoing public health events, thus raising or improving the public's public health awareness.

[Argument of Effectiveness – public health awareness 2 (E12)]

During COVID-19, the government stressed that the public is the main responsible for their health. However, the premise of that is that the public should know about the health risks they are facing. The implementation of CRID-PHE enables the public to know the ongoing public health events around them, so that they can take timely preventive measures according to their actual conditions and the public health events that put them in risk.

[Argument of Effectiveness – public health awareness 3 (E13)]

At present, the government will not disclose public health events to the public in real time except for major public emergencies. However, after all, there are very few major public

emergencies. Therefore, since the public usually does not hear anything, when it comes to public health, people may think it is just about something like not to spit. The implementation of CRID-PHE can make the public aware that public health events of one kind or another are occurring all the time around us. Although they do not pose a major threat to the whole society, not everyone can get away from it. One will always encounter a public health event that poses a health threat to oneself or one's family. Therefore, it is necessary to maintain the public's long-term awareness of public health.

5.3.2.5 Arguments in support of CRID-PHE effectiveness – public health big data utilization

Latent variable: Effectiveness of CRID-PHE – public health big data utilization

Argumentation for "effectiveness of CRID-PHE – public health big data utilization" is mainly to demonstrate what is the positive impact of CRID-PHE implementation on public health big data utilization. Therefore, "effectiveness of CRID-PHE – public health big data utilization" is set as an endogenous latent variable of SEM that depends on CRID-PHE implementation, that is, the latent variable of rationality of CRID-PHE. The arguments supporting "effectiveness of CRID-PHE – public health big data utilization" are set as measurement variables associated with this latent variable. The arguments of "effectiveness of CRID-PHE – public health big data utilization" include but are not limited to the following.

[Argument of Effectiveness – public health big data utilization 1 (E21)]

At present, in order to ensure safety, the monitoring system for major public health emergencies is essentially a comprehensive real-time monitoring system for public health events. However, in practice, very few public health events may evolve into major public health emergencies. Therefore, most of the public health event data generated by these systems are either filtered out immediately or deposited in the data center without further utilization. Some leaders of China's CDC once said, "The CDC of China receives more than 6 million reported cases nationwide annually, and the number is increasing every year." However, these data "have not been utilized to transform into a platform that can directly provide information services to the people". We should "provide targeted public health information services for the people, and such services must be dynamic, not static". The implementation of CRID-PHE can directly transform the data collected by the monitoring systems into a "dynamic information service platform" for the public.

[Argument of Effectiveness – public health big data utilization 2 (E22)]

The collection and storage of public health big data will consume a lot of human and financial resources. If such data is not utilized, it will become a burden, and the losses will outweigh the gains. During COVID-19, JHU released the latest updates of the pandemic twice a day, making it popular for a while. However, JUH is a university and does not monitor public health events. The data released by JUH are all public data from the government. It shows that as long as the government releases public health big data, it will inevitably attract many non-governmental organizations (for-profit or non-profit) to participate in the data's utilization. The implementation of CRID-PHE is essentially to release the public health big data owned by the government to the public.

5.3.2.6 Arguments in support of CRID-PHE effectiveness – public health crisis early warning

Latent variable: Effectiveness of CRID-PHE – public health crisis early warning

Since all public health crises are triggered by major public health emergencies, public health crisis early warning is essentially the information disclosure of major public health emergencies. Since CRID-PHE refers to the information disclosure of public health events, which include major public health emergencies, the implementation of CRID-PHE will certainly impact the information disclosure of major public health emergencies and thus, on public health crisis early warning. Argumentation for the "effectiveness of CRID-PHE – public health crisis early warning" mainly demonstrates the impact of CRID-PHE implementation on public health crisis early warning. Therefore, "effectiveness of CRID-PHE – public health crisis early warning" is set as an endogenous latent variable of SEM that depends on the implementation of CRID-PHE, that is, on the latent variable of CRID-PHE rationality. The arguments supporting the "effectiveness of CRID-PHE – public health crisis early warning" are set as measurement variables associated with this latent variable. The arguments of the "effectiveness of CRID-PHE – public health crisis early warning" include but are not limited to the following.

[Argument of Effectiveness – public health crisis early warning 1 (E31)]

Public health crises are often triggered by major public health emergencies. However, major public health emergencies do not break out overnight. They often start with some ordinary public health events. For example, the outbreak of COVID-19 began with a number of pneumonia cases of unknown causes. If CRID-PHE is implemented, the occurrence and evolution of any public health event will be within the public's knowledge. If any public health event deteriorates rapidly, the public is prepared psychologically for the upcoming public health

crisis, which can greatly mitigate the psychological impact of public health crisis early warning on the public.

[Argument of Effectiveness – public health crisis early warning 2 (E32)]

Due to information asymmetry, the government and the public have quite different views of major public health emergencies. For the public, due to their lack of knowledge, a major public health emergency is an event that is suddenly informed to them, and upon being informed, the event has already deteriorated seriously. The implementation of CRID-PHE can reduce the information asymmetry between the government and the public-on-public health events and thus change the public's understanding of major public health emergencies.

[Argument of Effectiveness – public health crisis early warning 3 (E33)]

During COVID-19, the government released the latest updates of the pandemic on a daily basis. There were several major fluctuations, such as the emergence of Delta and Omicron variant strain, and each fluctuation can be regarded as a major public health emergency that occurred between the relatively stable periods. However, as updates of the pandemic were disclosed to the public every day, the information of these major public health emergencies caused by major fluctuations was already being released during the evolution of such events and thus, it was no longer necessary to issue crisis warning on these emergencies. This shows that the implementation of CRID-PHE can greatly affect public health early warning.

5.3.2.7 Arguments in support of CRID-PHE effectiveness – government information disclosure

Latent variable: Effectiveness of CRID-PHE – government information disclosure

Since the information of public health events is held by the government, the information disclosure of public health events is part of government information disclosure. The "effectiveness of CRID-PHE – government information disclosure" mainly demonstrates the impact of CRID-PHE implementation on government information disclosure. Therefore, the "effectiveness of CRID-PHE – government information disclosure" is set as an endogenous latent variable of SEM that depends on the implementation of CRID-PHE, more specifically, the latent variable CRID-PHE rationality. The arguments supporting the "effectiveness of CRID-PHE – government information disclosure" are set as measurement variables associated with this latent variable. The arguments include but are not limited to the following.

[Argument of Effectiveness – government information disclosure 1 (E41)]

At present, the government is responsible for monitoring, collecting, and managing public health event information. Therefore, public health event information disclosure is a type of

government information disclosure. Historically, SARS in 2003 has greatly driven the reform of government information disclosure. Since COVID-19 is much larger than SARS in 2003 in terms of scale and duration, summarizing the gains and losses related to government information disclosure during COVID-19 will certainly drive the improvement of government information disclosure to a great extent.

[Argument of Effectiveness – government information disclosure 2 (E42)]

The information disclosed by the government falls into two categories. One is the real information of objective events, such as information of public health events. It reflects the real situation of the environment surrounding the public. The other is the information generated through government affairs activities by the government in performing its duties (e.g., the adjustment or implementation of policies), which is called government affairs information. In the practice of government information disclosure, it is necessary to distinguish these two types of information and adopt different information disclosure strategies accordingly.

[Argument of Effectiveness – government information disclosure 3 (E43)]

The disclosed information from the national economic operation data is also the information of objective events. According to the Statistics Law, the national economic operation data should be disclosed on schedule, regardless of any change in national economic policies or decline of the national economy. Public health events, like the national economic operation data, are information of objective events. The practice of regular disclosure of national economic operation data can be taken as a reference for information disclosure of public health events. Through the legislation of the Standing Committee of the National People's Congress, the information can be comprehensively and timely disclosed to the public under the condition of not violating national security or personal privacy.

5.3.3 The SEM model of CRID-PHE

The SEM model for CRID-PHE demonstration is formed by integrating the structural model and the measurement model, as shown in Figure 5.2. In this model, the necessity, rationality, and feasibility are exogenous latent variables, while CRIID-PHE implementation and effectiveness are endogenous latent variables. CRIID-PHE implementation relies on its necessity, rationality, and feasibility, indicating that these three can foster the establishment and implementation of CRID-PHE. The effectiveness depends on CRID-PHE implementation, indicating the implementation of CRID-PHE can bring positive effects. The viewpoints expressed by the measurement variables are the arguments demonstrated in §5.3.2. Therefore,

this SEM model includes all the elements of CRID-PHE's theoretical demonstration and the relations between them.

5.4 Likert scale design based on CRID-PHE SEM model

In our proposed policy argumentation framework, Likert scale is used as a measurement tool for SEM model, and the measurement variables are turned into items of the scale. The respondents' ratings on the items ("strongly agree" = 5 points, "agree" = 4 points, "do not know" = 3 points, "disagree" = 2 points, "strongly disagree" = 1 point) are taken as the SEM measurement data. In the following subsections, we will present the items for the measurement variables associated with the latent variables, including necessity, rationality, feasibility, and effectiveness. In particular, to facilitate the respondents' understanding and ensure the validity of the collected data, a background introduction is provided for each dimension of the Likert scale.

5.4.1 Items for CRID-PHE necessity

Background:

Many public health events are ordinary events, with self-limited or controllable hazards. However, after all, they are public health events, which impose risks to the public and sometime may even be fatal to some groups. At present, except for public health crises triggered by major public health emergencies, most of these ongoing public health events are not informed to the public.

Item 1:

At present, most of the ongoing ordinary public health events are unknown to the public. Since they are public health events, they have a certain impact on public health. It is necessary to keep the public informed of these ongoing public health events in real time.

Answers (single choice)：

"Strongly agree" (5 points), "agree" (4 points), "do not know" (3 points), "disagree" (2 points), "strongly disagree" (1 point)

Item 2:

There are too many ongoing ordinary public health events. Since their hazard is self-limited and controllable, there is no need to notify the public in real time, otherwise it will cause information overload and disturb the regular governance of public health in society.

Answers (single choice):

"Strongly agree" (5 points), "agree" (4 points), "do not know" (3 points), "disagree" (2 points), "strongly disagree" (1 point)

Item 3:

The public has the legal right to know about the public health events that may affect their health. Regardless of the scale, all events should be informed to the public comprehensively, not selectively, and in real time, not afterwards.

Answers (single choice):

"Strongly agree" (5 points), "agree" (4 points), "do not know" (3 points), "disagree" (2 points), "strongly disagree" (1 point)

Item 4:

The government is entrusted by the public to manage public affairs, and thus, the relationship between the government and the public is similar to that between property companies and property owners. Therefore, the data collected by the government during the governance process should be owned by the public, and it's the government's duty to keep the public informed of the data collected.

Answers (single choice):

"Strongly agree" (5 points), "agree" (4 points), "do not know" (3 points), "disagree" (2 points), "strongly disagree" (1 point)

Item 5:

In China, AIDS is the leading cause of death among adolescents aged 14-21, and the number of adolescents with AIDS is rapidly increasing. Parents of adolescents of this age group hope to be always informed of the updated AIDS situation in their community to city.

Answers (single choice):

"Strongly agree" (5 points), "agree" (4 points), "do not know" (3 points), "disagree" (2 points), "strongly disagree" (1 point)

Item 6:

The mortality rate of rabies is 100%, and it only takes 6-10 days from the onset of rabies to death. In China, 40 million people are bitten by dogs every year, and 10 million of them need emergency treatment to prevent rabies. Nowadays, since keeping pets is increasingly popular, it is necessary to report the prevalence of rabies in the city or community on a regular basis, so that both dog owners and non-dog owners will always be aware.

Answers (single choice):

"Strongly agree" (5 points), "agree" (4 points), "do not know" (3 points), "disagree" (2 points), "strongly disagree" (1 point)

Item 7:

The flu season occurs every year. During the flu season, information such as the daily number of new cases, the severity rate, the death rate, the affected population, and the geographic distribution should be notified to the public to help them survive the flu season.

Answers (single choice)：

"Strongly agree" (5 points), "agree" (4 points), "do not know" (3 points), "disagree" (2 points), "strongly disagree" (1 point)

5.4.2 Items for CRID-PHE rationality

Background:

Some governments are disclosing statistics of public health events that occurred over a period of time, such as the Morbidity and Mortality Weekly Report (MMWR) issued by U.S. CDC. However, these data are statistics over a past period of time, not in real time. At present, only the data of those major public health emergencies that trigger public health crises are disclosed by the government in real time, and they are disclosed only during the crisis.

Item 1:

Different groups or individuals have different public health concerns, and the public health concerns of the same group or individuals are evolving over time. Therefore, to address the different health concerns of the public as much as possible, the only way may be to disclose information of all public health events, leaving the public to choose what to learn about according to their concerns.

Answers (single choice)：

"Strongly agree" (5 points), "agree" (4 points), "do not know" (3 points), "disagree" (2 points), "strongly disagree" (1 point)

Item 2:

The disclosure of public health events in not only for academic research purpose or to prove the correctness of government's decision-making. More importantly, it is to prevent the public from getting infected due to unawareness. Therefore, the disclosure of public health events should be in real time. Only in this way would it be possible for the public to be the main responsible for their health.

Answers (single choice)：

"Strongly agree" (5 points), "agree" (4 points), "do not know" (3 points), "disagree" (2 points), "strongly disagree" (1 point)

5.4.3 Items for CRID-PHE feasibility

Background:

The comprehensive and real-time disclosure of public health events was unimaginable in the past. However, in the era of big data and the Internet, the implementation of CRID-PHE has become feasible from the point of view of data resources, software and hardware infrastructure, and technology level.

Item 1:

The great advancement of technologies such as the Internet, mobile internet, internet of things, big data, and cloud computing make it possible to monitor public health events comprehensively and in real-time.

Answers (single choice)：

"Strongly agree" (5 points), "agree" (4 points), "do not know" (3 points), "disagree" (2 points), "strongly disagree" (1 point)

Item 2:

During the COVID-19 pandemic, public health big data played an important role in pandemic statistics releasing, close contacts tracing, health code verification, nucleic acid testing, and vaccination, among others. Almost every individual of the public has personally witnessed the power of public health big data unprecedentedly, which increased public expectation for more applications of public health big data after COVID-19.

Answers (single choice)：

"Strongly agree" (5 points), "agree" (4 points), "do not know" (3 points), "disagree" (2 points), "strongly disagree" (1 point)

Item 3:

During the COVID-19 pandemic, Johns Hopkins University (JHU) in the United States updated the latest statistics of the global COVID-19 pandemic twice a day on its website. The mainstream media around the world (including CCTV in China) referred to JHU's statistics in their daily news broadcast, which greatly increased public interest and concern for public health.

Answers (single choice)：

"Strongly agree" (5 points), "agree" (4 points), "do not know" (3 points), "disagree" (2 points), "strongly disagree" (1 point)

Item 4:

During the COVID-19 pandemic, the comprehensive and timely disclosure of pandemic information helped the public know about the current status and evolving trend of the pandemic and even led the public to take self-protection measures.

Answers (single choice)：

“Strongly agree” (5 points), “agree” (4 points), “do not know” (3 points), “disagree” (2 points), “strongly disagree” (1 point)

5.4.4 Items for CRID-PHE effectiveness

Background:

Once CRBPDS-PHE is implemented, it will definitely be considered as a major initiative in the field of public health. In addition to addressing the public’s concerns about ongoing public health events, it will certainly have a positive impact on public health governance.

Item 1:

The implementation of CRID-PHE can make the public be aware of the ongoing public health events around them every day and will continuously provide public health topics for the public’s daily social interaction, which will greatly increase public health awareness.

Answers (single choice)：

“Strongly agree” (5 points), “agree” (4 points), “do not know” (3 points), “disagree” (2 points), “strongly disagree” (1 point)

Item 2:

After SARS, to monitor major public health emergencies, many countries have established comprehensive and real-time monitoring systems for public health events. However, major public health emergencies are rare. The big amount of public health event data captured by these systems are either filtered or stored in databases without utilization. The implementation of CRID-PHE will greatly improve the utilization of these systems, enabling customized public health event inquiry services to be provided for the public.

Answers (single choice)：

“Strongly agree” (5 points), “agree” (4 points), “do not know” (3 points), “disagree” (2 points), “strongly disagree” (1 point)

Item 3:

With the implementation of CRID-PHE, all public health events will be disclosed to the public immediately after they occur. Even if some public health events deteriorate rapidly in a

short period of time, the whole evolution process is of the public's knowledge. This would significantly mitigate the psychological impact of a public health crisis on the public and make information concealment or delay of information disclosure impossible.

Answers (single choice)：

"Strongly agree" (5 points), "agree" (4 points), "do not know" (3 points), "disagree" (2 points), "strongly disagree" (1 point)

Item 4

The implementation of CDR-PHE will transform the environment of public health governance from the information advantage of the government to the information sharing between the government and the public, which will inevitably challenge the current governance mode and drive the reform of government governance.

Answers (single choice)：

"Strongly agree" (5 points), "agree" (4 points), "do not know" (3 points), "disagree" (2 points), "strongly disagree" (1 point)

5.5 CRID-PHE SEM measurement data collected by Likert scale

5.5.1 Introduction of the questionnaire survey platform "WenJuanXing"

We used WenJuanXing (literally, "Questionnaire Star" in Chinese) (wjx.cn) for questionnaire design, distribution, collection, and statistical analysis. WenJuanXing is currently the most widely used online questionnaire survey platform in China. It has been used by 90% of Chinese universities and more than 30,000 companies for online survey. On average, its active respondents have exceeded 10 million per day, including civil servants, students, customer service, office workers, manufacturing workers, IT personnel, car owners, gamers, SNS (Social Network Service) users, house-wives, tourists, online shopping customers, and other groups. Users can easily distribute their survey questionnaires through WenJuanXing.

In addition, there are 2.6 million registered respondents on WenJuanXing with great representativeness of the population. Customers can sign service contracts with WenJuanXing to distribute their questionnaires to the target registered respondents.

There is a fee for distributing survey questionnaires through WenJuanXing, and the amount depends on factors such as random or targeted distribution and the number of questionnaires. When distributing questionnaires through WenJuanXing, for each questionnaire, the platform will assign a dedicated service consultant to communicate with the customer to ensure that the

questionnaire design is in compliance with the relevant norms and regulations and to ensure the recovery rate of valid questionnaires.

5.3.2 Results of questionnaire survey through WenJuanXing

We designed the survey questionnaire of CRID-PHE by using the scale template provided by WenJuanXing. Except for the first question (about demographic information) and the last question (an open question), all the others are Likert scale items, as presented in §5.4. After communicating with the service consultant from WenJuanXing, we made some modifications to comply with the forms of the platform.

In the service contract we signed with WenJuanXing, we chose random distribution for our questionnaires. According to the guideline in the literatures, the number of valid questionnaires should be no less than 20 times of the number of items. Our questionnaire has 13 Likert scale items in total, and therefore, we required WenJuanXing to return no less than 200 valid questionnaires. Upon completion of the contract, WenJuanXing returned a total of 216 valid questionnaires. The basic information of the 216 respondents is summarized in Appendix G, including the submitting date and time, the time spent to answer the questionnaire, the IP address, and the occupation.

See Annex F for the questionnaire data returned by WenJuanXing and the obtained statistical results by suing the tools provided by the platform.

Note: Typically, each Likert scale item is a short declarative sentence. However, in this thesis, the SEM model is a policy argumentation model, where each measurement variable is an argument or viewpoint. After being transformed into a Likert scale item, some explanations need to be provided to facilitate the respondents' understanding and judgment. Potentially, it may even lead to respondents' comments. The last question (Q15) of our survey questionnaire is an open question, giving the respondents an opportunity to make comments. In fact, we have found that many respondents have indeed provided their opinions (see Annex H).

5.6 Reliability and validity analysis of the data collected by Likert scale

The reliability and validity testing and analysis of SEM measurement data, or Likert scale data, have been introduced in detail in §3.5. In this section, we will present the results of the reliability and validity testing of Likert scale data and carry out discussions accordingly.

5.6.1 Reliability analysis results and discussion

The results of the reliability analysis on the data collected through the Likert scale are presented in Table 5.1. In this thesis, we used SPSS for data processing and statistical analysis. As mentioned above, the items in the Likert scale correspond to the measurement variables in the CRID-PHE SEM model. Therefore, what is presented in Table 5.1 can also be considered as the results of the reliability analysis of the measurement data of the CRID-PHE SEM model.

Table 5.1 Reliability analysis of the data collected by Likert scale

Total Item Statistics				
	Mean after deleting the item	Variance after deleting the item	Corrected item-total correlation	Cronbach's α after deleting the item
Q1	48.88	32.568	.360	.786
Q2	49.21	32.596	.311	.791
Q3	48.93	31.339	.482	.776
Q4	48.99	32.228	.445	.780
Q5	49.14	30.688	.515	.773
Q6	49.09	31.802	.438	.780
Q7	49.61	30.555	.407	.783
Q8	49.35	30.266	.496	.774
Q9	49.15	31.699	.452	.779
Q10	49.37	31.732	.358	.787
Q11	49.26	30.316	.491	.774
Q12	49.23	31.583	.391	.784
Q13	49.23	31.599	.391	.784
Cronbach's α		.794	Number of items	13

Reliability testing examines the consistency and stability of measurement results. There are various reliability tests, and the most commonly used is the internal consistency test. The commonly used index is Cronbach's coefficient, that is, coefficient α. It is generally considered that $\alpha \geq 0.7$ indicates good reliability and $0.5 \leq \alpha \leq 0.7$ indicates acceptable reliability. From the last row of Table 5.1, we can see that the overall Cronbach's α = 0.794, indicating a good overall reliability of the scale data.

In addition, from the last column of Table 5.1, it can be seen that when one item of the scale was removed, the reliability of the data did not exceed the overall reliability 0.791, indicating that no item had abnormal data.

Note: The Cronbach's coefficient of a data set is inversely proportional to the data set's variance. When a data is removed from the data set, if the variance of the data set significantly reduces, or the Cronbach's coefficient of the data set significantly increases, it indicates that the removed data is a biased data. In practical application, this data can be regarded as abnormal data. As shown in Table 5.1, after removing a data from the data set, the Cronbach's coefficient of the data set only slightly decreased, with no significance. Therefore, no item of the scale had abnormal data.

5.6.2 Validity analysis results and discussion

Validity analysis is to examine whether the scale data is able to measure the intended content. The most common validity analyses are exploratory factor analysis and confirmatory factor analysis. We used SPSS for exploratory factor analysis, but AMOS for confirmatory factor analysis. That is because AMOS was also used for SEM analysis, and the data used in confirmatory factor analysis are the same as that in SEM analysis. The operation in AMOS is the same for these two analyses; only the interpretation of the results is different. Therefore, in this section, we only present the results and discussion of the exploratory factor analysis. The results of confirmatory factor analysis and SEM analysis will be presented together in subsequent section.

In §3.5, we mentioned that the exploratory factor analysis is essentially a clustering analysis, which is based on the correlation of data. Therefore, the data must have a certain correlation. A main indicator for data correlation is KMO. In general, if KMO > 0.9, the data is considered marvelous for factor analysis; 0.8 < KMO < 0.9 indicates meritorious; 0.7 < KMO < 0.8 indicates appropriate; 0.5 < KMO < 0.7 indicates not very appropriate; KMO < 0.5 indicates not appropriate. In Table 5.2, KMO is 0.811 > 0.8, indicating that the data is quite appropriate for factor analysis. In addition, the *p* value (significance) of Bartlett's spherical test is also an indicator for whether the data is appropriate for factor analysis. In Table 5.2, $p = 0.000 < 0.05$, showing that the data is suitable for factor analysis.

Table 5.2 Results of exploratory factor analysis (number of categories)

	Initial eigenvalue			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings
		Variance			Variance		
Component	Total	%	Cumulative %	Total	%	Cumulative %	Total
1	3.829	29.456	29.456	3.829	29.456	29.456	2.066
2	1.288	9.904	39.360	1.288	9.904	39.360	2.004
3	1.091	8.389	47.749	1.091	8.389	47.749	1.688
4	1.062	8.166	55.915	1.062	8.166	55.915	1.510
5	.921	7.081	62.997				
6	.831	6.395	69.392				
7	.735	5.656	75.048				
8	.661	5.081	80.130				
9	.631	4.853	84.983				
10	.564	4.339	89.322				
11	.544	4.182	93.504				
12	.462	3.555	97.059				
13	.382	2.941	100.000				
KMO and Bartlett's spherical test							
KMO						.811	
Bartlett's sphericity test				Approximate Chi-squared value		550.499	

Component	Initial eigenvalue			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings
	Total	Variance %	Cumulative %	Total	Variance %	Cumulative %	Total
				Degree of freedom			78
				p			0.000

In addition, it can be seen from Table 5.2 that through exploratory factor analysis, the data were clustered into four categories. Since we designed scale items from four dimensions, including necessity, feasibility, rationality, and effectiveness, the data clustering results of the exploratory factor analysis are consistent with our item design.

Furthermore, from the rotated component matrix in Table 5.3, we can see the category of each item. It is a slightly different from the item setting, but the connotation is basically consistent. After clustering, the first category (yellow) is rationality, the second category (red) is necessity, the third category (green) is feasibility, and the fourth category (blue) is effectiveness.

Table 5.3 Results of exploratory factor analysis (categorical results)

Rotated component matrix				
	Component			
	1	2	3	4
Q12 Public Health Warning	.750	.172	.227	
Q7 Real-time disclosure	.597	.054	.187	.264
Q13 Information disclosure	.461	.310		.175
Q2 AIDS		.756	.183	-.092
Q5 Right to know	.141	.616	.102	.209
Q6 Comprehensive disclosure	.405	.519		.302
Q4 Flu	.501	.504	.251	-.178
Q10 Public health awareness	.304	.477		.336
Q9 Sufficient data resources	.221	.203	.784	
Q14 Legislation and norms	.224		.736	.120
Q3 Rabies	-.357	.311	.557	.430
Q8 Media supported by Internet	.060	.179	.144	.788
Q11 Application of public health big data	.421	-.053	.085	.548

5.7 Discussions on the results of descriptive statistical analysis of respondents' occupations and regions

The purpose of data processing in this section is mainly to analyze the distribution of respondents' occupations and regions, so as to analyze the representation of respondents in terms of occupations or regions, and avoid the situation that respondents are excessively concentrated in a certain occupation or region. All data analysis in this section was performed using SPSS software.

5.7.1 Discussion on the results of descriptive statistical analysis of respondents' occupations

Table 5.4 shows the results of descriptive statistical analysis of respondents' occupations, in which the upper part of Table 5.4 is the result of descriptive statistical analysis of occupations of respondent individuals, while the lower part is the result of descriptive statistical analysis of occupations of respondent groups. From the results of the descriptive statistical analysis of occupations of respondent individuals, it seems that the respondents are excessively concentrated in the occupations of "ordinary staff". However, if we divide the respondents into different groups according to the following criteria:

(1) Managers of enterprises and public institutions + civil servants (Managers): 48 respondents

(2) Ordinary employees of enterprises and public institutions (Ordinary employees): 93 respondents

(3) College students + teachers + R&D personnel + medical personnel + advisors/consultants + volunteers and public welfare individuals + others (Intellectual individuals): 75 respondents

Then it can be seen from the lower part of Table 5.4 that the descriptive statistical distribution of respondent occupations is not abnormal. Note that, these three groups are what we usually call officials, civilians and professionals.

Table 5.4 Descriptive statistical analysis of occupation of respondents

Descriptive statistical analysis of occupations of respondent individuals				
	Frequency	Percentage	Valid percentage	Cumulative percentage
Civil servants	8	3.7	3.7	3.7
Undergraduate or graduate students	30	13.9	13.9	17.6
Teachers	13	6.0	6.0	23.6
Ordinary employees in enterprises and public institutions	93	43.1	43.1	66.7
Managers of enterprises and public institutions	40	18.5	18.5	85.2
R&D personnel	6	2.8	2.8	88.0
Medical personnel	7	3.2	3.2	91.2
Advisors/consultants	4	1.9	1.9	93.1
Media personnel	2	.9	.9	94.0
Volunteers and public welfare individuals	7	3.2	3.2	97.2
Others	6	2.8	2.8	100.0
Total	216	100.0	100.0	
Descriptive statistical analysis of occupations of respondent groups				

Descriptive statistical analysis of occupations of respondent individuals				
	Frequency	Percentage	Valid percentage	Cumulative percentage
	Frequency	Percentage	Valid percentage	Cumulative percentage
Ordinary employees	93	43.1	43.1	43.1
Managers	48	22.2	22.2	65.3
Intellectual individuals	75	34.7	34.7	100.0
Total	216	100.0	100.0	

5.7.2 Discussion on the results of descriptive statistical analysis of respondents' regions

Table 5.5 shows the results of descriptive statistical analysis of respondents' regions, in which the upper part of Table 5.5 is the result of descriptive statistical analysis of province distribution of respondents, while the lower part is the result of descriptive statistical analysis of region distribution of respondents. The provinces are divided into different regions according to the following criteria:

Table 5.5 Descriptive statistical analysis of respondent regions

Descriptive statistical analysis of regions of respondent individuals				
	Frequency	Percentage	Valid percentage	Cumulative percentage
安徽/Anhui	8	3.7	3.7	3.7
北京/Beijing	10	4.6	4.6	8.3
福建/Fujian	6	2.8	2.8	11.1
甘肃/Gansu	3	1.4	1.4	12.5
广东/Guangdong	26	12.0	12.0	24.5
广西/Guangxi	12	5.6	5.6	30.1
贵州/Guizhou	2	.9	.9	31.0
河北/Hebei	16	7.4	7.4	38.4
河南/Henan	12	5.6	5.6	44.0
黑龙江/Heilongjiang	4	1.9	1.9	45.8
湖北/Hubei	10	4.6	4.6	50.5
湖南/Hunan	7	3.2	3.2	53.7
吉林/Jilin	3	1.4	1.4	55.1
江苏/Jiangsu	12	5.6	5.6	60.6
江西/Jiangxi	7	3.2	3.2	63.9
辽宁/Liaoning	10	4.6	4.6	68.5
内蒙古/ Inner Mongolia	5	2.3	2.3	70.8
山东/Shandong	14	6.5	6.5	77.3
山西/Shanxi	4	1.9	1.9	79.2
陕西/Shaanxi	5	2.3	2.3	81.5
上海/Shanghai	10	4.6	4.6	86.1
四川/Sichuan	10	4.6	4.6	90.7
天津/Tianjin	6	2.8	2.8	93.5
新疆/Xinjiang	1	.5	.5	94.0
云南/Yunnan	4	1.9	1.9	95.8
浙江/Jiangsu	7	3.2	3.2	99.1

Descriptive statistical analysis of regions of respondent individuals				
	Frequency	Percentage	Valid percentage	Cumulative percentage
重庆/Chongqing	2	.9	.9	100.0
Total	216	100.0	100.0	
Descriptive statistical analysis of regions of respondent groups				
	Frequency	Percentage	Valid percentage	Cumulative percentage
Eastern	91	42.1	42.1	42.1
Western	48	22.2	22.2	64.4
Central	77	35.6	35.6	100.0
total	216	100.0	100.0	

(1) Eastern region: Zhejiang + Tianjin + Jiangsu + Beijing + Guangdong + Shanghai + Shandong + Fujian, with a total of 85 respondents. The eastern region is an economically developed region in China.

(2) Western region: Chongqing + Shanxi + Guizhou + Yunnan + Guangxi + Xinjiang + Shaanxi + Sichuan + Gansu + Inner Mongolia, with a total of 36 respondents. The western region is an economically underdeveloped region in China.

(3) Central region: the other provinces with 99 respondents.

On the surface, it seems from the lower part of Table 5.5 that the respondents are mainly concentrated in the eastern and central regions, but the distribution of the Chinese population itself is also concentrated in the eastern and central regions, so the regional distribution of the respondents is roughly the same as the distribution of the Chinese population.

5.8 Discussion on the results of statistical analysis of the occupational and regional differences of respondent attitudes

The purpose of data processing in this section is mainly to analyze the respondents' attitudes towards the questions raised by Likert scale and whether the differences of respondents' occupations or regions will affect their attitudes. Similarly, the data analysis in this section was performed using SPSS software.

5.8.1 Discussion on the results of statistical analysis of the occupational differences of respondent attitudes

Table 5.6 shows the results of statistical analysis of the occupational differences of respondent attitudes, in which the upper part of Table 5.6 is the result of the occupational differences of respondent attitudes towards each item of the scale, while the lower part is the result of statistical analysis of the occupational differences of respondent attitudes towards the entire scale.

In the last two columns of the upper part of Table 5.6, one column indicates the chi-square value, and the other indicates the probability of chi-square value. The smaller the probability, the greater the difference. Since we want no significant differences, the larger the probability, the smaller the difference. It is generally believed that if the probability is greater than or equal to 0.05, the respondents' attitudes towards the item show no significant occupational difference. As can be seen from the upper part of Table 5.6, except for Q5, Q9, Q6 and Q8, there were no significant occupational differences in the respondents' attitudes toward the remaining 70% of the items of scale.

Further, we assume that if a respondent shows a positive attitude towards 60% of the items of the scale (i.e., scores 4 points ["agree"] or above ["strongly agree"]), this respondent is considered to have a positive attitude towards the entire scale. The lower part of Table 5.6 presents the results of statistical analysis of occupational differences in respondents' attitudes towards the entire scale. From the lower part of Table 5.6, it can be seen that $p = 0.091>0.05$. Therefore, there were no occupational differences in the respondents' attitudes towards the entire scale.

Table 5.6 Occupational differences in respondents' attitudes towards the entire scale

Occupational differences analysis on respondents' attitudes towards each item of the scale							
		Occupation					
Item	Attitude	Ordinary employees	Managers	Intellectual individuals	Total	x^2	p
	Disagree	5(38.46%)	2(15.38%)	6(46.15%)	13(100%)		
Q2	Agree	88(43.35%)	46(22.66%)	69(33.99%)	203(100%)	.879	0.644
	Total	93(43.06%)	48(22.22%)	75(34.72%)	216(100%)		
	Disagree	9(34.62%)	5(19.23%)	12(46.15%)	26(100%)		
Q4	Agree	84(44.21%)	43(22.63%)	63(33.16%)	190(100%)	1.721	0.423
	Total	93(43.06%)	48(22.22%)	75(34.72%)	216(100%)		
	Disagree	6(22.22%)	6(22.22%)	15(55.56%)	27(100%)		
Q5	Agree	87(46.03%)	42(22.22%)	60(31.75%)	189(100%)	6.968	.031*
	Total	93(43.06%)	48(22.22%)	75(34.72%)	216(100%)		
	Disagree	22(36.07%)	10(16.39%)	29(47.54%)	61(100%)		
Q9	Agree	71(45.81%)	38(24.52%)	46(29.68%)	155(100%)	6.287	.043*
	Total	93(43.06%)	48(22.22%)	75(34.72%)	216(100%)		
	Disagree	21(51.22%)	3(7.32%)	17(41.46%)	41(100%)		
Q6	Agree	72(41.14%)	45(25.71%)	58(33.14%)	175(100%)	6.505	.039*
	Total	93(43.06%)	48(22.22%)	75(34.72%)	216(100%)		
	Disagree	14(37.84%)	9(24.32%)	14(37.84%)	37(100%)		
Q7	Agree	79(44.13%)	39(21.79%)	61(34.08%)	179(100%)	.496	0.780
	Total	93(43.06%)	48(22.22%)	75(34.72%)	216(100%)		
	Disagree	39(44.83%)	12(13.79%)	36(41.38%)	87(100%)		
Q8	Agree	54(41.86%)	36(27.91%)	39(30.23%)	129(100%)	6.623	.036*
	Total	93(43.06%)	48(22.22%)	75(34.72%)	216(100%)		
	Disagree	33(50.77%)	8(12.31%)	24(36.92%)	65(100%)		
Q11	Agree	60(39.74%)	40(26.49%)	51(33.77%)	151(100%)	5.528	0.063
	Total	93(43.06%)	48(22.22%)	75(34.72%)	216(100%)		
Q12	Disagree	24(42.86%)	9(16.07%)	23(41.07%)	56(100%)	2.165	0.339

Occupational differences analysis on respondents' attitudes towards each item of the scale							
		Occupation					
Item	Attitude	Ordinary employees	Managers	Intellectual individuals	Total	x^2	p
	Agree	69(43.13%)	39(24.38%)	52(32.5%)	160(100%)		
	Total	93(43.06%)	48(22.22%)	75(34.72%)	216(100%)		
	Disagree	27(51.92%)	7(13.46%)	18(34.62%)	52(100%)		
Q13	Agree	66(40.24%)	41(25%)	57(34.76%)	164(100%)	3.616	0.164
	Total	93(43.06%)	48(22.22%)	75(34.72%)	216(100%)		
	Disagree	19(44.19%)	8(18.6%)	16(37.21%)	43(100%)		
Q10	Agree	74(42.77%)	40(23.12%)	59(34.1%)	173(100%)	.428	0.807
	Total	93(43.06%)	48(22.22%)	75(34.72%)	216(100%)		
	Disagree	21(48.84%)	7(16.28%)	15(34.88%)	43(100%)		
Q14	Agree	72(41.62%)	41(23.7%)	60(34.68%)	173(100%)	1.271	0.530
	Total	93(43.06%)	48(22.22%)	75(34.72%)	216(100%)		
Occupational differences analysis on respondents' attitudes towards the entire scale							
		Occupation					
	Attitude	Ordinary employees	Managers	Intellectual individuals	Total	x^2	p
The	Disagree	1(20%)	0(0%)	4(80%)	5(100%)		
entire	Agree	92(43.6%)	48(22.75%)	71(33.65%)	211(100%)	4.791	0.091
scale	Total	93(43.06%)	48(22.22%)	75(34.72%)	216(100%)		

5.8.2 Discussion on the results of the statistical analysis of the regional differences of respondent attitudes

Table 5.7 shows the results of statistical analysis of the regional differences of respondent attitudes, in which the upper part of Table 5.7 is the result of the regional differences of respondent attitudes towards each item of the scale, while the lower part is the result of statistical analysis of the regional differences of respondent attitudes towards the entire scale.

Table 5.7 Regional differences in respondents' attitudes towards the entire scale

Region differences analysis on respondents' attitudes towards each item of the scale							
		Region					
Item	Attitude	Eastern	Western	Central	Total	x^2	p
Q2	Disagree	6(46.15%)	4(30.77%)	3(23.08%)	13(100%)	1.121	0.571
	Agree	85(41.87%)	44(21.67%)	74(36.45%)	203(100%)		
	Total	91(42.13%)	48(22.22%)	77(35.65%)	216(100%)		
Q4	Disagree	8(30.77%)	7(26.92%)	11(42.31%)	26(100%)	1.567	0.457
	Agree	83(43.68%)	41(21.58%)	66(34.74%)	190(100%)		
	Total	91(42.13%)	48(22.22%)	77(35.65%)	216(100%)		
Q5	Disagree	7(25.93%)	7(25.93%)	13(48.15%)	27(100%)	3.466	0.177
	Agree	84(44.44%)	41(21.69%)	64(33.86%)	189(100%)		
	Total	91(42.13%)	48(22.22%)	77(35.65%)	216(100%)		
Q9	Disagree	23(37.7%)	17(27.87%)	21(34.43%)	61(100%)	1.650	0.438
	Agree	68(43.87%)	31(20%)	56(36.13%)	155(100%)		
	Total	91(42.13%)	48(22.22%)	77(35.65%)	216(100%)		

Region differences analysis on respondents' attitudes towards each item of the scale							
Item	Attitude	Region				x^2	p
		Eastern	Western	Central	Total		
Q6	Disagree	11(26.83%)	14(34.15%)	16(39.02%)	41(100%)	6.212	.045*
	Agree	80(45.71%)	34(19.43%)	61(34.86%)	175(100%)		
	Total	91(42.13%)	48(22.22%)	77(35.65%)	216(100%)		
Q7	Disagree	9(24.32%)	12(32.43%)	16(43.24%)	37(100%)	6.177	.046*
	Agree	82(45.81%)	36(20.11%)	61(34.08%)	179(100%)		
	Total	91(42.13%)	48(22.22%)	77(35.65%)	216(100%)		
Q8	Disagree	32(36.78%)	28(32.18%)	27(31.03%)	87(100%)	8.364	.015*
	Agree	59(45.74%)	20(15.5%)	50(38.76%)	129(100%)		
	Total	91(42.13%)	48(22.22%)	77(35.65%)	216(100%)		
Q11	Disagree	23(35.38%)	22(33.85%)	20(30.77%)	65(100%)	7.278	.026*
	Agree	68(45.03%)	26(17.22%)	57(37.75%)	151(100%)		
	Total	91(42.13%)	48(22.22%)	77(35.65%)	216(100%)		
Q12	Disagree	21(37.5%)	15(26.79%)	20(35.71%)	56(100%)	1.093	0.579
	Agree	70(43.75%)	33(20.63%)	57(35.63%)	160(100%)		
	Total	91(42.13%)	48(22.22%)	77(35.65%)	216(100%)		
Q13	Disagree	22(42.31%)	13(25%)	17(32.69%)	52(100%)	.406	0.816
	Agree	69(42.07%)	35(21.34%)	60(36.59%)	164(100%)		
	Total	91(42.13%)	48(22.22%)	77(35.65%)	216(100%)		
Q10	Disagree	12(27.91%)	10(23.26%)	21(48.84%)	43(100%)	5.223	0.073
	Agree	79(45.66%)	38(21.97%)	56(32.37%)	173(100%)		
	Total	91(42.13%)	48(22.22%)	77(35.65%)	216(100%)		
Q14	Disagree	18(41.86%)	4(9.3%)	21(48.84%)	43(100%)	6.654	.036*
	Agree	73(42.2%)	44(25.43%)	56(32.37%)	173(100%)		
	Total	91(42.13%)	48(22.22%)	77(35.65%)	216(100%)		
Region differences analysis on respondents' attitudes towards the entire scale							
The entire scale	Attitude	Region				x^2	p
		Eastern	Western	Central	Total		
	Disagree	2(40%)	2(40%)	1(20%)	5(100%)	1.085	0.581
	Agree	89(42.18%)	46(21.8%)	76(36.02%)	211(100%)		
	Total	91(42.13%)	48(22.22%)	77(35.65%)	216(100%)		

Similarly, in the last two columns of the upper part of Table 5.7, one column indicates the chi-square value, and the other indicates the probability of the chi-square value. The smaller the probability, the greater the difference. Since we want no significant differences, the larger the probability, the smaller the difference. It is generally believed that if the probability is greater than or equal to 0.05, the respondents' attitudes towards the item show no significant regional difference. As can be seen from the upper part of Table 5.7, except for Q6, Q7, Q8,

Q11 and Q14, there were no significant regional differences in the respondents' attitudes toward the remaining 60% of the items of scale.

Again, we assume that if a respondent shows a positive attitude towards 60% of the items of the scale (i.e., scores 4 ["agree"] or above ["strongly agree"]), the respondent is considered to hold a positive attitude towards the entire scale. The lower part of Tables 5.7 shows the regional differences in the respondent's attitude towards the entire scale. From the lower part of Tables 5.7, we can see that $p = 0.0581>0.05$. Therefore, there were no significant regional differences in the respondents' attitudes towards the entire scale.

5.9 Discussion on the results of CRID-PHE SEM Model Fit and path Estimation

With the measurement data collected through Likert scale, we examined the CRID-PHE SEM model structure using AMOS and obtained the calculation output. The results related to model fit and path estimation are presented in Annex I, from which it can be seen that:

(1) The two key parameters for model fit are CMIN/DF and RMSEA. Table 5.8 shows the AMOS output related to CMIN/DF and RMSEA. It is generally considered that CMIN/DF between 1-3 indicates excellent model fit, and 3-5 indicates good fit; RMSEA < 0.05 indicates excellent fit, and RMSEA < 0.08 indicates good fit. Our model showed that CMIN/DF = 3.033, which is good, and RMSEA = 0.097, which is close to good. Therefore, overall, our model showed good data fit.

Table 5.8 Fit indices of the CRID-PHE SEM model

Model	NPAR	CMIN	DF	P	CMIN/DF	Model	RMSEA	LO 90	HI 90	PCLOSE
Default model	29	188.027	62	.000	3.033	Default model	.097	.082	.113	.000

(2) The estimation of the path coefficient (the relationship between latent variables) is the main objective of SEM model calculation. Table 5.9 presents the AMOS output related to the path coefficient. According to Table 5.9, the coefficient of the path Necessity -> CRID-PHE was 0.697, the coefficient of Feasibility -> CRID-PHE was 0.695, and the coefficient of CRID-PHE -> Effectiveness was 1.011, which exceeded 1, showing a small anomaly. However, more importantly, according to Table 5.9, all estimated path coefficients were displayed with ***, that is, $p < 0.001$, showing significance at the maximum significant level in AMOS.

Table 5.9 Standardized path coefficients of the CRID-PHE SEM model

			Estimate	S.E.	C.R.	p
CRID-PHE	<---	Necessity	.697	.152	4.241	***
CRID-PHE	<---	Feasibility	.695	.190	3.429	***
Effectiveness	<---	CRID-PHE	1.011	.196	5.362	***

Figure 5.3 presents the AMOS results of the CRID-PHE SEM model, including the path coefficients and load factors of the SEM model.

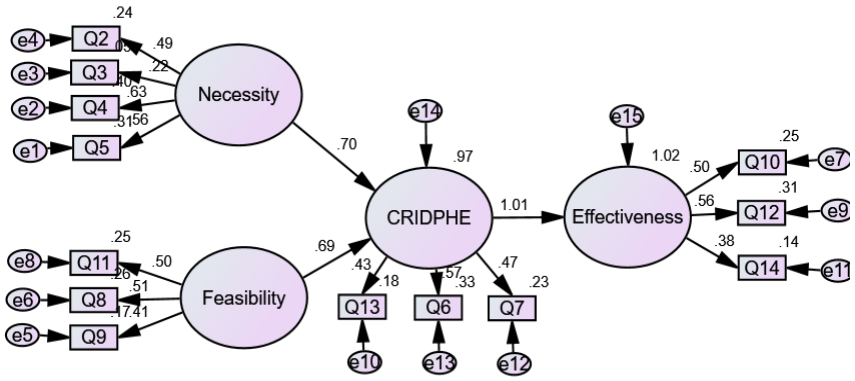

Figure 5.3 AMOS results of CRID-PHE SEM model

The results suggest that the framework for policy argumentation based on SEM and Likert scale proposed in this thesis is feasible. In this specific case, the AMOS results showed that the model calculation reached its minimum value after only ten iterations.

5.10 Discussion on the results of CRID-PHE questionnaire survey

5.10.1 Discussion on the respondents' demographic characteristics

We selected respondents who are active online and randomly distributed the questionnaire through WenJuanXing.

In the questionnaire survey, the basic information of the respondents had a great impact on the interpretation of the survey's results. The 216 valid questionnaires returned by WenJuanXing contained the basic information of the respondents (See Annex G), including the submitting date & time, duration of answering the questionnaire, IP address, and occupation from the duration, we can determine whether the respondent paid sufficient attention to answering the questionnaire. According to some recommendations in the literature, a questionnaire should not have too many items, to avoid the fatigue of the respondents (Nemoto & Beglar, 2014). Our questionnaire has a total of 14 items. We invited some colleagues who knew about this thesis to try to answer the questionnaire. In general, they could complete the

questionnaire in about one minute. From Annex G, it can be seen that most respondents spent more than two minutes answering the questionnaire, and some even as long as 10 minutes. Therefore, it is deemed that most respondents were serious when responding to the questions. The geographical distribution of the respondents can be found out through their IP address. According to Annex G, some respondents come from first-tier cities such as Beijing, Shanghai, Guangzhou, and Shenzhen and the economically developed eastern region, while others from second- or third-tier cities and the economically underdeveloped western and border regions. Thus, the respondents' geographical distribution shows representativeness and inclusiveness.

5.10.2 Discussions on the results of the questionnaire survey

The data from the Likert scale, if viewed as measurement data of the SEM model, can be categorized according to the latent variables. When we used AMOS to calculate based on the SEM model, the results we obtained were the impact of an entire category (latent variable) on CRID-PHE. For example, in Figures 5.3, the path coefficient 0.70 between Necessity and CRID-PHE represents the combined impact of the four items Q2-Q5 on CRID-PHE. Of course, we can also consider the impact of each item on CRID-PHE individually, for example, the impact of people's concerns with AIDS on CRID-PHE. In the following, we will discuss the impact of each item on CRID-PHE.

For convenience of discussion, we integrated the results of questionnaire survey (Annex F) into a graph, as shown in Figure 5.4. We regarded the combined rate of "agree" + "strong agree" toward an item as the respondents' support rate for the item and marked it on the corresponding line in Figure 5.4. For example, among the 216 respondents, the support rate for Q2 was 43.06% + 50.93% = 94% (See Figure F.2 in Annex F). In the following, we will discuss the possible reasons behind these support rates.

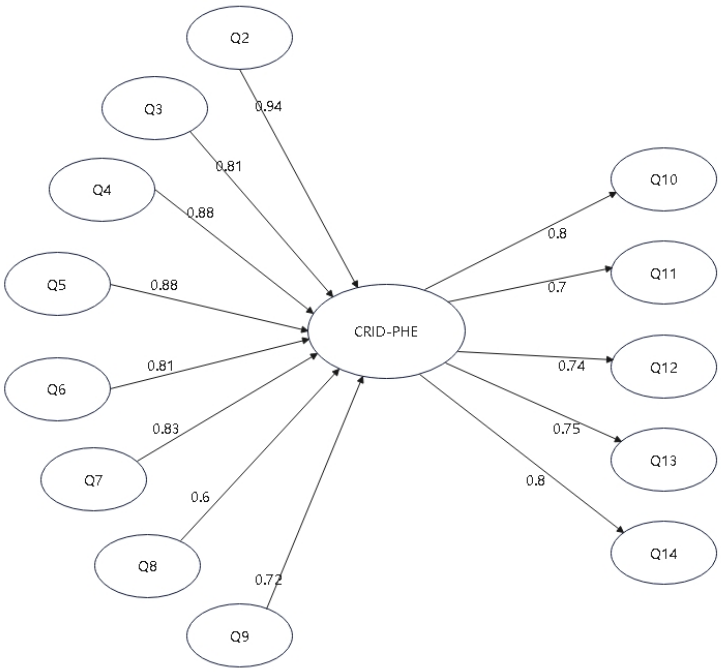

Figure 5.4 Results of the CRID-PHE questionnaire survey

1) Discussion on the responses to [Q1]

The first question of the survey questionnaire is about the respondent's identity. We initially intended to list the stakeholders of CRID-PHE for the respondents to indicate which type of stakeholders they are. However, the service consultant of WenJuanXing believed that the CRID-PHE stakeholder catalog we provided was too detailed and technical, which may eventually lead to most respondents choosing "Others", making it impossible to analyze the identities of the respondents. The service consultant suggested that we can design this question by referring to the respondents' registration information on WenJuanXing. For example, officials of public health authorities can be considered as "civil servants", and employees of Internet, big data, and other high-tech enterprises can be considered as employees or managers of enterprises. We basically adopted the service consultant's suggestion. In this way, this survey questionnaire became a public opinion survey on a public health policy initiative.

It can be seen from Figure F.1 of Annex F that the respondents were mainly managers and employees of enterprises, as well as undergraduate and graduate students. These three groups accounted for 75.47% of all respondents. The personnel of enterprises and public institutions are struggling to live and have extensive life experience and a deep understanding of public health policies, especially during the COVID-19 pandemic, while undergraduate and graduate students have a keen academic sense. According to our research on stakeholders of CRID-PHE, scholars are stakeholders of CRID-PHE. However, many scholars' research is carried out by

their graduate students, and therefore, the views of graduates and undergraduates can represent that of scholars to some extent.

2) Discussion on the responses to [Q2-Q4]

[Q2-Q4] of the questionnaire are all about the necessity of CRID-PHE. The items are based on specific examples to facilitate the respondents' understanding.

The spread of AIDS is undoubtedly a public health event. For many years, with the rise of the Red Ribbon Movement, the society seems to be more concerned about the demand of people with AIDS, arguing that everyday interactions will not lead to AIDS infection. Thus, the real status of AIDS transmission has not been informed to the public in real time. However, the research findings of Peking University and Tsinghua University mentioned in [Q2] are shocking. The results of the questionnaire survey showed that 94% of the respondents supported the real-time disclosure of public health events such as the spread of AIDS. This item received the highest support rate.

Rabies is an acute infectious disease. It takes about 3~6 days from onset to death, and the death rate is 100%. However, videos of intimate interactions between people and pets are all over social media, and you can find people walking their dogs on the street without using dog leashes. People are completely unaware of the status of rabies in their communities. According to the information in [Q3], 40 million people are bitten by pets every year, and more than 10 million of them need emergency treatment to prevent rabies. From the returned result, we see that 80.56% of the respondents supported the real-time disclosure of the status of rabies in their cities or communities.

Similarly, flu outbreaks occur every year, but very few people realize that flu can also lead to death. As shown in Figure 5.4, 87.96% of the respondents supported timely disclosure of the real status of flu during flu seasons, so that people can take self-prevention measures in time.

3) Discussion on the responses to [Q5]

[Q5] is also an item about the necessity of CRID-PHE.

The information on public health events, which presents threats to public health, is collected and held by the government. According to the theory of the right to know, the government must give people such information timely. However, at present, not only the information on ordinary public health events is not disclosed in real time; even during public health crises, the information disclosure of major public health emergencies does not continue to the end. For example, after the adjustment of COVID-19 prevention and control policy, the National Health Commission of China announced that it would no longer release the pandemic information on a daily basis (NHC, 2022). This decision caused controversies and questions among some

experts (Cheng, 2022). According to the results of the questionnaire survey, 87.5% of the respondents agreed with opinion in [Q5], with almost no objection (0% "strongly disagree", 0.93% "disagree").

4) Discussion on the responses to [Q6-Q7]

[Q6~Q7] are items about the rationality of CRID-PHE, that is, whether it is necessary to disclose information on public health events comprehensively and in real time.

Different groups of people have different concerns about public health events, and their concerns are changing dynamically. Therefore, the information of public health events should be disclosed comprehensively, not selectively, which can not only meet the concerns of different public groups, but also prevent the government from intentionally concealing certain facts that are unfavorable to itself. It can be seen from Figure 5.4 that 81.02% of the respondents agreed with the opinion in [Q6].

In addition, some public health authorities regularly publish statistics on some public health events, such as the Morbidity and Mortality Weekly Report (MMWR) of the U.S. CDC (www.cdc.gov/mmwr/index.html). However, these statistics are all from a past period of time, instead of real-time data. They are of little help for the public to take timely prevention measures, and are not aligned with the public's current real feelings about public health. For these reasons, such government websites usually are not visited frequently. [Q7] calls for the real-time disclosure of public health events according to the public's right to know and real needs. From Figure 5.4, it can be seen that the view in [Q7] was widely recognized among the respondents, with 82.87% support rate.

5) Discussion on the responses to [Q8-Q9]

[Q8~Q9] are items about the feasibility of CRID-PHE, that is, whether the conditions for the implementation of CRID-PHE are available.

CRID-PHE involves the real-time disclosure of massive information, which the traditional media cannot handle. However, in today's Internet age, it has become a common practice to display massive amounts of information through Internet portals. The official websites of government authorities at all levels are Internet portals, and the websites of merchants such as Taobao and JD.com are also portals. The public is familiar with and frequently uses various portals in their daily lives. Especially during the COVID-19 pandemic, Johns Hopkins University in the U.S. released the latest pandemic data from around the world twice a day on its relevant portal website. During the peak of the pandemic, JHU's related website received 4 billion visits. [Q8] states that the conditions for CRID-PHE implementation are already available in terms of communication media, and 59.72% of the respondents supported this view.

Since the SARS outbreak in 2003, China has established various public health event monitoring systems. With the implementation of the big data strategy and the establishment of big data centers by public health authorities at all levels, the data resources needed to implement CRID-PHE are already available. From Figure 5.4, it can be seen that 71.76% of the respondents agreed with the viewpoint in [Q9].

6) Discussion on the responses to [Q10-Q13]

[Q10~Q13] are items about the effectiveness of CRID-PHE, that is, what positive impacts CRID-PHE will have once implemented. Some possible impacts are presented in [Q10~Q13], but obviously, the potential impacts are not limited to those.

[Q10] At present, people are aware of public health problems only during public health crises. In peacetime, being uninformed, people do not know that there are public health problems in society. The implementation of CRID-PHE can keep the public informed of the undergoing public health events and continuously provide public health topics for people's daily interaction. As a result, people's public health awareness will be greatly improved.

[Q11] The volume of public health big data is increasing, but its application is lagging behind. Over time, public health big data will no longer be a wealth, but a burden. The solution is to make public health big data assessable and attract forces in society to take part in the its application. The implementation of CRID-PHE is conducive to making comprehensive and real-time public health big data available.

[Q12] The dilemma of public health crisis early warning lies in deciding the appropriate timing to disclose the ongoing public health events to the public. The implementation of CRID-PHE makes all public health events informed to the public from the moment they occur. If a public health event deteriorates to the extent of triggering a public health crisis, the whole process is within the public's knowledge from the very beginning, which will make the public psychologically prepared for the possible public health crise, thus greatly alleviating the impact of public health crisis early warning on social psychology.

[Q13] For a long time, the government has been used to conducting public health governance in the position with information advantage. The implementation of CRID-PHE will change the government's information advantage to information sharing, which will drive the reform of public health governance mode.

As can be seen from Figure 5.4, most respondents agreed with the views expressed in [Q10-Q13], with support rates of 80%, 70%, 74%, and 75% respectively.

7) Discussion on the responses to [Q14]

Public health event information is monitored, collected, managed, and held by the government. Therefore, the information disclosure of public health events is within the scope of government information disclosure. At present, in China, government information disclosure is regulated by administrative regulations formulated by the government itself. In practice, we have seen that some government authorities, in order to facilitate policy implementation, stop disclosing certain government information that was previously available to the public. In [Q14], we suggest that, by referring to the practice of other countries, the disclosure of government information should be regulated by the legislature. It can be seen from Figure 5.4 that the viewpoint in [Q14] received support from most respondents, with a support rate of 80.09%.

8) Discussion on the responses to [Q15]

[Q15] in the questionnaire is to solicit opinions or comments from the respondents regarding the questionnaire or the issues raised in the questionnaire. Among the 216 valid questionnaires, 85 provided opinions or comments, accounting for 39.5%. They are mainly comments on the issues raised in the questionnaire. Two respondents expressed their concerns about the possible rumors or fear about the comprehensive and real-time information disclosure of public health events, and one respondent requested paying attention to personal privacy protection. All other respondents showed a supportive attitude towards the viewpoints expressed in the items of the questionnaire. The answers of each respondent to [Q15] can be found in Annex H.

5.11 Summary

(1) This chapter put forward a general framework for policy argumentation based on SEM and Likert scales. In this framework, the latent variables of SEM represent different aspects of the policy argument, such as the necessity, feasibility, rationality, and effectiveness, while the measurement variables represent the arguments supporting these aspects. The Likert scale was used as a measurement tool for the SEM model. The items of the Likert scale correspond to the measurement variables of the SEM, and thus, the respondents' scores on the items are considered their ratings of the arguments expressed by the corresponding measurement variables. This framework has two advantages: First, it incorporates all elements of policy argumentation (aspects + arguments); second, it provides a platform for quantitative analysis of policy arguments; third, since SEM measurement data were collected using the Likert scale, multi-factor analysis can be performed by using AMOS, and regression analysis can be conducted by using SPSS.

(2) By applying the policy argumentation framework proposed in this chapter, we demonstrated CRID-PHE. Through the quantitative analysis of the opinions collected by Likert scale, it can be seen that most respondents held a positive attitude towards CRID-PHE.

Chapter 6: CRID-PHE from the Perspective of Signal Theory

6.1 Research purposes

In China, public health event information is held by the government. Unless a major public health emergency occurs, the government will generally not disclose public health event information to the public in a comprehensive and real-time manner. Therefore, there is an information asymmetry between the government and the public. Signal theory is a theory in economics that studies information asymmetry. The main research purposes of this chapter are to use signal theory to study the issue of information disclosure of public health events. According to the three components of signal theory: information asymmetry, signaling and signal screening, the specific research purposes are:

(1) Information asymmetry: Demonstrate that there is information asymmetry between the government and the public in terms of public health events, and use some events that occurred during COVID-19 to illustrate the harm of information asymmetry.

(2) Signaling: Demonstrate that the CRID-PHE proposed in this thesis, as a method of signaling, can eliminate information asymmetry, and make use of COVID-19 to construct a natural experiment to prove the role of CRID-PHE in eliminating the harm caused by information asymmetry.

(3) Signal screening: Demonstrate that in China, self-media public opinion can be used as a means of signal screening, and make use of some events occurring during COVID-19 to demonstrate the role of self-media public opinion in eliminating information asymmetry

6.2 The applicability of signal theory to the information disclosure of public health events

The information disclosure of public health event is the disclosure of information by the government to the public. The reason why we called it a problem is because the information of public health events is monitored, collected, and managed, and controlled by the government and is not freely accessible to the public. Therefore, regarding information on public health

events, there is a serious information asymmetry between the government and the public, and information asymmetry is exactly what the signal theory addresses.

Although there exists information asymmetry between the government and the public regarding public health events, both sides have a need to eliminate or reduce this information asymmetry. For the public, since public health events may seriously impact their physical and mental health, they have the right and urgent need to know about the ongoing public health events around them. On the other hand, the government also hopes to conditionally or selectively disclose some information about public health events to the public in order to gain their cooperation in public health governance in the society. Both parties' willingness to reduce information asymmetry makes it possible to apply the findings of the signal theory to the research on CRID-PHE.

For example, from the perspective of signal theory, the government is to the signaler (informed party), while the public is the receiver (uninformed party). The signaler (the government) holds the insider information that the receiver (the public) wants to know, and the receiver (the public) will react to the signal sent by the signaler (government). The reactions can sometimes be positive, such as taking self-protection measures, but they can also be negative, such as panic buying. Therefore, the signaler (government) needs to consider how to effectively send signals, which is the issue addressed by the signaling part of the signal theory.

Signal theory originated from information economics and has been widely applied in the field of management (Connelly et al., 2011). However, according to our search on Google Scholar, we have not found any study where the signal theory is directly applied to information disclosure of public health events. Therefore, it is pioneering and challenging to use the signal theory to study information disclosure of public health events. For example, according to the signal theory, the informed party always attempts to send information to the uninformed party to eliminate or reduce information asymmetry between the two. It is for this reason that the informed party is the signaler. However, in terms of information disclosure of public health events, although the government holds a large amount of such information, it may not be willing to disclose it to the public (Lightfoot & Wisniewski, 2014). Many government officials or authorities view the information they hold as their information advantage relative to the public. They believe that maintaining this advantage can ensure the execution of their policies. For example, after the COVID-19, due to the adjustment of China's anti-pandemic policy, the number of infected cases in society increased rapidly, but at the same time, the National Health Commission stopped the daily update of pandemic information to the public. These examples demonstrate that in public health information disclosure, the existence of information

asymmetry is unquestionable, but the informed party may not necessarily be the signaler, which is a new issue to be explored in signal theory research.

6.3 Information disclosure of major public health emergencies – a pseudo-problem arising from information asymmetry

At present, the government generally does not disclose information about ordinary public health events to the public. In other words, although there is information asymmetry regarding ordinary public health event information, there is no signaling between the government and the public, making it impossible to use the signal theory to study the information disclosure of public health events. However, if an ordinary public health event deteriorates and develops into a major public health emergency, according to relevant laws and regulations, the government must disclose relevant information to the public. In other words, signaling occurs between the government and the public in this case. Therefore, we can attempt to use the signal theory to study the information disclosure of major public health emergencies.

Specifically, during the COVID-19 pandemic, the information disclosure caused a lot of controversies. For example, at the beginning of the COVID-19 pandemic, the media (including central media) once questioned whether the Wuhan Municipal Government had timely released pandemic information to the public (CCTV Network, 2020). The signal theory can provide a new perspective to study the controversy surrounding information disclosure of major public health emergencies.

In addition, since public health crises are triggered by sudden major public health emergencies, the information disclosure of sudden major public health emergencies can be viewed as a public health crisis early warning. Public health crisis early warning is an important research topic in the field of public health and has been explored in many studies (W. Yang, 2017). However, it seems that no scholar has studied this topic from the perspective of signal theory. Therefore, the research in this thesis has a certain novelty and creativity, and of course, it is also challenging.

6.3.1 The signaling model for information disclosure of major public health emergencies

From the perspective of signal theory, the information disclosure of major public health emergencies can be illustrated as in Figure 6.1:

Figure 6.1 Signaling model for information disclosure of major public health emergencies

(1) Signaler: Government

The monitoring and evaluation of major public health emergencies is the responsibility of the government. To comply with relevant law and to facilitate public health governance, the government discloses information about major public health emergencies to the public. In this case, the government plays the role of signaler based on the signal theory.

(2) Receiver: The public

Major public health emergencies present serious threats to the health of the public, and thus, the public wants to acquire information on the ongoing major public health emergencies around them from government. In this case, the public plays the role of signal receiver based on the signal theory.

(3) Signaling

Signals are carriers of information. In information disclosure of major public health emergencies, the function of signals is to inform the public of the suddenness and seriousness of the major public health emergencies. It is worth noting that besides the content of the signal, the way of sending the signal can also convey some kind of information. Even the act of not sending any signal or stopping sending signals can also convey some kind of information.

6.3.2 Major public health emergencies - a false problem resulted from information asymmetry

The major public health emergencies discussed in this thesis all refer to the major public health emergencies caused by infectious diseases such as SARS and COVID-19. These public health emergencies have two characteristics: Firstly, they are triggered by some individual public health events. For example, SARS and COVID-19 both originated from some cases of pneumonia of unknown cause. Secondly, they do not develop from public health events to major public health emergencies overnight – their occurrence and development take some time. Taking COVID-19 as an example, the development from the initial pneumonia of unknown cause to the final outbreak of the pandemic took more than a month.

At present, in China, the government is responsible for monitoring public health events. With the establishment of the network direct reporting system of public health events after SARS 2003, the comprehensive real-time monitoring of public health events has been realized in China. Any public health event, once it occurs, will immediately attract the attention of the government. If a public health event deteriorates rapidly in a short period of time, the government will mobilize various forces to conduct epidemiological investigations. If the event eventually irreversibly develops into a major public health emergency, that is, if the hazard reaches a certain level in a short period of time, the entire development process has been closely monitored by the government from its beginning. Therefore, from the perspective of the government, the major public health emergency did not happen overnight, and its hazard is not significant either.

However, the public is unaware of all these. In terms of information on public health events, there is a serious information asymmetry between the government and the public. At a certain point, the public will be suddenly notified by the government that a public health event with major hazards has taken shape. Therefore, from the perspective of the public, this event is a major public health emergency. Its emergency is reflected in the suddenness of being informed, and its significance is reflected in the fact that the event has already caused a major hazard when being informed.

Therefore, the government and the public have different understanding of major public health emergencies. For the government, a major public health emergency is defined in the sense of epidemiology or public health, that is, within a preset time period, the cumulative hazard of the event has reached a certain threshold. The preset time period is an indicator for measuring the suddenness, and the hazard threshold is for measuring the significance. However, for the public, due to information asymmetry, a major public health emergency is an event defined in the sense of signaling, that is, an event with major hazards that is suddenly announced publicly (See Figure 6.2).

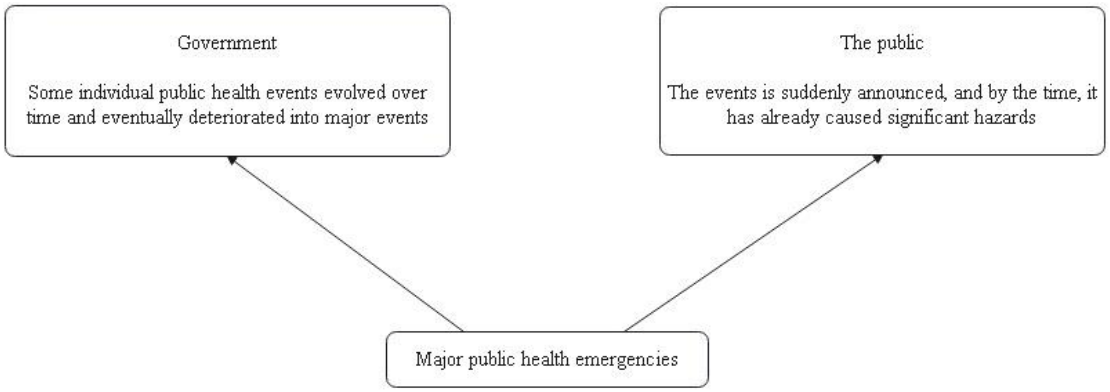

Figure 6.2 Different understandings between the government and the public

6.4 Impact of CRID-PHE on information disclosure of major public health emergencies – An empirical research based on natural experiments

As discussed above, from the perspective of signal theory, the suddenness and significance of major public health emergencies are only perceived by the public as a result of information asymmetry. Then, if CRID-PHE is implemented, the information asymmetry between the government and the public will be transformed into information sharing, and the information asymmetry will no longer exist. Based on the signal theory, if there is no information asymmetry between the signaler and the receiver, signaling will be meaningless. In other words, if CRID-PHE is implemented, the information disclosure of major public health emergencies will no longer be needed.

Since CRID-PHE has not been implemented in practice, it is difficult to empirically study the impact of CRID-PHE on the information disclosure of major public health emergencies. Fortunately, COVID-19 has provided an environment for natural or quasi-natural experiments in public health research (Rosen, 2021). The context of the natural experiment constructed based on COVID-19 in this thesis is as follows (See Figure 6.3):

(1) Experimental group

We took the practice and effect of pandemic information disclosure by the government during COVID-19 as the experimental group of the natural experiment. During this period, as the government updated the latest pandemic information every day, the government and the public were in a state of information sharing regarding the pandemic information.

(2) Control group

We took the normal times, i.e., non-pandemic times as the control group of the natural experiment. During these periods of time, the government barely discloses information about public health events comprehensively and in real time. Therefore, in terms of public health event information, there is a serious information asymmetry between the government and the public.

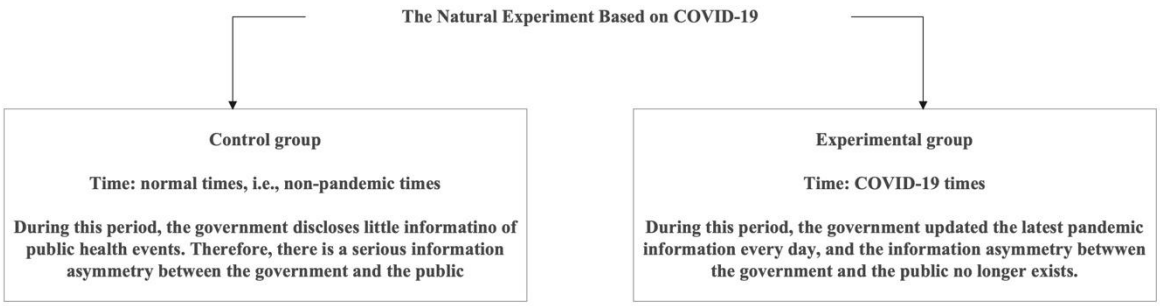

Figure 6.3 The natural experiment based on COVID-19

A. Discussions on the experimental group

During the time period of the experimental group, the Chinese government updated the latest pandemic information to the public every day, while Johns Hopkins University updated the latest information about the global pandemic status twice a day (E. Dong et al., 2022). These practices are essentially a comprehensive and real-time disclosure of the pandemic information and can be regarded as the prototype or pilot test of CRID-PHE. Here, “public health events” refer to the number of daily new infections, severe cases, and deaths, as well as other related events; “comprehensive” means that almost all information about the pandemic has been released; and “real-time” refers to the frequency of disclosure being once a day or twice a day. In other words, during the experimental group period, as far as the pandemic information is concerned, the government has realized the comprehensive and real-time disclosure of public health events in practice, the government and the public have achieved complete information sharing, and there is no longer information asymmetry.

Furthermore, since the government disclosed the latest pandemic information every day during COVID-19, this normalized disclosure made the disclosed events no longer emergent. At the same time, as the pandemic information disclosed by the government each day is only the incremental events of that day (e.g., the number of new cases and new deaths), and the hazard caused by these incremental events within a day is limited, these daily disclosed events are not considered as major events with significant hazards. That means, the pandemic events disclosed by the government every day during COVID-19 are no longer major public health emergencies. Therefore, although the entire COVID-19 is a major public health emergency in

human history, the daily disclosed pandemic events are not major public health emergencies, but normalized public health events with limited hazard.

During the period of the experimental group, there were indeed some major public health emergencies of epidemiological significance. According to WHO (2023), during the experimental group period, there were several significant pandemic fluctuations, including the emergence of the Delta and Omicron variants and the hazard caused by them. Europe witnessed three major ups and downs, each of which is a truly major public health emergency, or public health crisis. Every time when a crisis occurred, the government had to retake strict anti-pandemic measures. In China, under the policy of "dynamic zero", a few new local cases could immediately trigger the closure of the related community. Thus, from the perspective of these communities, these new cases are major public health emergencies. However, during the period of the experimental group, since the government was already informing the public of the latest pandemic status every day, the government no longer needed to issue a crisis early warning separately. The suddenness and significance of major public health emergencies were mitigated by the daily disclosure of pandemic information. From the government's daily pandemic updates, the public could estimate the development trend of the pandemic and roughly predict whether the government would retake strict anti-pandemic measures. The whole society remained relatively calm going through one public health crisis after another.

B. Discussion on the control group

The first few cases of COVID-19 occurred during the period of the control group, and the subsequent development of these cases was closely monitored by the government. However, the government did not disclose the information to the public and even blocked the news until it was finally confirmed that these cases had developed into a major public health emergency of epidemiological significance. Thus, during the period of the control group, there was a serious information asymmetry between the government and the public. It is because of this information asymmetry that the public was in shock and consternation when the government announced that a major public health emergency had already occurred.

To sum up, during the experimental group period, the information of major public health emergencies was being gradually released along with the events' evolution, and therefore, it was no longer necessary to issue an early warning on the final outcome of the evolution. However, during the control group period, due to the lack of comprehensive and real-time information disclosure of public health events, when a major public health emergency occurred, the government had to struggle to determine the timing of issuing an early warning.

6.5 Signal screening and self-media public opinion

In the signal theory, signal screening has a specific meaning, that is, the uninformed party induces the informed party to send signals in the context set by the uninformed party. "The context set by the uninformed party" means that the uninformed party hopes to obtain the information it needs from the informed party; as not all information sent by the informed party is needed, the uninformed party has to identify the information it needs from the received information. For instance, in the insurance market example provided by Stiglitz, one of the Nobel laureates, the insurance company is the uninformed party, while the customer is the informed party. In order to reduce the information asymmetry between the insurance company and the customer, the insurance company provides the customer with a variety of different health insurance contracts, and based on the customer's choice, the customer's physical health information can be inferred (Rothschild & Stiglitz, 1976).

At present, in China, public health event information is monitored and managed by the government and will not be disclosed to the public comprehensively and in real time unless major public health emergencies occur. Therefore, there is an information asymmetry between the government and the public, with the government being the informed party and the public being the uninformed party. It seems that the government wants to maintain its information advantage, probably due to two reasons:

a. Worries about its executive power in governance being weakened;

b. Concerns about backlash and "infodemic".

In this section, we will not discuss these two reasons in detail but focus on signal screening. Is it possible for the public to obtain the public health event information held by the government in an approach similar to signal screening in the signal theory?

We believe such an approach does exist and has been widely applied in practice, but the public is just not aware of that, let alone consider it from the perspective of signal screening in the signal theory. It is self-media public opinion! At present, self-media has surpassed traditional media and become the main channel for information acquisition and communication among the public. The government also attaches great importance to the public opinion on self-media, to which it often responds openly and proactively. As a result, the public can obtain some information that is held by the government and was not previously publicly available. Therefore, the public opinion expressed through self-media and the government's selective responses are actually an approach of signal screening in the signal theory, but neither the government nor the public is aware of that.

For example, in the later stage of COVID-19, the Chinese government adjusted its anti-pandemic policy from “dynamic zero” to “herd immunity”. Possibly to adapt to the policy adjustment, the National Health Commission of China announced to stop the daily pandemic information notification (NHC, 2022). However, during the “dynamic zero” period, there were almost no COVID-19 cases in the society. After the policy adjustment, the number of COVID-19 cases surged in the society, but at that time, the government stopped the daily pandemic notification. As a result, a large amount of public opinion about the pandemic emerged on self-media, which forced the government to disclose the pandemic information of a past period of time once a while. This is a good example of signal screening.

It is worth noting that self-media public opinion may contain rumors, but there are always some reasons behind rumors. Excessive crackdown on rumors may weaken the warning effect of public opinion and result in embarrassing situations such as the Dr. Li Wenliang incident.

6.7 Classification of CRID-PHE stakeholders based on information advantage – Inspired by the signal theory

Initially, the stakeholder theory was mainly applied in enterprise strategic management. Therefore, the definition and classification criteria of stakeholders were mainly proposed based on the needs of enterprise strategic management. Currently, the stakeholder theory has been widely applied in many other fields. Obviously, the definition and classification criteria of stakeholders should adapt to the specific application scenarios. This thesis studies the information disclosure of public health events. As far as public health event information disclosure is concerned, we propose that the stakeholders of CRID-PHE can be classified according to the following three criteria:

Information advantage: whether the stakeholder has the information about public health events;

Authority: whether the stakeholder has the authority to disclose public health event information externally;

Direct benefit: whether the stakeholder will benefit directly from the information disclosure of public health events.

In the following, according to these three criteria, we will classify the stakeholders identified by the CRID-PHE empirical model (see Figure 4.2):

Government: The government is the informed party because public health event information is monitored, collected, and managed by the government, and therefore, the

government owns such information. According to China's current laws and regulations, only the government has the power to disclose information of public health events (Authority). The government will not directly benefit from the information disclosure of public health events (Direct benefit);

Centers for Disease Control and Prevention (CDC): The CDC is the informed party because CDC is entrusted by the government to implement the monitoring, collection, and management of public health event information. However, they have no power to disclose this information (Authority), nor they benefit directly from the information disclosure of public health events due to the organizations' non-profit nature (Direct benefit);

Scholars: Scholars are also the informed party because the determination of public health events requires scholars' professional knowledge and thus, they are often the first to learn about public health events. However, they have no power to disclose information about public health events (Authority), and they do not benefit directly from such information disclosure either (Direct benefit);

Self-media or new media: Self-media or new media are also the informed party because nowadays, a lot of information is leaked from self-media or new media, and public health event information is no exception. For instance, the information about the COVID-19 was first leaked by Dr. Li Wenliang through new media. In principle, self-media or new media has no right to leak information about public health events without authorization (Authority). However, self-media or new media can benefit directly from leaking information about public health events because the traffic can bring them economic benefits (Direct benefit).

In addition to the above-mentioned stakeholders, other stakeholders in the CRID-PHE empirical model, such as the public, are not informed parties regarding public health events. The classification of stakeholders of the CRID-PHE empirical model is shown in Table 6.1.

Table 6.1 Classification of CRID-PHE stakeholders based on information advantage

Stakeholders	Classification criteria		
	Information advantage	Authority	Direct benefit
Government	√	√	×
The public	×	×	√
Centers for Disease Control and Prevention (CDC)	√	×	×
Internet, big data, and other high-tech enterprises	×	×	√
Communities	×	×	√
Social or public welfare organizations	×	×	√
Scholars	√	×	×
Self-media or new media	√	×	√

6.7 Summary

(1) The problem of information disclosure of public health events stems from information asymmetry between the government and the public regarding public health events. The signal theory addressed information asymmetry in economics and has won the Nobel Prize in Economic Science twice. Signal theory mainly includes three parts: information asymmetry, signaling, and screening. By studying the information disclosure of public health events from the perspective of signal theory, we have obtained some novel findings.

(2) Information asymmetry and major public health emergencies. Research on information asymmetry mainly addresses the application scenarios where there is information asymmetry and the consequences caused by information asymmetry, with topics such as information asymmetry and lemon markets, and information asymmetry and moral hazard. In this thesis, we found that there is a serious information asymmetry between the government and the public regarding public health events. Due to this information asymmetry, the government and the public have different understandings of major public health emergencies. For the public, a major public health emergency is an event that is suddenly informed to them. Its emergency comes from the suddenness of being informed, and its significance comes from the fact that at the time of being informed, the event has already caused very serious hazards. For the public, a major public health emergency is a pseudo-problem as a result of information asymmetry.

(3) Signaling and CRID-PHE. In signal theory, signaling refers to the informed party (government) sending signals to the uninformed party (the public) to reduce information asymmetry. In information disclosure of public health events, the government sends signals to the public with the aim of reducing information asymmetry. If the government discloses information on public health events to the public comprehensively and in real time (i.e., implementing CRID-PHE), information asymmetry will no longer exist, and thus, signaling will no longer be unnecessary. Given that public health emergencies are caused by information asymmetry, if information asymmetry no longer exists, information disclosure of major public health emergencies is no longer necessary. Therefore, through the implementation of CRID-PHE, relevant information is already gradually released before any event finally develops into an emergency, and thus, the public is psychologically prepared for the upcoming major public health emergencies and may even take certain preventive measures in advance.

(4) Natural experiments and CRID-PHE empirical research. As for now, CRID-PHE is just an initiative proposed in this thesis and has not been implemented in practice. Then, how can we conduct empirical research on the impact of CRID-PHE on information disclosure of major

public health emergencies? Fortunately, COVID-19 provides a unique natural experimental environment for research in public health. The natural experiment method was awarded the Nobel Prize in Economic Science in 2021 for its application in empirical economics. In this thesis, we took the COVID-19 period as the experimental group for natural experiments and normal times (non-pandemic period) as the control group. During the experimental group period, the government disclosed the latest pandemic information every day, which can be regarded as a prototype of CRID-PHE; however, during the control group period, the government did not comprehensively disclose real-time information on ongoing public health events. Through natural experiments, we, to some extent, verified the offsetting effect of CRID-PHE implementation on the problem of information disclosure in major public health emergencies.

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Chapter 7: Information Disclosure of Public Health Events – A Case Study of Government Information Disclosure

7.1 Research purposes

Since the information of public health events is held by the government, the information disclosure of public health events falls within the scope of government information disclosure. The research purpose of this chapter is to take the study of information disclosure of public health events as a case study of government information disclosure, and by analyzing the practice and effect of government information disclosure of public health events during COVID-19, to obtain some new insights and suggestions for the reform of government information disclosure.

7.2 The historical role played by the information disclosure of public health events in promoting government information disclosure

Since China's reform and opening up, government information disclosure has been continuously advanced, but the SARS in 2003 exposed many problems in this regard, which greatly promoted the reform of government information disclosure. Since then, the government has issued a series of laws and regulations on major public health emergencies, including regulations on the information disclosure of major public health emergencies. In particular, in 2007, The State Council promulgated the *Regulations on Government Information Disclosure of the People's Republic of China*, which is regarded as the greatest political legacy of SARS by many scholars.

COVID-19 is far larger than SARS in terms of scale and duration. At present, due to the current international political environment, studying the gains and losses of the government's information disclosure of public health events during COVID-19 is highly politically sensitive. The purpose of this thesis is only to study this issue academically. The research findings will not be published on social media, and the study will only be submitted to academic journals after the review and approval by the ethics committee of the author's organization.

7.3 Classification of government information disclosure

The pandemic information disclosed by the government during COVID-19 can be divided into two categories: a) information about the pandemic itself, such as the number of daily new cases, severe cases, and deaths, and b) anti-pandemic policy or measures, such as the arrangement of nucleic acid testing, the inspection of health codes in public places, and community closure.

Obviously, these two are completely different in nature. The former is the information of real objective events, and the latter is the information generated by government governance activities, called government affairs information – there is no subordinate relationship between the two. At present, in the practice of government information disclosure, these two kinds of information are not distinguished. For example, the government information stipulated to be disclosed by the *Regulations on Government Information Disclosure of the People's Republic of China* is basically government affairs information, rather than the information of objective events. Due to the government's strong position, the information disclosure of objective events is often considered subordinate to the information disclosure of government affairs and may even serve as a support for the information disclosure of government affairs, which led to a lot of controversies. This can be illustrated by two examples from COVID-19.

Example 1: According to an thesis published in the *Lancet* by scholars from the CDC of China, the first case of COVID-19 occurred on December 1, 2019. However, in wait for the results of the "human-to-human transmission" epidemiological investigation, Wuhan government delayed the pandemic information disclosure to the public. As a consequence, on January 18, 2020, almost 50 days after the first case, a community in Wuhan held a large banquet with 40,000 people attending at the same time. Two days later (January 20), the "human-to-human transmission" was officially confirmed, and five days later (January 23), Wuhan was officially locked down. The information of infected cases is information of objective events, while the conclusion of epidemiological investigation is the information generated by the government's public health governance activities, which belongs to the category of government affairs information. This example illustrates the subordination of the information disclosure of objective events to the information disclosure of government affairs, which caused some controversies at that time.

Example 2: In the later stage of COVID-19, the government adjusted its anti-pandemic policy from "dynamic zero" to "herd immunity". In fact, during the "dynamic zero" period, there were almost no COVID-19 cases in the society, but after the adjustment of the anti-pandemic policy, the number of COVID-19 cases in the society surged. Probably in order to

avoid public panic and reduce the resistance to the implementation of "herd immunity", on December 25, 2022, the National Health Commission announced the cessation of the daily pandemic notification. The daily notified pandemic information is information of objective events, while the information of the government's anti-pandemic policy adjustment is typical government affairs information. This is an example of objective event information disclosure serving government affairs information disclosure, which also caused some controversies at that time.

If we could have strictly distinguished between objective event information disclosure and government affairs information disclosure at that time and adopted different information disclosure strategies accordingly, the outcome might be different.

7.4 Suggestions on government information disclosure

Although the information of objective events is monitored by the government, it constitutes the actual living environment of the public. Its ownership should belong to the public, and the public has the right to know. Therefore, information about objective events, as long as they do not violate national security or personal privacy, once confirmed, should be comprehensively disclosed to the public, preferably by the technical department that is responsible for monitoring the events, just like weather forecasts are disclosed by meteorological stations.

On the other hand, government affairs information is the information generated by the government's governance activities, including the government's creative labor, to which the government has certain intellectual property rights. In the disclosure of government affairs information, the government can choose what to disclose according to the situation.

For example, at the later stage of COVID-19, in order to keep in line with international situation, taking advantage of the weakened virulence of the virus and the widespread vaccination among the public, the government adjusted its anti-pandemic policy from "dynamic zero" to "herd immunity". However, until today, the government has never acknowledged that the new anti-pandemic policy is "herd immunity", but rather "precise pandemic prevention". From the measures taken by the government, such as stopping the lockdown, lifting the quarantine requirement, stopping the nucleic acid test, lifting the ban on crowd gathering, and finally, ending the mask requirement, the new pandemic prevention policy is obviously "herd immunity". In this respect, the government information disclosure was not comprehensive and thorough, but in a selective manner, or in other words, the government concealed some information. The reason probably lies in that in the later stage of COVID-19, China witnessed

a fierce debate about “herd immunity”, which even rose to the level of political correctness; in addition, “herd immunity” gives the impression that the government is not doing anything. However, the public did not seem to be aware of the selective manner of government information disclosure, or even if they did, it did not lead to strong criticism.

The national economic operation data belongs to the information of objective events. According to the Statistics Law, the national economic operation data must be fully disclosed on a regular basis, regardless of the adjustment of the government’s economic policies or the deterioration of the national economy. The same as the national economic operation data, the information of public health events is also information of objective events. We suggest that, referring to the practice of comprehensive disclosure of national economic operation data on a regular basis, legislation should be passed to require comprehensive and real-time disclosure of information on public health events.

CRID-PHE enables the public to learn about the health threats around them in a timely manner, thus avoiding contracting diseases being uninformed; it will also change the public health governance environment, turning the government’s information advantage over the public into information sharing. It will certainly promote the reform of the government’s public health governance.

7.5 Summary

(1) Public health event information disclosure falls into the category of government information disclosure. Historically, the experience and lessons of public health event information disclosure have been important drivers of the reform of government information disclosure. For example, after SARS 2003, the Chinese government issued the *Regulations on Government Information Disclosure of the People’s Republic of China* in 2007. From this, we can infer that COVID-19 can also provide a lot of implications for the improvement of government information disclosure.

(2) Public health event information is currently monitored and managed by the government, but it is the work of the agent (the government) entrusted by the principal (the public). Its outcome should be owned by the principal (the public) and be disclosed to the principal (the public) comprehensively and in real time.

(3) The information of public health events is information of objective events, which is different from the information of government affairs activities in nature. Much of the debate over the information disclosure of public health events during COVID-19 may stem from the

unawareness of the distinction between these two different types of information. The disclosure of objective event information not only enables the public to understand the objective environment they are in, but also helps the public to supervise and evaluate the work of the government.

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Chapter 8: Conclusions

8.1 Main findings

At present, people mention public health events, they all refer to major public health emergencies. However, after all, there are very few major public health emergencies; the vast majority of public health events in people's daily life are "ordinary" public health events. Although these "ordinary" public health events do not cause major hazard to the whole society, they may cause serious or even fatal harm to some public groups. In particular, major public health emergencies caused by infectious diseases all have evolved from "ordinary" public health events. This thesis studies the comprehensive and real-time information disclosure of public health events (CRID-PHE). Since public health events include major public health emergencies, the findings of this thesis are also applicable to the information disclosure of major public health emergencies. The findings of this study are as follows:

(1) The so-called public health event information disclosure refers to the government's disclosure of public health event information to the public. At present, public health event information is monitored and managed by the government and is generally not fully disclosed to the public in real time unless a major public health emergency occurs. Therefore, in terms of public health event information, there is an information asymmetry between the government and the public. The signal theory addresses the information asymmetry in economics and has won the Nobel Prize in Economic Science twice. According to our search on Google Scholar, there is barely any study on the information disclosure of public health events using the signal theory. In this thesis, we applied the signal theory to study information disclosure of public health events and found that due to information asymmetry, the government and the public have different understandings of major public health emergencies. For the public, major public health emergencies are a pseudo-problem caused by information asymmetry.

(2) Given that a major public health emergency is a pseudo-problem resulting from information asymmetry, if the information asymmetry between the government and the public can be eliminated, according to the signal theory, signaling is no longer necessary, that is, the information disclosure of major public health emergencies is no longer needed. The implementation of CRID-PHE can completely solve the information asymmetry problem

between the government and the public regarding public health events, enabling the information of major public health emergencies to be gradually released during the emergencies' formation. By using the practice and effect of the pandemic information disclosure by the government during COVID-19, we constructed a natural experiment to demonstrate, to a certain extent, the role of CRID-PHE in addressing information asymmetry. The natural experiment method has a long history. It was initially applied in the field of public health as an approximation of RCT. In 2021, three scholars were awarded the Nobel Prize in Economic Science for using the natural experiment method in empirical economics, which has led to widespread attention and application of this method.

(3) This thesis proposed a general framework for policy argumentation based on SEM and Likert scales. In this framework: a) all aspects for policy argumentation are taken as latent variables of SEM, and the arguments and evidence in support of these arguments are taken as the measurement variables associated with the corresponding latent variables; b) the Likert scale was used as a measurement tool for the SEM model, in which the arguments and evidence are taken as the items of the Likert scale, and the respondents were asked to provide their opinions (scores) on the arguments by reviewing the corresponding evidences. In this thesis, the proposed framework was applied to the argumentation of CRID-PHE. The necessity, rationality, feasibility, and effectiveness of CRID-PHE as well as CRID-PHE itself were set as the latent variables of SEM, and their supporting arguments and evidences were set as the corresponding measurement variables. The Likert scale was used to collect data. The results showed that CRID-PHE was fully recognized by the respondents.

(4) Since the information of public health events is held by the government, the information disclosure of public health events falls into the category of government information disclosure. In this thesis, we regard the study of information disclosure of public health events as a case study of government information disclosure, and thus, the obtained findings can be applied to government information disclosure. By studying the practice and effect of the government's pandemic information disclosure during COVID-19, we concluded that the information disclosed by the government should be divided into two types: a) objective event information, such as information of public health events; b) government affairs information, such as government anti-pandemic policies and measures. Objective event information, if it does not violate national security and personal privacy, should be comprehensively disclosed to the public in real time; however, government affairs information may not need to be fully disclosed in real time, and the government can make decisions according to the practical situation. At present, in the practice of government information disclosure, these two types of information

are not clearly distinguished, and consequently, the government does not have distinct disclosure strategies for them. During COVID-19, some of the government's practices in pandemic information disclosure caused controversies. The reason may be that the government did not distinguish between these two different types of information. It mistakenly regarded objective event information as government affair information and handled the information disclosure of objective events as a way of facilitating policy implementation.

8.2 Outlook for future work

(1) Historically, the information disclosure of public health events, especially during public health crises, has greatly promoted the reform of government information disclosure. For example, SARS in 2003 led to the promulgation of the *Regulations on Government Information Disclosure of the People's Republic of China*. COVID-19 is a pandemic that far exceeds SARS in terms of duration and scale. Studying the gains and losses of public health event information disclosure during COVID-19 will certainly provide useful enlightenment for the improvement of government information disclosure. However, due to the current international political struggle, research on public health event information disclosure during COVID-19 has become extremely politically sensitive. Much of the information and data have not been made public, which makes the research of the thesis somewhat limited. We perhaps can delve further into this issue when the international political struggle eases.

(2) Theoretical argumentation for policy-making is usually considered a process of qualitative analysis rather than quantitative analysis. This thesis proposed a general framework for policy argumentation based on SEM and Likert scales. This framework uses SEM to bear all elements of policy argumentation, such as using latent variables to represent the necessity, feasibility, rationality, and effectiveness of policy-making, and measurement variables to represent the corresponding arguments. In addition, the Likert scale is used to collect measurement data. However, since this framework was first proposed in this thesis, there are no well-established scales to refer to. Therefore, the scale designed in this thesis for CRID-PHE demonstration based the proposed framework has a lot of room for improvement. Here, the "well-established scales" do not have the same concept as the Likert scale. The Likert scale represents how to collect data, while the well-established scales illustrate why these data are to be collected. Well-established scales all have specificity. For example, the widely applied scale SERVQUAL is only suitable for service quality surveys (Babakus & Boller, 1992). The design of a well-established scale must follow certain norms. It should be repeatedly revised through

testing using extensive sample data. In the future, we can consider designing a well-established scale for policy approval or for a particular policy, for example, public health policy.

(3) The signal theory mainly consists of three parts: information asymmetry, signaling, and screening. Signaling means that the informed party takes the initiative to send signals to the uninformed party to reduce information asymmetry; screening means that the uninformed party takes the initiative to induce the informed party to send signals to reduce information asymmetry. In terms of public health events, the government is the informed party, while the public is the uninformed party. Many government officials and even some government authorities believe that maintaining a certain degree of information asymmetry can help ensure the government's execution power, making it challenging to reduce information asymmetry through signaling. On the other hand, in the past, it was almost impossible for the public to take the initiative to induce the government to release information, that is, to reduce information asymmetry through screening. However, nowadays, with the Internet and self-media, it is very common for the public to use self-media public opinion to force the government to release some information, and there are many studies on the role of self-media public opinion. However, the current research rarely examines the role of self-media public opinion from the perspective of screening in the signal theory. In the future, the role of self-media public opinion in reducing the information asymmetry between the government and the public can be explored from the perspective of screening and public autonomy.

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Annex A: List of Theses Collected from CNKI on Stakeholders of Public Health

	Title	Journal	Volume Issue	Date	Valid
1	创新药物市场准入政策环境研究——基于利益相关者视角 A Review on policy environment innovative drug market access: A stakeholder's perspective	中国卫生政策研究 Chinese Journal of Health Policy	Vol. 10, No. 8	2017.8	√
2	电子健康档案建设利益相关者影响指数研究 A Study of Stakeholder Impact Index in Electronic Health Records Construction	中国卫生信息管理杂志 Chinese Journal of Health Informatics and Management	Vol. 14 No. 4	2017.4	√
3	分级诊疗背景下医疗卫生机构分工协作的利益相关者分析：基于苏州市两区的实证研究 Stakeholder analysis of division and cooperation of medical and health institutions in the context of hierarchical diagnosis and treatment: An Empirical Study Based on two districts of Suzhou	中国卫生资源 Chinese Health Resources	Vol. 23 No. 6	2020.11	√
4	公共卫生应急协同管理：理论、情境及机制分析 Collaborative public health emergency management: theory, context, and mechanisms	中国公共卫生 Chinese Journal of Public Health	Vol. 36 No. 12	2020.12	√
5	基本药物制度的利益相关者分析 Analysis of Stakeholder of Basic Medicine System	中国药事 Chinese Pharmaceutical Affairs	Vol. 24 No. 5	2010.5	√
6	基于利益相关者的突发事件网络舆情演化研究 The Evolution of the Online Public Opinion of Stakeholders in Emergencies	情报学报 Journal of the China Society for Scientific and Technical information	Vol. 41 No. 5	2022.5	√
7	基于利益相关者角度分析居民健康档案存在的问题及对策 Analysis on the Problems and Countermeasures of the Residents Health Records from the Perspective of Stakeholder	医学与哲学 Medicine and Philosophy	Vol. 33 No. 12A	2012.12	√

8	江苏农村医疗服务纵向协作的利益相关者分析 Analysis of Stakeholder of vertical collaboration in rural medical services in Jiangsu	南京医科大学学报（社会科学版） Journal of Nanjing Medical University (Social Sciences)	Vol. 18 No. 2	2017.4	√
9	利益相关者、医疗公平与中国医疗体制改革 The Stakeholder, Medical Justice, and China’s Medical System Reform	山东社会科学 Shandong Social Sciences	Vol. 34 No. 7	2020.7	√
10	利益相关者博弈视角下疫苗安全风险防控研究 – 以长春长生疫苗为例 Research on Vaccine Safety Risk Prevention and Control from the Perspective of Stakeholder Games – Take Changchun Changsheng Vaccine Incident as An Example	科技智囊 Think Tank of Science & Technology	Vol. 26 No. 5	2020.5	√
11	利益相关者参与公共卫生危机治理模式分析 On the Governance Mode of Stakeholders Participating in Major pandemic Crisis	合肥学院学报（综合版） Journal of Hefei University (Comprehensive Edition)	Vol. 37 No. 6	2020.12	√
12	利益相关者理论及其分析方法在卫生领域的应用进展 Progressing on the application of stakeholder theory and method in health services	中国卫生事业管理 Chinese Health Service Management	Vol. 28 No. 2	2011.2	√
13	利益相关者理论视角下家庭医生签约服务研究 Research on Family Doctor Contract Services from the Perspective of Stakeholder Theory	卫生软科学 Soft Science of Health	Vol. 35 No. 4	2021.4	√
14	利益相关者理论视阈下突发公共卫生事件的治理模式探析 Analysis on the Governance Mode of Public Health Emergencies from the Perspective of Stakeholder Theory	云南行政学院学报 The Journal of Yunnan Administration College	Vol. 23 No. 4	2021.7	√
15	利益相关者视角下的公立医院社会责任 Social Responsibility of Public Hospitals from the Perspective of Stakeholders	西南国防医药 Medical Journal of National Defending Forces in Southwest China	Vol. 22 No. 4	2012.4	√
16	利益相关者视角下我国诊所发展的影响因素分析 Analysis of Influencing Factors of Clinic Development in China from the Perspective of Stakeholders	大众科技 Popular Science & Technology	Vol. 23 No. 3	2021.3	√

17	社区基本公共卫生服务的利益相关者分析 Analysis on Stakeholder of Community Basic Public Health Service	医学与社会 Medicine and Society	Vol. 25 No. 4	2012.4	√
18	突发公共卫生事件利益相关者在社交媒体中的关注点及演化模式 Concerns and Evolutionary Patterns of Stakeholders on Social Media Platforms during Public Health Emergencies	情报学报 Journal of the China Society for Scientific and Technical Information	Vol. 37 No. 4	2018.4	√
19	突发公共卫生事件利益相关者的社会网络情感图谱研究 Study on Social Network Emotion Map of Stakeholders in Public Health Emergencies	图书情报工作 Library and Information Service	Vol. 61 No. 20	2017.12	√
20	医疗服务纵向整合的利益相关者分析——以镇江市为例 Analyzing the stakeholders in vertically integrated health service system sampled with Zhenjiang City	中国卫生事业管理 Chinese Health Service Management	Vol. 31 No. 4	2014.4	√
21	医源性人体脱离物处置上的利益冲突 Conflicts of Interest on the Disposal of Iatrogenic Substances Separated from Human Body	医学与哲学 Medicine & Philosophy	Vol. 36 No. 4	2015.4	√
22	“5WHR”数据治理概念框架及其应用——针对重大突发公共卫生事件 “5WHR” Data Governance Conceptual Framework and Its Applications in Major Public Health Emergencies	西华大学学报（哲学社会科学版） Journal of Xihua University (Philosophy & Social Sciences)	Vol. 39 No. 5	2020.9	×
23	国际利益相关者视角下中国参与全球卫生安全治理的作用研究 Role of China’s participation in global health security governance based on international stakeholders perspective	中国公共卫生管理 Chinese Journal of Public Health Management	Vol. 38 No. 1	2022.2	×
24	基于利益相关者理论的民族地区社会管理创新 Social Administration Innovation in Minority Area on Stakeholder Theory	兰州文理学院学报（社会科学版） Journal of Lanzhou University of Arts and Science (Social Sciences)	Vol. 30 No. 1	2014.1	×
25	激励相容视角下的医疗卫生体制改革 Reform of Healthcare System under the Perspective of Incentive Compatibility	中国卫生经济 Chinese Health Economics	Vol. 29 No. 12	2010.12	×

26	集利益相关者权益为一体的社区卫生绩效测评系统 The Performance Evaluation System of Community Health with Stakeholder's Benefits	中国卫生事业管理 Chinese Health Service Management	Vol. 24 No. 10	2008.10	×
27	美国 FDA 2011～2015 财政年度战略重点（草案）——应对 21 世纪公共卫生挑战 FDA's strategic priorities for fiscal year 2011 ~ 2015 (Draft) -- meeting the public health challenges of the 21st century	中国药物经济学 China Journal of Pharmaceutical Economics	Vol. 5 No. 6	2010.12	×
28	社交媒体危机主题演化模型构建与趋势分析 Construction and Trend Analysis of Crisis Theme Evolution Mode in Social Media	图书情报工作 Library and Information Service	Vol. 65 No. 13	2021.7	×
29	新冠肺炎疫情对我国体育赛事利益相关者的影响及应对策略 Effects of Covid-19 on Sport Event Stakeholders in China and Its Countermeasures	北京体育大学学报 Journal of Beijing Sport University	Vol. 43 No. 11	2020.11	×
30	学校突发性公共卫生事件应对的探索 Exploration on Response to Public Health Events in Schools	教学与管理 Journal of Teaching and Management	Vol. 38 No. 18	2021.5	×
31	医联体建设中的利益协调困境及协同治理机制研究 Dilemma of Interest Coordination and Cooperative Governance Mechanism in the Construction of Medical Alliance	中国医院管理 Chinese Hospital Management	Vol. 41 No. 1	2021.1	×
32	医院管理者对医院医学新技术引进的认知态度研究 Research on the perception and attitude to new health technology adoption from the perspective of hospital administrators	中国医院 Chinese Hospitals	Vol. 22 No. 10	2018.10	×
33	整合营销传播理论在公共卫生危机中的应用研究——以 SARS 危机为例 Research on the application of integrated marketing communication theory in public health crisis – Take SARS crisis as an example	外国经济与管理 Foreign Economics & Management	Vol. 26 No. 10	2004.3	×

Annex B: List of Dissertations Collected from CNKI on Stakeholders of Public Health

	Title	University	Degree	Date	Valid
1	县域医共体建设中利益相关者冲突研究 -- 以广东省湛江市徐闻县为例 A Study on Stakeholder Conflict in the Construction of County Medical Community – A Case Study of Xuwen County Zhanjiang City Guangdong Province	华南理工大学 South China University of Technology	Master	2020.8	√
2	北京市零售药店执业药师配备现状及利益相关者的调查研究 Investigation on licensed pharmacists' current situation of Beijing retail pharmacies and stakeholders	北京中医药大学 Beijing University of Chinese Medicine	Master	2012.5	√
3	分级诊疗体系中利益相关者行为选择及意愿影响研究 Study on Behavior Choice and Willingness of the Stakeholders in Hierarchical Diagnosis System	武汉理工大学 Wuhan University of Technology	Doctor	2018.7	√
4	公立医院利益相关者及其利益诉求研究 Study on the Stakeholders and Their Interests Claims of Public Hospital	华中科技大学 Huazhong University of Science and Technology	Master	2009.5	√
5	基于棱柱法的社区卫生组织绩效评价研究 The performance evaluation research of community health organization based on The Performance Prism	中南大学 Central South University	Master	2012.5	√
6	基于利益相关者视角的腹膜透析液配送上门服务发展策略分析 The strategy analysis of home delivery service of peritoneal dialysis fluid based on stakeholder perspectives	安徽医科大学 Anhui Medical University	Master	2016.3	√
7	基于利益相关者视角构建城乡医疗联合体模式研究 Study of the Model Construction of Urban-Rural Health Association from the Perspective of Stakeholder Theory Based on a Health Association in Guangzhou	南方医科大学 Southern Medical University	Master	2018.5	√
8	基于主要利益相关者视角的国家基本药物制度运行机制的研究 The Study on the Operating Mechanism of National Essential Medicines System	南京中医药大学 Nanjing University of Chinese Medicine	Doctor	2013.4	√

	Based on the Perspective of the Major Stakeholders				
9	绩效棱柱在公共卫生部门中的应用 Application of performance prism in public health department	上海师范大学 Shanghai Normal University	Master	2015.5	√
10	契约式社区医疗服务的利益博弈与优化策略研究 Study on Benefit Game and Optimization Strategy of Contractual Community Medical Service	南昌大学 Nanchang University	Master	2018.6	√
11	社会资本参与公立医院改制：模式、风险与路径选择 Social Capital Involvement into Public Hospital Reform: Mode, Risk and Path Selection from the Perspective of Stakeholder Theory	南方医科大学 Southern Medical University	Master	2015.5	√
12	社区居家养老服务中心的社会投资回报研究 Research on the Social Return on Investment of the Community Home-Based Elderly Care Center	东南大学 Southeast University	Master	2019.5	√
13	突发公共卫生事件利益相关者在社交媒体中的关注点及演化模式 Topical evolution patterns of stakeholders in social media platforms regarding public health emergencies	武汉大学 Wuhan University	Master	2017.5	√
14	卫生领域利益相关者分析：方法学和医药改革评价研究 Stakeholder analysis in health: methodology and evaluation of pharmaceutical reform	山东大学 Shandong University	Master	2007.4	√
15	医疗联合体核心利益相关者及其利益诉求研究 Study on the Core Stakeholders and its Interests Claims of Regional Medical Union	遵义医学院 Zunyi Medical University	Master	2017.5	√
16	中国人用疫苗行业利益相关者识别及其相互关系研究 The study of stakeholders identification and relationship analysis in China’s human vaccines industry	北京邮电大学 Beijing University of Posts and Telecommunications	Master	2019.5	√
17	基于利益相关者的医药企业社会责任评价指标体系研究 Research on Evaluation Index System of Social Responsibility of Pharmaceutical Enterprises Based on Stakeholders	北京中医药大学 Beijing University of Chinese Medicine	Master	2013.4	×
18	跨国制药公司在全球公共卫生治理中的作用 The Role of Multinational Pharmaceutical Companies in Global Public Health Governance	外交学院 China Foreign Affairs University	Master	2018.6	×

19	山东省居民健康档案实施现状及对策分析 The Analysis of Current Situation and Countermeasures of Residents' Health Records Implementation in Shandong Province	山东大学 Shandong University	Master	2013.5	×
20	食品安全事件应急管理研究 Research on Emergency Management of Food Safety Event: Based on Stakeholders' Behavior and Risk Communication	中国农业大学 China Agricultural University	Doctor	2017.12	×
21	政府应对人感染禽流感防控政策演化逻辑研究 The study on Evolutionary logic of Prevention and Control Policy for Eradicated Avian-human Influenza – Take Guangdong Province as Example	暨南大学 Jinan University	Master	2016.6	×

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Annex C: Candidates for CRID-PHE Stakeholders

Table C.1 Stakeholders mentioned in the 18 valid Theses

Stakeholders	Number of Theses	Scores	Comments
Government health authorities	18	7	
Relevant government departments	13	5	Such as Ministry of Finance, Ministry of Science and Technology, Food and Drug Administration, Healthcare Security Administration
The public	17	7	People affected by public or medical health, such as patients
Medical or public health facilities	15	6	Such as hospitals, Centers for Disease Control and Prevention (CDC)
Enterprises	10	4	Enterprises benefiting from public health, such as pharmaceutical companies, hardware and software equipment suppliers, high-tech companies
Employees of medical or public health institutes	10	4	Such as doctors, pandemic prevention personnel
Communities	6	2	It refers not only to residential places (residential quarters), but also places for work (workplaces) and study (schools or school districts)
Social welfare organizations or professional associations	8	3	
Scientific research institutions and scholars	3	1	
Media	8	3	

Table C.2 Stakeholders mentioned in the 17 valid dissertations

Stakeholders	Number of dissertations	Scores	Comments
Government health authorities	14	6	
Relevant government departments	14	6	Such as Ministry of Finance, Ministry of Science and Technology, Food and Drug Administration, Healthcare Security Administration
The public	15	6	People affected by public or medical health, such as patients
Medical or public health institutes	12	5	Such as hospitals, Centers for Disease Control and Prevention (CDC)
Enterprises	14	6	Enterprises benefiting from public health, such as pharmaceutical companies, hardware and software equipment suppliers, high-tech companies
Employees of medical or public health institutes	13	5	Such as doctors, pandemic prevention personnel
Communities	4	2	It refers not only to residential places (residential quarters), but also to places for work (workplaces) and study (schools or school districts)
Social welfare organizations or professional associations	7	3	
Scientific research institutions and scholars	1	0	
Media	5	2	

Table C.3 Stakeholder candidates determined by literature research

Stakeholders	Scores	Comments
Government	7	We combine government health authorities and relevant government departments in Tables C.1 and C.2 into one stakeholder: the government.
The public	7	People affected by public health or having ability to promote public health
Medical or public health institutes	6	Such as Centers for Disease Control and Prevention (CDC), hospitals
Enterprises	5	Enterprises related to public health, such as pharmaceutical companies, Internet, big data and other high-tech companies
Communities	2	Such as the residential communities, workplaces and schools or school districts
Social welfare organizations or professional associations	3	Public health-related non-profits, NGOs, including professional associations
Scholars	0	Scholars and research institutions engaged in public health research
Media	3	Traditional media, new media, and other media.

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Annex D: Delphi Consultation Experts

D.1 List of experts invited in Delphi consultation

Number	Name	Information
1	郝元涛 Y. Hao	Gender: Male, Age: 53, Working Years: 26, Tel: 13610271412 School of Public Health, Peking Univ., Ph. D/Prof.
2	范阳东 Y. Fan	Gender: Male, Age: 45, Working Years: 19, Tel: 13580339500 School of Health Management, Guangzhou Medical Univ., Ph. D/Prof./Dean
3	邓文斌 W. Deng	Gender: Male, Age: 55, Working Years: 37, Tel: 15071561390 School of pharmacy (Shenzhen), Sun Yat-sen Univ., Ph. D/Prof./Dean
4	熊勇 Y. Xiong	Gender: Female, Age: 47, Working Years: 26, Tel: 13726807998 Nursing Dept., South China Affiliated Hospital, Shenzhen Univ., Master/Chief Nurse/Director
5	熊春霖 C. Xiong	Gender: Male, Age: 49, Working Years: 28, Tel: 18125225912 Dongfeng People Hospital, Zhongshan City, Guangdong Province Master/Chief Physician/Vice President
6	秦丽娜 L. Qin	Gender: Female, Age: 44, Working Years: 21, Tel: 159204661612 Morphological lab., Medical Experiment Center, Sun Yat-sen Univ., Ph. D/Associate Prof./Director
7	钱怡 Y. Qian	Gender: Female, Age: 49, Working Years: 31, Tel: 13632101533 School of Health Management, Southern Medical Univ., Ph. D/Prof./Vice President
8	汪皓 H. Wang	Gender: Male, Age: 56, Working Years: 30, Tel: 13500059209 Shenzhen Maternity & Child Health Affiliated Hospital, Southern Medical Univ., Master/Chief Physician/Vice President
9	齐鹏 P. Qi	Gender: Male, Age: 44, Working Years: 20, Tel: 13889906481 Guangzhou Municipal Bureau of Science and Technology Master/Deputy Director
10	贾敏 M. Jia	Gender: Female, Age: 44, Working Years: 25, Tel: 18928891337 Guangdong Provincial Bureau of Statistics S/Deputy Director

D.2 Briefing sent to experts before consultation

Before Delphi consultation, a letter was sent to the invited experts to facilitate their understanding:

Distinguished Experts:

Hello! We are conducting research on the topic of "Comprehensive and Real-time Information Disclosure of Public Health Events (CRID-PHE)". In view of your profound knowledge and rich practice in the field of public health, we sincerely invite you to participate in the research as a consulting expert to help us determine the potential stakeholders in the implementation of CRID-PHE. Thank you very much for your great support. We wish you all the best!

The CRID-PHE Research Group

I. Background Introduction

Background 1: Comprehensive and Real-time Disclosure of Public Health Events

At present, only during a public health crisis would the authorities disclose information in real time about the major public health emergency that triggers the crisis. For example, during the COVID-19 pandemic, the authorities released the latest statistics of the pandemic every day. However, in daily life, a large number of public health events occur every day, and their occurrence has become normalized. Although these events will not trigger a public health crisis due to their limited hazard, they may affect the physical and mental health of some public groups and even the entire public. However, at present, the authorities generally do not disclose the information of these events to the public in real time. For example, PM2.5 is a public health event that occurs all the time, but in the past, the real-time status of PM2.5 was not disclosed to the public. Through the efforts of scholars, social groups, and the media, PM2.5 has now become part of daily weather broadcast, and some neighborhoods even set up PM2.5 signboard to show the local PM2.5 in real time. The purpose of "Comprehensive and Real-time Information Disclosure of Public Health Events" (CRID-PHE) is to enable the public to know about the ongoing public health events around them.

Background 2: Stakeholder Theory

The stakeholder theory originated from enterprise management. The so-called stakeholders of an enterprise are individuals, groups, and environments that affect or are affected by the operation of the enterprise. The stakeholder theory emphasizes that an enterprise can only succeed if the interests of various stakeholders are fully considered and coordinated. At present, the application of the stakeholder theory has expanded from enterprise management to social, political, and economic fields, such as public health governance. Our research intends to apply the stakeholder theory to study CRID-PHE.

When using the stakeholder theory to study a specific topic (such as our topic CRID-PHE), the relevant stakeholders are first identified and then are classified according to their relevance in various aspects.

II. Explanation of the Method Used

The Delphi multi-round scoring method is used to identify and classify the stakeholders. At first, based on literature research, the candidates of stakeholders are identified and presented to experts for the first-round scoring. The scores are the integers between 0-7, representing to what extent you think it is a stakeholder. The average of the scores given by all experts is taken as the score of the stakeholder in this round, which will be presented to the experts in the next round for further scoring. This process repeats round after round until the experts' scores no longer change.

We have already identified the stakeholder candidates through literature research, following the following steps: First, we used "public health + stakeholder" as the key word combination to search for relevant dissertations and scientific Theses on the subject domain of CNKI. The stakeholders proposed in these dissertations and Theses are taken as the stakeholder candidates. Furthermore, each stakeholder candidate received a score between 1-7 depending on the number of dissertations and Theses in which it was mentioned. The stakeholder candidates and their scores will be presented to experts only for reference.

III. Explanation of the Expert Consultation Form

In the expert consultation form, in addition to asking experts to judge whether certain individuals or groups are stakeholders of CRID-PHE, we have listed three characteristics: influence, benefits, and resources. Experts are also asked to judge whether the stakeholder possess these characteristics.

- Influence: Since CRID-PHE is just an initiative and is still in the pre-research stage, we pay special attention to those stakeholders who have influence on promoting the establishment and implementation of CRID-PHE;
- Benefits: These stakeholders benefit directly from CRID-PHE implementation, and they will be most active advocates of CRID-PHE;
- Resources: Different from other public health service programs, CRID-PHE is essentially a digital public health service program based on internet, public health big data, and high technology. Therefore, we are particularly concerned with those stakeholders who can provide data resources and technical support for CRID-PHE implementation.

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Annex E: Delphi Expert Consultation Data

In the thesis, we first identified public health stakeholders based on the results of literature research. Then, on this basis, 10 experts were invited to identify and classify the CRID-PHE stakeholders following the procedure of the Delphi method. The Delphi method involves multiple rounds of consultations with experts. In the case of CRID-PHE, by using the improved Delphi method proposed in this thesis (See §5.2), the opinions of the 10 experts rapidly converged after three rounds of Delphi expert consultation. The raw data collected from the 10 experts during the three rounds of Delphi consultations can be found in the following.

The name list of the 10 experts is provided in Annex D.1. Before consultation, each expert received an email, in which the consultation purpose, some involved concepts, and the consultation procedure were explained.

The layout of the scoring tables was also explained, as follows:

(1) The “identification score” is a score on whether a candidate can be identified as a CRD-PHE stakeholder. The scores are between 7 and 1, with 7 indicating high agreement and 1 indicating complete disagreement.

(2) The “salience score” is a score for whether a candidate has a certain trait (influence, benefits, resources). The score is between 7 and 1, with 7 indicating complete possession and 1 indicating no possession at all. The meanings of influence, benefits, and resources are as follows:

- Influence refers to that the stakeholder has influence on the establishment and implementation of CRD-PHE;
- Benefits mean the stakeholder directly benefits from the implementation of CRD-PHE;
- Resources refer to that the stakeholder has the funds, data, technology, and other resources needed for CRD-PHE implementation.

(3) In the first round of scoring, the scores we obtained through calculations (See §3.2.2) were provided for reference. The scores were calculated based on the level of scientific journals (core or non-core), the level of universities (“985”, “211”, or ordinary universities), and the frequency of occurrence of the candidate in scientific Theses or dissertations.

(4) The average of the scores given by 10 experts in each round is the final result of this round. The results of each round are shown in the table are shown in Tables 4-1, 4-2, and 4-3.

E.1 Raw data collected in the first round of Delphi consultation

Expert No. 1 – Scoring on Identification and Salience of Stakeholders (The First Round)

利益相关者 Stakeholders	文献调研的识别评分（仅供参考） Scores of Identifications Based on Literature Research (Only For Reference)	识别评分 Scoring on Identification	属性评分 Scoring on Salience		
			影响力 Influence	受益性 Benefits	资源性 Resources
政府 Government	7	7	7	0	7
公众 The Public	7	6	2	7	0
公共卫生或医疗机构 Medical or Public Health Institutes	6	6	4	4	5
企业 Enterprises	5	3	0	1	2
社区 Communities	2	5	2	5	0
社会团体或公益组织 Social or Public Welfare Organizations	3	3	4	0	0
学者 Scholars	0	3	4	0	0
媒体 Media	3	3	3	3	0

如果您有什么建议，请告诉我们，不胜感激！(If you have any suggestions, please let me know. Thank you very much!):

签名（Signature）: 郝元涛

日期（Date):2022.9.5

Expert No. 2 – Scoring on Identification and Salience of Stakeholders (The First Round)

利益相关者 Stakeholders	文献调研的识别评分（仅供参考） Scores of Identifications Based on Literature Research (Only For Reference)	识别评分 Scoring on Identification	属性评分 Scoring on Salience		
			影响力 Influence	受益性 Benefits	资源性 Resources
政府 Government	7	7	7	0	6
公众 The Public	7	3	1	6	0
公共卫生或医疗机构 Medical or Public Health Institutes	6	5	5	4	5
企业 Enterprises	5	2	0	1	1
社区 Communities	2	3	2	3	0
社会团体或公益组织 Social or Public Welfare Organizations	3	4	4	0	0
学者 Scholars	0	4	4	0	0
媒体 Media	3	4	5	2	0

如果您有什么建议，请告诉我们，不胜感激！(If you have any suggestions, please let me know. Thank you very much!):

我觉得，媒体可以分为官媒和自媒体，官媒代表政府，某种意义上是政府的一个组成部分。建议媒体明确指定为自媒体。(In my opinion, the media can be divided into official media and self-media. Official media represents the government's opinion and in a sense can be regarded a part of the government. It is recommended that the media be clearly designated as self-media.)

签名（Signature）: 岳阳东

日期（Date):2022.9.5

Expert No. 3 – Scoring on Identification and Salience of Stakeholders (The First Round)

利益相关者 Stakeholders	文献调研的识别评分（仅供参考）Scores of Identifications Based on Literature Research (Only For Reference)	识别评分 Scoring on Identification	属性评分 Scoring on Salience		
			影响力 Influence	受益性 Benefits	资源性 Resources
政府 Government	7	7	7	0	7
公众 The Public	7	5	2	7	0
公共卫生或医疗机构 Medical or Public Health Institutes	6	5	4	2	5
企业 Enterprises	5	3	0	1	2
社区 Communities	2	3	2	5	0
社会团体或公益组织 Social or Public Welfare Organizations	3	4	4	0	0
学者 Scholars	0	5	4	0	0
媒体 Media	3	4	5	1	0

如果您有什么建议，请告诉我们，不胜感激！(If you have any suggestions, please let me know. Thank you very much!):

签名（Signature）:

日期（Date):2022.9.5

Expert No. 4 – Scoring on Identification and Salience of Stakeholders (The First Round)

利益相关者 Stakeholders	文献调研的识别评分（仅供参考）Scores of Identifications Based on Literature Research (Only For Reference)	识别评分 Scoring on Identification	属性评分 Scoring on Salience		
			影响力 Influence	受益性 Benefits	资源性 Resources
政府 Government	7	7	7	0	7
公众 The Public	7	3	2	5	0
公共卫生或医疗机构 Medical or Public Health Institutes	6	7	3	2	5
企业 Enterprises	5	1	0	0	1
社区 Communities	2	5	2	2	0
社会团体或公益组织 Social or Public Welfare Organizations	3	3	4	0	0
学者 Scholars	0	4	4	0	0
媒体 Media	3	2	5	3	0
如果您有什么建议，请告诉我们，不胜感激！(If you have any suggestions, please let me know. Thank you very much!): 属性的概念太抽象了，可否稍微说明一下(The concept of salience is too abstract. Can you explain it a little bit?)					

签名（Signature）: 

日期（Date):2022.9.5

Expert No. 5 – Scoring on Identification and Salience of Stakeholders (The First Round)

利益相关者 Stakeholders	文献调研的识别评分（仅供参考） Scores of Identifications Based on Literature Research (Only For Reference)	识别评分 Scoring on Identification	属性评分 Scoring on Salience		
			影响力 Influence	受益性 Benefits	资源性 Resources
政府 Government	7	7	7	0	7
公众 The Public	7	3	3	5	0
公共卫生或医疗机构 Medical or Public Health Institutes	6	6	3	3	4
企业 Enterprises	5	1	2	2	2
社区 Communities	2	1	2	5	0
社会团体或公益组织 Social or Public Welfare Organizations	3	2	3	0	0
学者 Scholars	0	3	5	0	0
媒体 Media	3	1	1	2	0

如果您有什么建议，请告诉我们，不胜感激！(If you have any suggestions, please let me know. Thank you very much!):

签名（Signature）:

日期（Date):2022.9.5

Expert No. 6 – Scoring on Identification and Salience of Stakeholders (The First Round)

利益相关者 Stakeholders	文献调研的识别评分（仅供参考） Scores of Identifications Based on Literature Research (Only For Reference)	识别评分 Scoring on Identification	属性评分 Scoring on Salience		
			影响力 Influence	受益性 Benefits	资源性 Resources
政府 Government	7	7	7	0	7
公众 The Public	7	5	1	7	0
公共卫生或医疗机构 Medical or Public Health Institutes	6	4	5	3	5
企业 Enterprises	5	3	0	2	2
社区 Communities	2	3	1	6	0
社会团体或公益组织 Social or Public Welfare Organizations	3	4	3	0	0
学者 Scholars	0	4	2	0	0
媒体 Media	3	4	1	1	0

如果您有什么建议，请告诉我们，不胜感激！(If you have any suggestions, please let me know. Thank you very much!):

CRD-PHE 属于公共卫生的范畴，建议“公共卫生或医疗机构”只考虑“公共卫生机”（CRD-PHE is within the scope of public health. It is suggested that “medical or public health institutes” is changed to “public health institutions” only.）

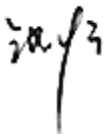
签名（Signature）:秦丽娜

日期（Date):2022.9.5

Expert No. 7 – Scoring on Identification and Salience of Stakeholders (The First Round)

利益相关者 Stakeholders	文献调研的识别评分（仅供参考） Scores of Identifications Based on Literature Research (Only For Reference)	识别评分 Scoring on Identification	属性评分 Scoring on Salience		
			影响力 Influence	受益性 Benefits	资源性 Resources
政府 Government	7	7	7	0	7
公众 The Public	7	4	3	5	0
公共卫生或医疗机构 Medical or Public Health Institutes	6	7	5	5	6
企业 Enterprises	5	1	0	1	1
社区 Communities	2	3	1	5	0
社会团体或公益组织 Social or Public Welfare Organizations	3	2	2	0	0
学者 Scholars	0	2	2	0	0
媒体 Media	3	3	2	2	0

如果您有什么建议，请告诉我们，不胜感激！(If you have any suggestions, please let me know. Thank you very much!):



签名（Signature):

日期（Date):2022.9.5

Expert No. 8 – Scoring on Identification and Salience of Stakeholders (The First Round)

利益相关者 Stakeholders	文献调研的识别评分（仅供参考） Scores of Identifications Based on Literature Research (Only For Reference)	识别评分 Scoring on Identification	属性评分 Scoring on Salience		
			影响力 Influence	受益性 Benefits	资源性 Resources
政府 Government	7	7	7	0	7
公众 The Public	7	5	4	7	0
公共卫生或医疗机构 Medical or Public Health Institutes	6	6	6	5	5
企业 Enterprises	5	2	0	0	2
社区 Communities	2	2	3	5	0
社会团体或公益组织 Social or Public Welfare Organizations	3	2	4	0	0
学者 Scholars	0	3	5	0	0
媒体 Media	3	4	2	3	0

如果您有什么建议，请告诉我们，不胜感激！(If you have any suggestions, please let me know. Thank you very much!):

签名（Signature）:

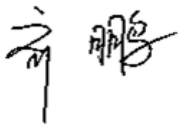
日期（Date):2022.9.5

Expert No. 9 – Scoring on Identification and Salience of Stakeholders (The First Round)

利益相关者 Stakeholders	文献调研的识别评分（仅供参考） Scores of Identifications Based on Literature Research (Only For Reference)	识别评分 Scoring on Identification	属性评分 Scoring on Salience		
			影响力 Influence	受益性 Benefits	资源性 Resources
政府 Government	7	7	7	0	6
公众 The Public	7	3	2	5	0
公共卫生或医疗机构 Medical or Public Health Institutes	6	7	2	4	2
企业 Enterprises	5	3	0	1	5
社区 Communities	2	3	2	5	0
社会团体或公益组织 Social or Public Welfare Organizations	3	3	5	0	0
学者 Scholars	0	2	6	0	0
媒体 Media	3	2	3	3	0

如果您有什么建议，请告诉我们，不胜感激！(If you have any suggestions, please let me know. Thank you very much!):

企业的概念太宽泛了，建议把企业限制到与海量信息监测、存储、管理和可视化展示相关的高科技企业。(The concept of enterprises is too broad. It is suggested that enterprise is limited to the high-tech enterprises related to monitoring, storage, management, and visual display of massive information.)

签名（Signature）: 

日期（Date):2022.9.5

Expert No. 10 – Scoring on Identification and Salience of Stakeholders (The First Round)

利益相关者 Stakeholders	文献调研的识别评分（仅供参考） Scores of Identifications Based on Literature Research (Only For Reference)	识别评分 Scoring on Identification	属性评分 Scoring on Salience		
			影响力 Influence	受益性 Benefits	资源性 Resources
政府 Government	7	7	7	0	5
公众 The Public	7	3	4	7	0
公共卫生或医疗机构 Medical or Public Health Institutes	6	6	6	5	5
企业 Enterprises	5	2	1	0	2
社区 Communities	2	3	3	6	0
社会团体或公益组织 Social or Public Welfare Organizations	3	3	4	0	0
学者 Scholars	0	4	6	0	0
媒体 Media	3	3	2	2	0

如果您有什么建议，请告诉我们，不胜感激！(If you have any suggestions, please let me know. Thank you very much!):

签名（Signature）: 

日期（Date):2022.9.5

E.2 The raw data collected in the second round of Delphi consultation

Expert No. 1 – Scoring on Identification and Salience of Stakeholders (The Second Round)

利益相关者 Stakeholders	上一轮识别评分的平均分（仅供本轮评分参考） Average Score of the Previous Round on Identification (Only For Reference in This Round)	上一轮属性评分的平均分（仅供本轮评分参考） Average Score of the Previous Round on Salience (Only For Reference in This Round)			识别评分 Scoring on Identification	属性评分 Scoring on Salience		
		影响力 Influence	受益性 Benefits	资源性 Resources		影响力 Influence	受益性 Benefits	资源性 Resources
政府 Government	7	7	0	7	7	7	2	6
普通百姓 The Public	4	3	6	0	6	2	6	0
公共卫生机构 Public Health Institutes	6	4	4	5	6	4	2	5
互联网、大数据等高科技企业 Internet, big data, and other high-tech enterprises	2	0	1	2	4	0	2	6
社区 Communities	3	2	6	0	5	3	5	0
社会团体或公益组织 Social or Public Welfare Organizations	3	2	4	0	3	4	0	0

学者 Scholars	3	4	0	0	4	5	0	0
自媒体或新媒体 Self-Media or New Media	3	3	2	0	5	3	3	2

如果您有什么建议，请告诉我们，不胜感激！(If you have any suggestions, please let me know. Thank you very much!):

说明(Explanation):

（1）根据上一轮一些专家的建议，在“利益相关者”一栏中，“企业”限制为“互联网、大数据等高科技企业”，“媒体”限制为“自媒体或新媒体”；(According to some experts' suggestions in the previous round of consultation, in the Stakeholders column, "Enterprises" are limited to "Internet, big data, and other high-tech enterprises" and "Media" are limited to "Self-Media or New Media".)

（2）属性的具体含义如下(The specific meanings of Salience are as follows):

- 影响力：对推动 CRID-PHE 有影响力的利益相关者(Influence: the stakeholders have influence on promoting CRID-PHE)
- 收益性：因 CRID-PHE 的实施而直接受益的利益相关者(Benefit: the stakeholders are the direct beneficiaries of CRID-PHE)
- 资源性：拥有 CRID-PHE 实施所需要的资源的利益相关者(Resources: the stakeholders have the resources required for the implementation of CRID-PHE)

签名（Signature）: 郝元涛

日期（Date):2022.9.25

Expert No. 2 – Scoring on Identification and Salience of Stakeholders (The Second Round)

利益相关者 Stakeholders	上一轮识别评分的平均分（仅供本轮评分参考） Average Score of the Previous Round on Identification (Only For Reference in This Round)	上一轮属性评分的平均分（仅供本轮评分参考） Average Score of the Previous Round on Salience (Only For Reference in This Round)			识别评分 Scoring on Identification	属性评分 Scoring on Salience		
		影响力 Influence	受益性 Benefits	资源性 Resources		影响力 Influence	受益性 Benefits	资源性 Resources
政府 Government	7	7	0	7	7	7	3	6
普通百姓 The Public	4	3	6	0	6	1	7	0
公共卫生机构 Public Health Institutes	6	4	4	5	5	5	2	6
互联网、大数据等高科技企业 Internet, big data, and other high-tech enterprises	2	0	1	2	6	1	3	6
社区 Communities	3	2	6	0	6	2	4	0
社会团体或公益组织 Social or Public Welfare Organizations	3	2	4	0	3	4	0	0
学者 Scholars	3	4	0	0	5	5	0	0
自媒体或新媒体	3	3	2	0	6	4	3	3

Self-Media or New Media	
如果您有什么建议，请告诉我们，不胜感激！(If you have any suggestions, please let me know. Thank you very much!):	

说明(Explanation):

（1）根据上一轮一些专家的建议，在“利益相关者”一栏中，“企业”限制为“互联网、大数据等高科技企业”，“媒体”限制为“自媒体或新媒体”；(According to some experts’ suggestions in the previous round of consultation, in the Stakeholders column, “Enterprises” are limited to “Internet, big data, and other high-tech enterprises” and “Media” are limited to “Self-Media or New Media”.)

（2）属性的具体含义如下(The specific meanings of Salience are as follows):

- 影响力：对推动 CRID-PHE 有影响力的利益相关者(Influence: the stakeholders have influence on promoting CRID-PHE)
- 收益性：因 CRID-PHE 的实施而直接受益的利益相关者(Benefit: the stakeholders are the direct beneficiaries of CRID-PHE)
- 资源性：拥有 CRID-PHE 实施所需要的资源的利益相关者(Resources: the stakeholders have the resources required for the implementation of CRID-PHE)

签名（Signature）: 范阳东

日期（Date):2022.9.25

Expert No. 3 – Scoring on Identification and Salience of Stakeholders (The Second Round)

利益相关者 Stakeholders	上一轮识别评分的平均分（仅供本轮评分参考） Average Score of the Previous Round on Identification (Only For Reference in This Round)	上一轮属性评分的平均分（仅供本轮评分参考） Average Score of the Previous Round on Salience (Only For Reference in This Round)			识别评分 Scoring on Identification	属性评分 Scoring on Salience		
		影响力 Influence	受益性 Benefits	资源性 Resources		影响力 Influence	受益性 Benefits	资源性 Resources
政府 Government	7	7	0	7	7	7	1	6
普通百姓 The Public	4	3	6	0	7	2	7	0
公共卫生机构 Public Health Institutes	6	4	4	5	6	5	2	6
互联网、大数据等高科技企业 Internet, big data, and other high-tech enterprises	2	0	1	2	4	0	2	6
社区 Communities	3	2	6	0	5	4	4	0
社会团体或公益组织 Social or Public Welfare Organizations	3	2	4	0	4	6	1	0
学者 Scholars	3	4	0	0	3	5	0	0
自媒体或新媒体	3	3	2	0	5	3	4	3

Self-Media or New Media	
如果您有什么建议，请告诉我们，不胜感激！(If you have any suggestions, please let me know. Thank you very much!):	

说明(Explanation):

（1）根据上一轮一些专家的建议，在“利益相关者”一栏中，“企业”限制为“互联网、大数据等高科技企业”，“媒体”限制为“自媒体或新媒体”；(According to some experts’ suggestions in the previous round of consultation, in the Stakeholders column, “Enterprises” are limited to “Internet, big data, and other high-tech enterprises” and “Media” are limited to “Self-Media or New Media”.)

（2）属性的具体含义如下(The specific meanings of Salience are as follows):

- 影响力：对推动 CRID-PHE 有影响力的利益相关者(Influence: the stakeholders have influence on promoting CRID-PHE)
- 收益性：因 CRID-PHE 的实施而直接受益的利益相关者(Benefit: the stakeholders are the direct beneficiaries of CRID-PHE)
- 资源性：拥有 CRID-PHE 实施所需要的资源的利益相关者(Resources: the stakeholders have the resources required for the implementation of CRID-PHE)

签名（Signature）:

日期（Date):2022.9.25

Expert No. 4 – Scoring on Identification and Salience of Stakeholders (The Second Round)

利益相关者 Stakeholders	上一轮识别评分的平均分（仅供本轮评分参考） Average Score of the Previous Round on Identification (Only For Reference in This Round)	上一轮属性评分的平均分（仅供本轮评分参考） Average Score of the Previous Round on Salience (Only For Reference in This Round)			识别评分 Scoring on Identification	属性评分 Scoring on Salience		
		影响力 Influence	受益性 Benefits	资源性 Resources		影响力 Influence	受益性 Benefits	资源性 Resources
政府 Government	7	7	0	7	7	7	0	6
普通百姓 The Public	4	3	6	0	7	3	5	0
公共卫生机构 Public Health Institutes	6	4	4	5	4	4	3	5
互联网、大数据等高科技企业 Internet, big data, and other high-tech enterprises	2	0	1	2	5	0	2	6
社区 Communities	3	2	6	0	6	2	6	0
社会团体或公益组织 Social or Public Welfare Organizations	3	2	4	0	2	4	1	0
学者 Scholars	3	4	0	0	3	5	0	0
自媒体或新媒体	3	3	2	0	5	3	4	2

Self-Media or New Media	
如果您有什么建议，请告诉我们，不胜感激！(If you have any suggestions, please let me know. Thank you very much!):	

说明(Explanation):

（1）根据上一轮一些专家的建议，在“利益相关者”一栏中，“企业”限制为“互联网、大数据等高科技企业”，“媒体”限制为“自媒体或新媒体”；(According to some experts’ suggestions in the previous round of consultation, in the Stakeholders column, “Enterprises” are limited to “Internet, big data, and other high-tech enterprises” and “Media” are limited to “Self-Media or New Media”.)

（2）属性的具体含义如下(The specific meanings of Salience are as follows):

- 影响力：对推动 CRID-PHE 有影响力的利益相关者(Influence: the stakeholders have influence on promoting CRID-PHE)
- 收益性：因 CRID-PHE 的实施而直接受益的利益相关者(Benefit: the stakeholders are the direct beneficiaries of CRID-PHE)
- 资源性：拥有 CRID-PHE 实施所需要的资源的利益相关者(Resources: the stakeholders have the resources required for the implementation of CRID-PHE)

签名（Signature）: 

日期（Date):2022.9.25

Expert No. 5 – Scoring on Identification and Salience of Stakeholders (The Second Round)

利益相关者 Stakeholders	上一轮识别评分的平均分（仅供本轮评分参考） Average Score of the Previous Round on Identification (Only for Reference in This Round)	上一轮属性评分的平均分（仅供本轮评分参考） Average Score of the Previous Round on Salience (Only For Reference in This Round)			识别评分 Scoring on Identification	属性评分 Scoring on Salience		
		影响力 Influence	受益性 Benefits	资源性 Resources		影响力 Influence	受益性 Benefits	资源性 Resources
政府 Government	7	7	0	7	7	7	2	6
普通百姓 The Public	4	3	6	0	7	1	7	0
公共卫生机构 Public Health Institutes	6	4	4	5	5	6	3	5
互联网、大数据等高科技企业 Internet, big data, and other high-tech enterprises	2	0	1	2	6	1	3	4
社区 Communities	3	2	6	0	6	3	5	0
社会团体或公益组织 Social or Public Welfare Organizations	3	2	4	0	3	4	0	0
学者 Scholars	3	4	0	0	4	5	0	0
自媒体或新媒体	3	3	2	0	6	4	5	3

Self-Media or New Media	
如果您有什么建议，请告诉我们，不胜感激！(If you have any suggestions, please let me know. Thank you very much!):	

说明（Explanation):

（1）根据上一轮一些专家的建议，在“利益相关者”一栏中，“企业”限制为“互联网、大数据等高科技企业”，“媒体”限制为“自媒体或新媒体”；(According to some experts’ suggestions in the previous round of consultation, in the Stakeholders column, “Enterprises” are limited to “Internet, big data, and other high-tech enterprises” and “Media” are limited to “Self-Media or New Media”.)

（2）属性的具体含义如下(The specific meanings of Salience are as follows):

- 影响力：对推动 CRID-PHE 有影响力的利益相关者(Influence: the stakeholders have influence on promoting CRID-PHE)
- 收益性：因 CRID-PHE 的实施而直接受益的利益相关者(Benefit: the stakeholders are the direct beneficiaries of CRID-PHE)
- 资源性：拥有 CRID-PHE 实施所需要的资源的利益相关者(Resources: the stakeholders have the resources required for the implementation of CRID-PHE)

签名（Signature):

日期（Date):2022.9.25

Expert No. 6 – Scoring on Identification and Salience of Stakeholders (The Second Round)

利益相关者 Stakeholders	上一轮识别评分的平均分（仅供本轮评分参考） Average Score of the Previous Round on Identification (Only For Reference in This Round)	上一轮属性评分的平均分（仅供本轮评分参考） Average Score of the Previous Round on Salience (Only For Reference in This Round)			识别评分 Scoring on Identification	属性评分 Scoring on Salience		
		影响力 Influence	受益性 Benefits	资源性 Resources		影响力 Influence	受益性 Benefits	资源性 Resources
政府 Government	7	7	0	7	7	7	3	6
普通百姓 The Public	4	3	6	0	6	2	6	0
公共卫生机构 Public Health Institutes	6	4	4	5	5	5	4	5
互联网、大数据等高科技企业 Internet, big data, and other high-tech enterprises	2	0	1	2	5	1	3	5
社区 Communities	3	2	6	0	5	2	6	0
社会团体或公益组织 Social or Public Welfare Organizations	3	2	4	0	3	5	0	0
学者 Scholars	3	4	0	0	3	5	0	0
自媒体或新媒体	3	3	2	0	6	2	3	2

Self-Media or New Media	
如果您有什么建议，请告诉我们，不胜感激！(If you have any suggestions, please let me know. Thank you very much!):	

说明（Explanation):

（1）根据上一轮一些专家的建议，在“利益相关者”一栏中，“企业”限制为“互联网、大数据等高科技企业”，“媒体”限制为“自媒体或新媒体”；(According to some experts’ suggestions in the previous round of consultation, in the Stakeholders column, “Enterprises” are limited to “Internet, big data, and other high-tech enterprises” and “Media” are limited to “Self-Media or New Media”.)

（2）属性的具体含义如下(The specific meanings of Salience are as follows):

- 影响力：对推动 CRID-PHE 有影响力的利益相关者(Influence: the stakeholders have influence on promoting CRID-PHE)
- 收益性：因 CRID-PHE 的实施而直接受益的利益相关者(Benefit: the stakeholders are the direct beneficiaries of CRID-PHE)
- 资源性：拥有 CRID-PHE 实施所需要的资源的利益相关者(Resources: the stakeholders have the resources required for the implementation of CRID-PHE)

签名（Signature):秦丽娜

日期（Date):2022.9.25

Expert No. 7 – Scoring on Identification and Salience of Stakeholders (The Second Round)

利益相关者 Stakeholders	上一轮识别评分的平均分（仅供本轮评分参考） Average Score of the Previous Round on Identification (Only For Reference in This Round)	上一轮属性评分的平均分（仅供本轮评分参考） Average Score of the Previous Round on Salience (Only For Reference in This Round)			识别评分 Scoring on Identification	属性评分 Scoring on Salience		
		影响力 Influence	受益性 Benefits	资源性 Resources		影响力 Influence	受益性 Benefits	资源性 Resources
政府 Government	7	7	0	7	7	7	2	6
普通百姓 The Public	4	3	6	0	6	3	6	0
公共卫生机构 Public Health Institutes	6	4	4	5	5	5	3	5
互联网、大数据等高科技企业 Internet, big data, and other high-tech enterprises	2	0	1	2	6	0	2	3
社区 Communities	3	2	6	0	5	3	6	0
社会团体或公益组织 Social or Public Welfare Organizations	3	2	4	0	3	5	0	0
学者 Scholars	3	4	0	0	5	6	0	0
自媒体或新媒体	3	3	2	0	5	3	4	3

Self-Media or New Media	
如果您有什么建议，请告诉我们，不胜感激！(If you have any suggestions, please let me know. Thank you very much!):	

说明（Explanation):

（1）根据上一轮一些专家的建议，在“利益相关者”一栏中，“企业”限制为“互联网、大数据等高科技企业”，“媒体”限制为“自媒体或新媒体”；(According to some experts’ suggestions in the previous round of consultation, in the Stakeholders column, “Enterprises” are limited to “Internet, big data, and other high-tech enterprises” and “Media” are limited to “Self-Media or New Media”.)

（2）属性的具体含义如下(The specific meanings of Salience are as follows):

- 影响力：对推动 CRID-PHE 有影响力的利益相关者(Influence: the stakeholders have influence on promoting CRID-PHE)
- 收益性：因 CRID-PHE 的实施而直接受益的利益相关者(Benefit: the stakeholders are the direct beneficiaries of CRID-PHE)
- 资源性：拥有 CRID-PHE 实施所需要的资源的利益相关者(Resources: the stakeholders have the resources required for the implementation of CRID-PHE)

签名（Signature):

日期（Date):2022.9.25

Expert No. 8 – Scoring on Identification and Salience of Stakeholders (The Second Round)

利益相关者 Stakeholders	上一轮识别评分的平均分（仅供本轮评分参考） Average Score of the Previous Round on Identification (Only For Reference in This Round)	上一轮属性评分的平均分（仅供本轮评分参考） Average Score of the Previous Round on Salience (Only For Reference in This Round)			识别评分 Scoring on Identification	属性评分 Scoring on Salience		
		影响力 Influence	受益性 Benefits	资源性 Resources		影响力 Influence	受益性 Benefits	资源性 Resources
政府 Government	7	7	0	7	7	7	2	6
普通百姓 The Public	4	3	6	0	7	0	7	0
公共卫生机构 Public Health Institutes	6	4	4	5	6	4	4	6
互联网、大数据等高科技企业 Internet, big data, and other high-tech enterprises	2	0	1	2	4	0	2	4
社区 Communities	3	2	6	0	6	2	5	0
社会团体或公益组织 Social or Public Welfare Organizations	3	2	4	0	4	4	0	0
学者 Scholars	3	4	0	0	4	5	0	0
自媒体或新媒体	3	3	2	0	5	2	3	3

Self-Media or New Media	
如果您有什么建议，请告诉我们，不胜感激！(If you have any suggestions, please let me know. Thank you very much!):	

说明（Explanation):

（1）根据上一轮一些专家的建议，在“利益相关者”一栏中，“企业”限制为“互联网、大数据等高科技企业”，“媒体”限制为“自媒体或新媒体”；(According to some experts’ suggestions in the previous round of consultation, in the Stakeholders column, “Enterprises” are limited to “Internet, big data, and other high-tech enterprises” and “Media” are limited to “Self-Media or New Media”.)

（2）属性的具体含义如下(The specific meanings of Salience are as follows):

- 影响力：对推动 CRID-PHE 有影响力的利益相关者(Influence: the stakeholders have influence on promoting CRID-PHE)
- 收益性：因 CRID-PHE 的实施而直接受益的利益相关者(Benefit: the stakeholders are the direct beneficiaries of CRID-PHE)
- 资源性：拥有 CRID-PHE 实施所需要的资源的利益相关者(Resources: the stakeholders have the resources required for the implementation of CRID-PHE)

签名（Signature):

日期（Date):2022.9.25

Expert No. 9 – Scoring on Identification and Salience of Stakeholders (The Second Round)

利益相关者 Stakeholders	上一轮识别评分的平均分（仅供本轮评分参考） Average Score of the Previous Round on Identification (Only For Reference in This Round)	上一轮属性评分的平均分（仅供本轮评分参考） Average Score of the Previous Round on Salience (Only For Reference in This Round)			识别评分 Scoring on Identification	属性评分 Scoring on Salience		
		影响力 Influence	受益性 Benefits	资源性 Resources		影响力 Influence	受益性 Benefits	资源性 Resources
政府 Government	7	7	0	7	7	7	3	6
普通百姓 The Public	4	3	6	0	7	2	6	0
公共卫生机构 Public Health Institutes	6	4	4	5	4	6	3	6
互联网、大数据等高科技企业 Internet, big data, and other high-tech enterprises	2	0	1	2	5	2	3	4
社区 Communities	3	2	6	0	5	2	6	0
社会团体或公益组织 Social or Public Welfare Organizations	3	2	4	0	3	5	0	0
学者 Scholars	3	4	0	0	5	6	0	0
自媒体或新媒体	3	3	2	0	6	3	3	3

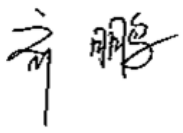
Self-Media or New Media	
如果您有什么建议，请告诉我们，不胜感激！(If you have any suggestions, please let me know. Thank you very much!):	

说明（Explanation):

（1）根据上一轮一些专家的建议，在“利益相关者”一栏中，“企业”限制为“互联网、大数据等高科技企业”，“媒体”限制为“自媒体或新媒体”；(According to some experts’ suggestions in the previous round of consultation, in the Stakeholders column, “Enterprises” are limited to “Internet, big data, and other high-tech enterprises” and “Media” are limited to “Self-Media or New Media”.)

（2）属性的具体含义如下(The specific meanings of Salience are as follows):

- 影响力：对推动 CRID-PHE 有影响力的利益相关者(Influence: the stakeholders have influence on promoting CRID-PHE)
- 收益性：因 CRID-PHE 的实施而直接受益的利益相关者(Benefit: the stakeholders are the direct beneficiaries of CRID-PHE)
- 资源性：拥有 CRID-PHE 实施所需要的资源的利益相关者(Resources: the stakeholders have the resources required for the implementation of CRID-PHE)

签名（Signature）: 

日期（Date):2022.9.25

Expert No. 10 – Scoring on Identification and Salience of Stakeholders (The Second Round)

利益相关者 Stakeholders	上一轮识别评分的平均分（仅供本轮评分参考） Average Score of the Previous Round on Identification (Only For Reference in This Round)	上一轮属性评分的平均分（仅供本轮评分参考） Average Score of the Previous Round on Salience (Only For Reference in This Round)			识别评分 Scoring on Identification	属性评分 Scoring on Salience		
		影响力 Influence	受益性 Benefits	资源性 Resources		影响力 Influence	受益性 Benefits	资源性 Resources
政府 Government	7	7	0	7	7	7	2	6
普通百姓 The Public	4	3	6	0	6	3	7	0
公共卫生机构 Public Health Institutes	6	4	4	5	5	6	2	5
互联网、大数据等高科技企业 Internet, big data, and other high-tech enterprises	2	0	1	2	6	0	2	5
社区 Communities	3	2	6	0	5	2	5	0
社会团体或公益组织 Social or Public Welfare Organizations	3	2	4	0	2	5	0	0
学者 Scholars	3	4	0	0	4	4	0	0
自媒体或新媒体	3	3	2	0	6	3	2	2

Self-Media or New Media	
如果您有什么建议，请告诉我们，不胜感激！(If you have any suggestions, please let me know. Thank you very much!):	

说明（Explanation):

（1）根据上一轮一些专家的建议，在“利益相关者”一栏中，“企业”限制为“互联网、大数据等高科技企业”，“媒体”限制为“自媒体或新媒体”；(According to some experts’ suggestions in the previous round of consultation, in the Stakeholders column, “Enterprises” are limited to “Internet, big data, and other high-tech enterprises” and “Media” are limited to “Self-Media or New Media”.)

（2）属性的具体含义如下(The specific meanings of Salience are as follows):

- 影响力：对推动 CRID-PHE 有影响力的利益相关者(Influence: the stakeholders have influence on promoting CRID-PHE)
- 收益性：因 CRID-PHE 的实施而直接受益的利益相关者(Benefit: the stakeholders are the direct beneficiaries of CRID-PHE)
- 资源性：拥有 CRID-PHE 实施所需要的资源的利益相关者(Resources: the stakeholders have the resources required for the implementation of CRID-PHE)

签名（Signature): 

日期（Date):2022.9.25

E.3 The Raw Data Collected in the Third Round of Delphi Consultation

Expert No. 1 – Scoring on Identification and Salience of Stakeholders (The Third Round)

利益相关者 Stakeholders	上一轮识别评分的平均分（仅供本轮评分参考） Average Score of the Previous Round on Identification (Only For Reference in This Round)	上一轮属性评分的平均分（仅供本轮评分参考） Average Score of the Previous Round on Salience (Only For Reference in This Round)			识别评分 Scoring on Identification	属性评分 Scoring on Salience		
		影响力 Influence	受益性 Benefits	资源性 Resources		影响力 Influence	受益性 Benefits	资源性 Resources
政府 Government	7	7	0	7	7	7	3	6
普通百姓 The Public	4	3	6	0	6	3	6	0
疾病控制与预防中心 Centers for Disease Control and Prevention (CDC)	6	4	4	5	6	4	3	5
互联网、大数据等高科技企业 Internet, big data, and other high-tech enterprises	2	0	1	2	4	1	2	6
社区 Communities	3	2	6	0	5	3	5	0
社会团体或公益组织	3	2	4	0	4	4	0	0

Social or Public Welfare Organizations								
学者 Scholars	3	4	0	0	4	5	0	0
自媒体或新媒体 Self-Media or New Media	3	3	2	0	5	3	3	2

如果您有什么建议，请告诉我们，不胜感激！(If you have any suggestions, please let me know. Thank you very much!):

说明(Explanation):

（1）根据上一轮一些专家的建议，在“公共卫生机构”直接改为“疾控中心企业”；(According to some experts' suggestions in the previous round of consultation, "Public Health Institutes" has been changed to "Centers for Disease Control and Prevention (CDC)")

（2）属性的具体含义如下(The specific meanings of Salience are as follows):

- 影响力：对推动 CRID-PHE 有影响力的利益相关者(Influence: the stakeholders have influence on promoting CRID-PHE)
- 收益性：因 CRID-PHE 的实施而直接受益的利益相关者(Benefit: the stakeholders are the direct beneficiaries of CRID-PHE)
- 资源性：拥有 CRID-PHE 实施所需要的资源的利益相关者(Resources: the stakeholders have the resources required for the implementation of CRID-PHE)

签名（Signature）: 郝元清

日期（Date):2022.10.11

Expert No. 2 – Scoring on Identification and Salience of Stakeholders (The Third Round)

利益相关者 Stakeholders	上一轮识别评分的平均分（仅供本轮评分参考） Average Score of the Previous Round on Identification (Only For Reference in This Round)	上一轮属性评分的平均分（仅供本轮评分参考） Average Score of the Previous Round on Salience (Only For Reference in This Round)			识别评分 Scoring on Identification	属性评分 Scoring on Salience		
		影响力 Influence	受益性 Benefits	资源性 Resources		影响力 Influence	受益性 Benefits	资源性 Resources
政府 Government	7	7	0	7	7	7	3	6
普通百姓 The Public	4	3	6	0	6	1	7	0
疾病控制与预防中心 Centers for Disease Control and Prevention (CDC)	6	4	4	5	5	5	2	6
互联网、大数据等高科技企业 Internet, big data, and other high-tech enterprises	2	0	1	2	6	1	3	6
社区 Communities	3	2	6	0	6	2	4	0
社会团体或公益组织 Social or Public Welfare Organizations	3	2	4	0	3	4	0	0

学者 Scholars	3	4	0	0	5	5	0	0
自媒体或新媒体 Self-Media or New Media	3	3	2	0	6	4	3	3

如果您有什么建议，请告诉我们，不胜感激！(If you have any suggestions, please let me know. Thank you very much!):

说明(Explanation):

（1）根据上一轮一些专家的建议，在“公共卫生机构”直接改为“疾控中心企业”；(According to some experts' suggestions in the previous round of consultation, "Public Health Institutes" has been changed to "Centers for Disease Control and Prevention (CDC)")

（2）属性的具体含义如下(The specific meanings of Salience are as follows):

- 影响力：对推动 CRID-PHE 有影响力的利益相关者(Influence: the stakeholders have influence on promoting CRID-PHE)
- 收益性：因 CRID-PHE 的实施而直接受益的利益相关者(Benefit: the stakeholders are the direct beneficiaries of CRID-PHE)
- 资源性：拥有 CRID-PHE 实施所需要的资源的利益相关者(Resources: the stakeholders have the resources required for the implementation of CRID-PHE)

签名（Signature）: 岑阳东

日期（Date):2022.10.11

Expert No. 3 – Scoring on Identification and Salience of Stakeholders (The Third Round)

利益相关者 Stakeholders	上一轮识别评分的平均分（仅供本轮评分参考） Average Score of the Previous Round on Identification (Only For Reference in This Round)	上一轮属性评分的平均分（仅供本轮评分参考） Average Score of the Previous Round on Salience (Only For Reference in This Round)			识别评分 Scoring on Identification	属性评分 Scoring on Salience		
		影响力 Influence	受益性 Benefits	资源性 Resources		影响力 Influence	受益性 Benefits	资源性 Resources
政府 Government	7	7	0	7	7	7	1	6
普通百姓 The Public	4	3	6	0	7	2	7	0
疾病控制与预防中心 Centers for Disease Control and Prevention (CDC)	6	4	4	5	6	5	2	6
互联网、大数据等高科技企业 Internet, big data, and other high-tech enterprises	2	0	1	2	4	0	2	6
社区 Communities	3	2	6	0	5	4	4	0
社会团体或公益组织 Social or Public Welfare Organizations	3	2	4	0	4	6	1	0

学者 Scholars	3	4	0	0	3	5	0	0
自媒体或新媒体 Self-Media or New Media	3	3	2	0	5	3	4	3

如果您有什么建议，请告诉我们，不胜感激！(If you have any suggestions, please let me know. Thank you very much!):

说明(Explanation):

（1）根据上一轮一些专家的建议，在“公共卫生机构”直接改为“疾控中心企业”；(According to some experts' suggestions in the previous round of consultation, "Public Health Institutes" has been changed to "Centers for Disease Control and Prevention (CDC)")

（2）属性的具体含义如下(The specific meanings of Salience are as follows):

- 影响力：对推动 CRID-PHE 有影响力的利益相关者(Influence: the stakeholders have influence on promoting CRID-PHE)
- 收益性：因 CRID-PHE 的实施而直接受益的利益相关者(Benefit: the stakeholders are the direct beneficiaries of CRID-PHE)
- 资源性：拥有 CRID-PHE 实施所需要的资源的利益相关者(Resources: the stakeholders have the resources required for the implementation of CRID-PHE)

签名（Signature）:

日期（Date):2022.10.11

Expert No. 4 – Scoring on Identification and Salience of Stakeholders (The Third Round)

利益相关者 Stakeholders	上一轮识别评分的平均分（仅供本轮评分参考） Average Score of the Previous Round on Identification (Only For Reference in This Round)	上一轮属性评分的平均分（仅供本轮评分参考） Average Score of the Previous Round on Salience (Only For Reference in This Round)			识别评分 Scoring on Identification	属性评分 Scoring on Salience		
		影响力 Influence	受益性 Benefits	资源性 Resources		影响力 Influence	受益性 Benefits	资源性 Resources
政府 Government	7	7	0	7	7	7	0	6
普通百姓 The Public	4	3	6	0	7	3	5	0
疾病控制与预防中心 Centers for Disease Control and Prevention (CDC)	6	4	4	5	4	4	3	5
互联网、大数据等高科技企业 Internet, big data, and other high-tech enterprises	2	0	1	2	4	0	2	6
社区 Communities	3	2	6	0	7	2	6	0
社会团体或公益组织 Social or Public Welfare Organizations	3	2	4	0	3	4	1	0

学者 Scholars	3	4	0	0	4	5	0	0
自媒体或新媒体 Self-Media or New Media	3	3	2	0	5	3	4	2

如果您有什么建议，请告诉我们，不胜感激！(If you have any suggestions, please let me know. Thank you very much!):

说明(Explanation):

（1）根据上一轮一些专家的建议，在“公共卫生机构”直接改为“疾控中心企业”；(According to some experts' suggestions in the previous round of consultation, "Public Health Institutes" has been changed to "Centers for Disease Control and Prevention (CDC)")

（2）属性的具体含义如下(The specific meanings of Salience are as follows):

- 影响力：对推动 CRID-PHE 有影响力的利益相关者(Influence: the stakeholders have influence on promoting CRID-PHE)
- 收益性：因 CRID-PHE 的实施而直接受益的利益相关者(Benefit: the stakeholders are the direct beneficiaries of CRID-PHE)
- 资源性：拥有 CRID-PHE 实施所需要的资源的利益相关者(Resources: the stakeholders have the resources required for the implementation of CRID-PHE)

签名（Signature）: 

日期（Date):2022.10.11

Expert No. 5 – Scoring on Identification and Salience of Stakeholders (The Third Round)

利益相关者 Stakeholders	上一轮识别评分的平均分（仅供本轮评分参考） Average Score of the Previous Round on Identification (Only For Reference in This Round)	上一轮属性评分的平均分（仅供本轮评分参考） Average Score of the Previous Round on Salience (Only For Reference in This Round)			识别评分 Scoring on Identification	属性评分 Scoring on Salience		
		影响力 Influence	受益性 Benefits	资源性 Resources		影响力 Influence	受益性 Benefits	资源性 Resources
政府 Government	7	7	0	7	7	7	2	6
普通百姓 The Public	4	3	6	0	7	1	7	0
疾病控制与预防中心 Centers for Disease Control and Prevention (CDC)	6	4	4	5	5	6	3	5
互联网、大数据等高科技企业 Internet, big data, and other high-tech enterprises	2	0	1	2	6	1	3	4
社区 Communities	3	2	6	0	6	3	5	0
社会团体或公益组织 Social or Public Welfare Organizations	3	2	4	0	3	4	0	0

学者 Scholars	3	4	0	0	4	5	0	0
自媒体或新媒体 Self-Media or New Media	3	3	2	0	6	4	5	3

如果您有什么建议，请告诉我们，不胜感激！(If you have any suggestions, please let me know. Thank you very much!):

说明(Explanation):

（1）根据上一轮一些专家的建议，在“公共卫生机构”直接改为“疾控中心企业”；(According to some experts' suggestions in the previous round of consultation, "Public Health Institutes" has been changed to "Centers for Disease Control and Prevention (CDC)")

（2）属性的具体含义如下(The specific meanings of Salience are as follows):

- 影响力：对推动 CRID-PHE 有影响力的利益相关者(Influence: the stakeholders have influence on promoting CRID-PHE)
- 收益性：因 CRID-PHE 的实施而直接受益的利益相关者(Benefit: the stakeholders are the direct beneficiaries of CRID-PHE)
- 资源性：拥有 CRID-PHE 实施所需要的资源的利益相关者(Resources: the stakeholders have the resources required for the implementation of CRID-PHE)

签名（Signature）:

日期（Date):2022.10.11

Expert No. 6 – Scoring on Identification and Salience of Stakeholders (The Third Round)

利益相关者 Stakeholders	上一轮识别评分的平均分（仅供本轮评分参考） Average Score of the Previous Round on Identification (Only For Reference in This Round)	上一轮属性评分的平均分（仅供本轮评分参考） Average Score of the Previous Round on Salience (Only For Reference in This Round)			识别评分 Scoring on Identification	属性评分 Scoring on Salience		
		影响力 Influence	受益性 Benefits	资源性 Resources		影响力 Influence	受益性 Benefits	资源性 Resources
政府 Government	7	7	0	7	7	7	3	6
普通百姓 The Public	4	3	6	0	6	2	6	0
疾病控制与预防中心 Centers for Disease Control and Prevention (CDC)	6	4	4	5	5	5	4	5
互联网、大数据等高科技企业 Internet, big data, and other high-tech enterprises	2	0	1	2	5	1	3	5
社区 Communities	3	2	6	0	5	2	6	0
社会团体或公益组织 Social or Public Welfare Organizations	3	2	4	0	3	5	0	1

学者 Scholars	3	4	0	0	3	5	0	1
自媒体或新媒体 Self-Media or New Media	3	3	2	0	6	2	3	3

如果您有什么建议，请告诉我们，不胜感激！(If you have any suggestions, please let me know. Thank you very much!):

说明(Explanation):

（1）根据上一轮一些专家的建议，在“公共卫生机构”直接改为“疾控中心企业”；(According to some experts' suggestions in the previous round of consultation, "Public Health Institutes" has been changed to "Centers for Disease Control and Prevention (CDC)")

（2）属性的具体含义如下(The specific meanings of Salience are as follows):

- 影响力：对推动 CRID-PHE 有影响力的利益相关者(Influence: the stakeholders have influence on promoting CRID-PHE)
- 收益性：因 CRID-PHE 的实施而直接受益的利益相关者(Benefit: the stakeholders are the direct beneficiaries of CRID-PHE)
- 资源性：拥有 CRID-PHE 实施所需要的资源的利益相关者(Resources: the stakeholders have the resources required for the implementation of CRID-PHE)

签名（Signature）:秦丽娜

日期（Date):2022.10.11

Expert No. 7 – Scoring on Identification and Salience of Stakeholders (The Third Round)

利益相关者 Stakeholders	上一轮识别评分的平均分（仅供本轮评分参考） Average Score of the Previous Round on Identification (Only For Reference in This Round)	上一轮属性评分的平均分（仅供本轮评分参考） Average Score of the Previous Round on Salience (Only For Reference in This Round)			识别评分 Scoring on Identification	属性评分 Scoring on Salience		
		影响力 Influence	受益性 Benefits	资源性 Resources		影响力 Influence	受益性 Benefits	资源性 Resources
政府 Government	7	7	0	7	7	7	2	6
普通百姓 The Public	4	3	6	0	6	3	6	0
疾病控制与预防中心 Centers for Disease Control and Prevention (CDC)	6	4	4	5	5	5	3	5
互联网、大数据等高科技企业 Internet, big data, and other high-tech enterprises	2	0	1	2	6	0	2	3
社区 Communities	3	2	6	0	5	3	6	0
社会团体或公益组织 Social or Public Welfare Organizations	3	2	4	0	3	5	0	0

学者 Scholars	3	4	0	0	5	6	0	0
自媒体或新媒体 Self-Media or New Media	3	3	2	0	5	3	4	3

如果您有什么建议，请告诉我们，不胜感激！(If you have any suggestions, please let me know. Thank you very much!):

说明(Explanation):

（1）根据上一轮一些专家的建议，在“公共卫生机构”直接改为“疾控中心企业”；(According to some experts' suggestions in the previous round of consultation, "Public Health Institutes" has been changed to "Centers for Disease Control and Prevention (CDC)")

（2）属性的具体含义如下(The specific meanings of Salience are as follows):

- 影响力：对推动 CRID-PHE 有影响力的利益相关者(Influence: the stakeholders have influence on promoting CRID-PHE)
- 收益性：因 CRID-PHE 的实施而直接受益的利益相关者(Benefit: the stakeholders are the direct beneficiaries of CRID-PHE)
- 资源性：拥有 CRID-PHE 实施所需要的资源的利益相关者(Resources: the stakeholders have the resources required for the implementation of CRID-PHE)

签名（Signature）:

日期（Date):2022.10.11

Expert No. 8 – Scoring on Identification and Salience of Stakeholders (The Third Round)

利益相关者 Stakeholders	上一轮识别评分的平均分（仅供本轮评分参考） Average Score of the Previous Round on Identification (Only For Reference in This Round)	上一轮属性评分的平均分（仅供本轮评分参考） Average Score of the Previous Round on Salience (Only For Reference in This Round)			识别评分 Scoring on Identification	属性评分 Scoring on Salience		
		影响力 Influence	受益性 Benefits	资源性 Resources		影响力 Influence	受益性 Benefits	资源性 Resources
政府 Government	7	7	0	7	7	7	2	6
普通百姓 The Public	4	3	6	0	7	0	7	0
疾病控制与预防中心 Centers for Disease Control and Prevention (CDC)	6	4	4	5	6	4	4	6
互联网、大数据等高科技企业 Internet, big data, and other high-tech enterprises	2	0	1	2	4	0	2	4
社区 Communities	3	2	6	0	6	2	5	0
社会团体或公益组织 Social or Public Welfare Organizations	3	2	4	0	4	4	0	1

学者 Scholars	3	4	0	0	4	5	0	0
自媒体或新媒体 Self-Media or New Media	3	3	2	0	5	2	3	3

如果您有什么建议，请告诉我们，不胜感激！(If you have any suggestions, please let me know. Thank you very much!):

说明(Explanation):

（1）根据上一轮一些专家的建议，在“公共卫生机构”直接改为“疾控中心企业”；(According to some experts' suggestions in the previous round of consultation, "Public Health Institutes" has been changed to "Centers for Disease Control and Prevention (CDC)")

（2）属性的具体含义如下(The specific meanings of Salience are as follows):

- 影响力：对推动 CRID-PHE 有影响力的利益相关者(Influence: the stakeholders have influence on promoting CRID-PHE)
- 收益性：因 CRID-PHE 的实施而直接受益的利益相关者(Benefit: the stakeholders are the direct beneficiaries of CRID-PHE)
- 资源性：拥有 CRID-PHE 实施所需要的资源的利益相关者(Resources: the stakeholders have the resources required for the implementation of CRID-PHE)

签名（Signature）:

日期（Date):2022.10.11

Expert No. 9 – Scoring on Identification and Salience of Stakeholders (The Third Round)

利益相关者 Stakeholders	上一轮识别评分的平均分（仅供本轮评分参考） Average Score of the Previous Round on Identification (Only For Reference in This Round)	上一轮属性评分的平均分（仅供本轮评分参考） Average Score of the Previous Round on Salience (Only For Reference in This Round)			识别评分 Scoring on Identification	属性评分 Scoring on Salience		
		影响力 Influence	受益性 Benefits	资源性 Resources		影响力 Influence	受益性 Benefits	资源性 Resources
政府 Government	7	7	0	7	7	7	3	6
普通百姓 The Public	4	3	6	0	7	2	6	0
疾病控制与预防中心 Centers for Disease Control and Prevention (CDC)	6	4	4	5	4	6	3	6
互联网、大数据等高科技企业 Internet, big data, and other high-tech enterprises	2	0	1	2	5	2	3	4
社区 Communities	3	2	6	0	5	2	6	0
社会团体或公益组织 Social or Public Welfare Organizations	3	2	4	0	3	5	0	0

学者 Scholars	3	4	0	0	5	6	0	0
自媒体或新媒体 Self-Media or New Media	3	3	2	0	6	3	3	3

如果您有什么建议，请告诉我们，不胜感激！(If you have any suggestions, please let me know. Thank you very much!):

说明(Explanation):

（1）根据上一轮一些专家的建议，在“公共卫生机构”直接改为“疾控中心企业”；(According to some experts' suggestions in the previous round of consultation, "Public Health Institutes" has been changed to "Centers for Disease Control and Prevention (CDC)")

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- 收益性：因 CRID-PHE 的实施而直接受益的利益相关者(Benefit: the stakeholders are the direct beneficiaries of CRID-PHE)
- 资源性：拥有 CRID-PHE 实施所需要的资源的利益相关者(Resources: the stakeholders have the resources required for the implementation of CRID-PHE)

签名（Signature）:

日期（Date):2022.10.11

Expert No. 10 – Scoring on Identification and Salience of Stakeholders (The Third Round)

利益相关者 Stakeholders	上一轮识别评分的平均分（仅供本轮评分参考） Average Score of the Previous Round on Identification (Only For Reference in This Round)	上一轮属性评分的平均分（仅供本轮评分参考） Average Score of the Previous Round on Salience (Only For Reference in This Round)			识别评分 Scoring on Identification	属性评分 Scoring on Salience		
		影响力 Influence	受益性 Benefits	资源性 Resources		影响力 Influence	受益性 Benefits	资源性 Resources
政府 Government	7	7	0	7	7	7	2	6
普通百姓 The Public	4	3	6	0	6	3	7	0
疾病控制与预防中心 Centers for Disease Control and Prevention (CDC)	6	4	4	5	5	6	2	5
互联网、大数据等高科技企业 Internet, big data, and other high-tech enterprises	2	0	1	2	6	0	2	5
社区 Communities	3	2	6	0	5	2	5	0
社会团体或公益组织 Social or Public Welfare Organizations	3	2	4	0	2	5	0	0

学者 Scholars	3	4	0	0	4	4	0	0
自媒体或新媒体 Self-Media or New Media	3	3	2	0	6	3	2	2

如果您有什么建议，请告诉我们，不胜感激！(If you have any suggestions, please let me know. Thank you very much!):

说明(Explanation):

（1）根据上一轮一些专家的建议，在“公共卫生机构”直接改为“疾控中心企业”；(According to some experts' suggestions in the previous round of consultation, "Public Health Institutes" has been changed to "Centers for Disease Control and Prevention (CDC)")

（2）属性的具体含义如下(The specific meanings of Salience are as follows):

- 影响力：对推动 CRID-PHE 有影响力的利益相关者(Influence: the stakeholders have influence on promoting CRID-PHE)
- 收益性：因 CRID-PHE 的实施而直接受益的利益相关者(Benefit: the stakeholders are the direct beneficiaries of CRID-PHE)
- 资源性：拥有 CRID-PHE 实施所需要的资源的利益相关者(Resources: the stakeholders have the resources required for the implementation of CRID-PHE)

签名（Signature）: 

日期（Date):2022.10.11

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Annex F: The Questionnaire and the Data Collected by the Questionnaire

Research on Comprehensive and Real-time Information Disclosure of Public Health Events (CRID-PHE)

The so-called "public health event" is an event that presents threats to public health. Events such as SARS and COVID-19 are major public health emergencies, but a large number of other public health events are concurring every day. Their occurrence has become normalized. Although the hazard of these public health events is great enough to cause public health crises that impact the entire society, they could have a dramatic, sometimes even fatal, impact on certain groups of the public, such as community transmission of AIDS.

At present, major public health emergencies are informed to the public comprehensively and timely during public health crises, but other public health events are generally not disclosed to the public in a comprehensive and real-time manner. This survey questionnaire investigates the necessity and feasibility of comprehensive and real-time information disclosure of public health events as well as its possible positive impacts on public health governance.

This survey questionnaire solicits to what extent the respondents agree with the views stated in the questionnaire items. For purpose of quantification and data analysis, this questionnaire uses the 5-point Likert scale for scoring. The score of 5 means strong agreement and the score of 4 means agreement, while the score of 1 means strongly disagree and the score of 2 means disagree. The score of 3 means that the respondents are noncommittal about the opinions stated in the item.

This survey is anonymous. The survey data will not be disclosed and are only used for internal scientific research purpose. It would be highly appreciated if you could support us by answering the questionnaire.

[Q1] What is your current occupation? [Single Choice]

○Civil servant

○Undergraduate & graduate student

○Teacher

○Ordinary employee in enterprises and public institutions

○Manager of enterprises and public institutions

○R&D personnel

○Medical personnel

○Advisor/consultant

○Media personnel

○Volunteer or public welfare individual

○Others _____

公共卫生事件的全面实时披露的研究 v1

第1题： 您目前从事的职业是？ [单选题]

选项	小计	比例
公务员	8	3.7%
大学生或研究生	30	13.89%
教师	13	6.02%
企事业单位的普通职员	93	43.06%
企事业单位的管理人员	40	18.52%
技术研发人员	6	2.78%
医护人员	7	3.24%
顾问/咨询	4	1.85%
媒体人士	2	0.93%
社区自愿者或社会公益人士	7	3.24%
其他 [详细]	6	2.78%
自由职业	1	0.46%
无业游民	1	0.46%
退休	1	0.46%
餐饮服务	1	0.46%
工人	1	0.46%
本题有效填写人次	216	

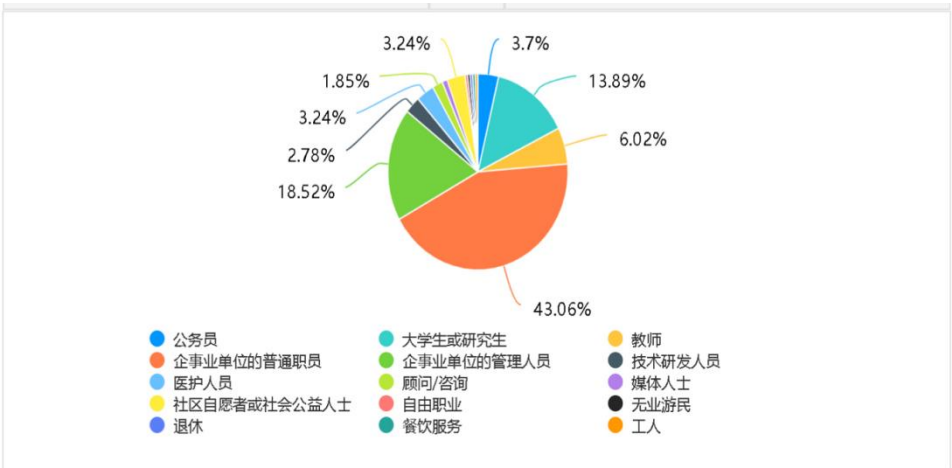

Figure E.1 Statistical results of Q1 (in Chinese)

[Q2] Case I on the necessity of CRID-PHE. In China, according to a published study by Peking University, AIDS has overtaken rabies and tuberculosis and become the number one cause of death among 14-22-year-olds. In addition, a study by the China Centers for Disease Control and Prevention and Tsinghua University also concluded that the prevalence of AIDS

among Chinese students is soaring. It is hoped that the government can disclose the status of AIDS transmission in school districts or residential communities in real time, rather than statistical data for a period of time. [Single Choice]

Strongly disagree ○1 ○2 ○3 ○4 ○5 Strongly agree

选项	小计	比例
1 非常不希望	4	1.85%
2 不希望	2	0.93%
3 不置可否	7	3.24%
4 希望	93	43.06%
5 非常希望	110	50.93%
本题有效填写人次	**216**	

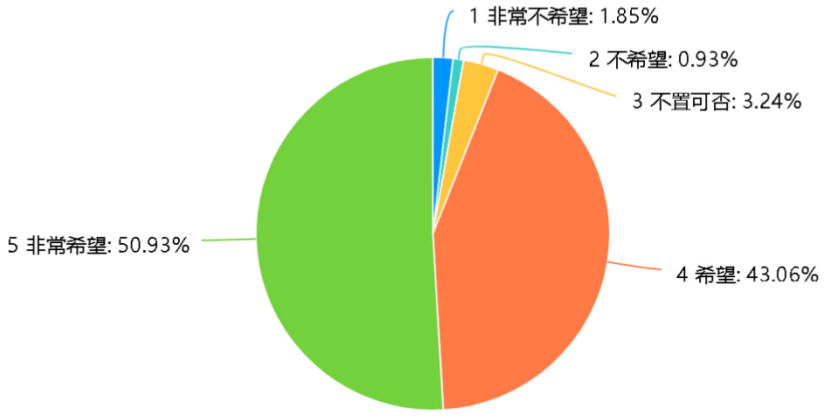

Figure E.2 Statistical Results of Q2 (in Chinese)

[Q3] Case II on the necessity of CRID-PHE. Rabies has a 100% mortality rate. According to the 2022 Animal-Related Injury Diagnosis and Treatment Summit Forum, 40 million people are bitten by cats and dogs every year, and more than 10 million of them need rabies diagnosis and treatment. It is hoped that the government can disclose the incidence of rabies in real time, so that both dog owners and non-dog owners are vigilant and dog raising can be regulated. [single choice]

Strongly disagree ○1 ○2 ○3 ○4 ○5 Strongly agree

选项	小计	比例
1 非常不希望	3	1.39%
2 不希望	6	2.78%
3 不置可否	33	15.28%
4 希望	104	48.15%
5 非常希望	70	32.41%
本题有效填写人次	**216**	

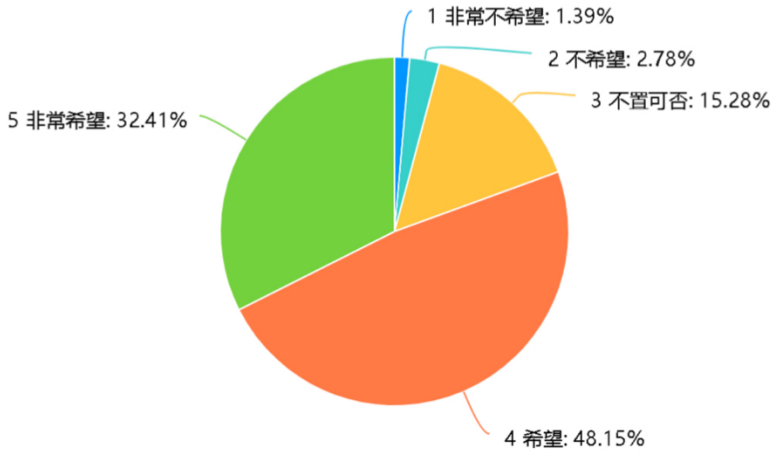

Figure E.3 Statistical Results of Q3 (in Chinese)

[Q4] Case III on the necessity of CRID-PHE. Flu seasons occur every year, and the flu is a significant public health event. In the United States, between 23,000 and 69,000 people die from influenza each year. It is hoped that the government can keep the public informed the real-time situation of local influenza during flu seasons, so that people can take timely self-prevention measures. [single choice]

Strongly disagree ○1 ○2 ○3 ○4 ○5 Strongly agree

选项	小计	比例
1 非常不希望	2	0.93%
2 不希望	4	1.85%
3 不置可否	20	9.26%
4 希望	79	36.57%
5 非常希望	111	51.39%
本题有效填写人次	**216**	

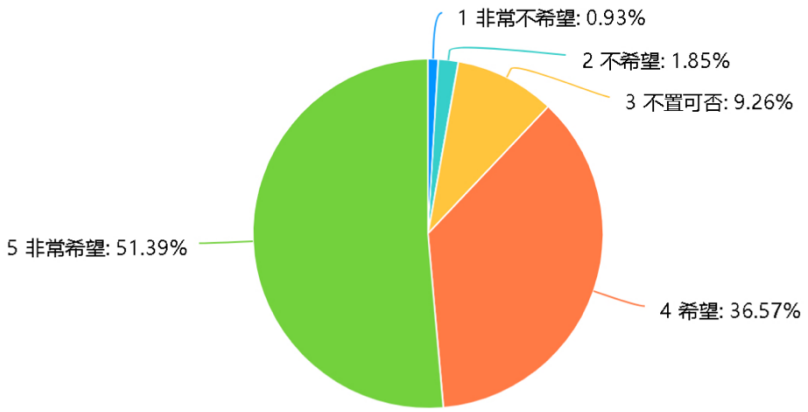

Figure E.4 Statistical Results of Q4 (in Chinese)

[Q5] Right to know. Public health events affect the interest of the public. According to the theory of the public's right to know, the public should be informed of all events that affect their interest. Therefore, public health events, no matter whether they are major public health emergencies or ordinary public health events, should be promptly informed to the public and it should be made as convenient as possible for the public to access this information. [single choice]

Strongly disagree ○1 ○2 ○3 ○4 ○5 Strongly agree

选项	小计	比例
1 非常不认同	0	0%
2 不认同	2	0.93%
3 不置可否	25	11.57%
4 认同	95	43.98%
5 非常认同	94	43.52%
本题有效填写人次	**216**	

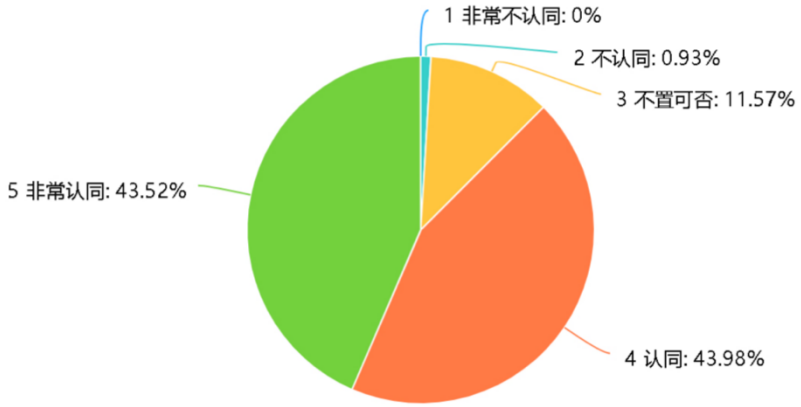

Figure E.5 Statistical Results of Q5 (in Chinese)

[Q6] Rationality of comprehensive disclosure. Since different groups of the public have different concerns about public health events, the information of public health events should be disclosed as comprehensively as possible, rather than being selected by only a few people. It is hoped that through user-friendly webpage navigation or intelligent search engine, people can find the public health events they care about on an integrated Internet portal. [single choice]

Strongly disagree ○1 ○2 ○3 ○4 ○5 Strongly agree

选项	小计	比例
1 非常不认同	0	0%
2 不认同	12	5.56%
3 不置可否	29	13.43%
4 认同	90	41.67%
5 非常认同	85	39.35%
本题有效填写人次	**216**	

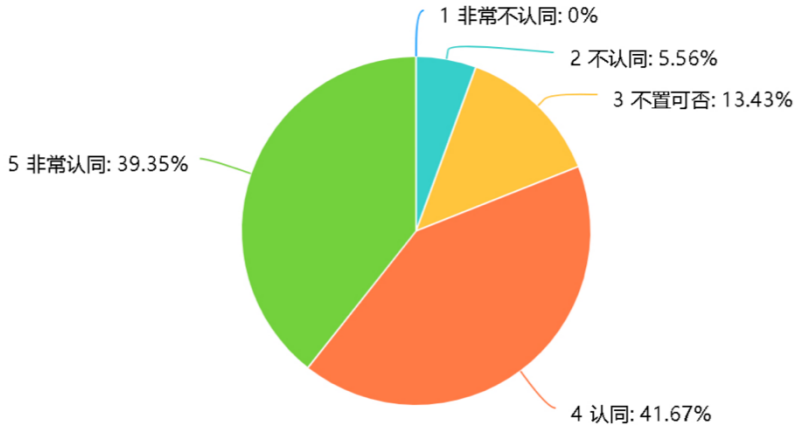

Figure E.6 Statistical Results of Q6 (in Chinese)

[Q7] Rationality of real-time disclosure. At present, the public health authorities of some countries regularly publish statistics on public health events over a period of time. However, these data are statistics over a past period of time, instead of real-time data. They are not helpful for the public to understand the ongoing public health events. The disclosure of public health event information must be real-time to prevent people from being infected as a result of being uninformed. [single choice]

Strongly disagree ○1 ○2 ○3 ○4 ○5 Strongly agree

选项	小计	比例
1 非常不认同	0	0%
2 不认同	6	2.78%
3 不置可否	31	14.35%
4 认同	93	43.06%
5 非常认同	86	39.81%
本题有效填写人次	**216**	

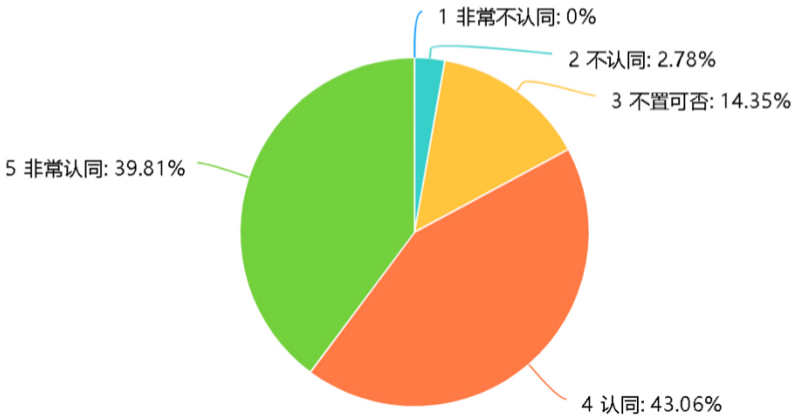

Figure E.7 Statistical Results of Q7 (in Chinese)

[Q8] Internet portals as the information disclosure platform. The comprehensive and real-time disclosure of public health events involves massive amounts of information, which traditional media such as newspapers, radio, and television cannot handle. Fortunately, the Internet portals make it possible. In fact, the official websites of governments at all levels and e-commerce shopping sites such as JD.com and Taobao are all Internet portals. The public is familiar with the use of portals. Therefore, there is no technical barrier for the comprehensive and real-time disclosure of information on public health events through Internet portals. [Single-choice question]

Strongly disagree ○1 ○2 ○3 ○4 ○5 Strongly agree

选项	小计	比例
1 非常不认同	5	2.31%
2 不认同	25	11.57%
3 不置可否	57	26.39%
4 认同	77	35.65%
5 非常认同	52	24.07%
本题有效填写人次	**216**	

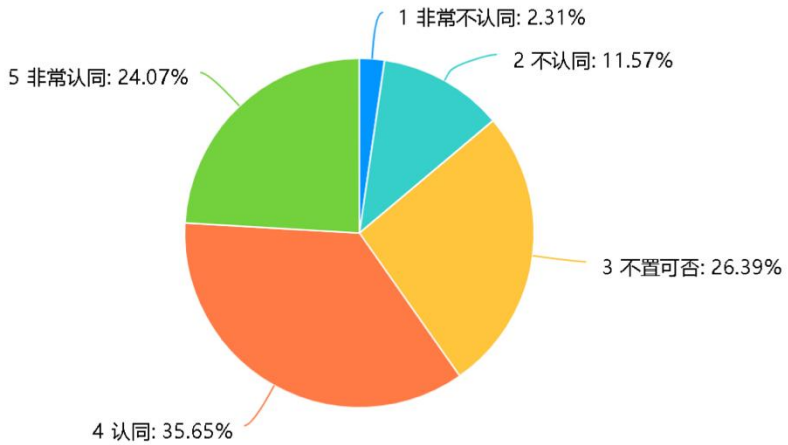

Figure E.8 Statistical Results of Q8 (in Chinese)

[Q9] Public health big data. After SARS in 2003, in order to prevent SARS-like pandemic, many countries have established comprehensive and real-time monitoring systems for public health events. These systems have collected a massive amount of public health information, which lays the foundation for the establishment of public health big data. [single-choice]

Strongly disagree ○1 ○2 ○3 ○4 ○5 Strongly agree

选项	小计	比例
非常不认同	4	1.85%
不认同	11	5.09%
不置可否	46	21.3%
认同	89	41.2%
非常认同	66	30.56%
本题有效填写人次	**216**	

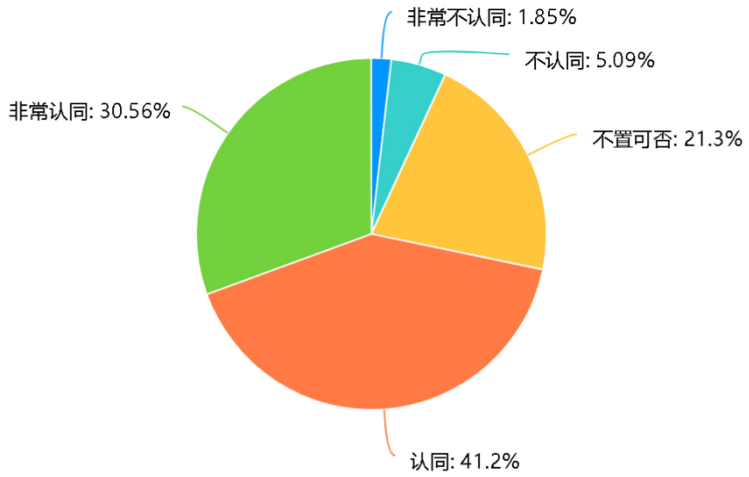

Figure E.9 Statistical Results of Q9 (in Chinese)

[Q10] Potential positive effect I: Promoting and improving public health awareness. The comprehensive and real-time information disclosure of public health events enables the public to know about the current public health situation, so that they can take timely preventive measures when necessary. More importantly, real-time disclosure will be newsworthy, providing sustained public health topics for the public's daily interactions, thereby greatly improving public health awareness. [single choice]

Strongly disagree ○1 ○2 ○3 ○4 ○5 Strongly agree

选项	小计	比例
非常不认同	0	0%
不认同	5	2.31%
不置可否	38	17.59%
认同	95	43.98%
非常认同	78	36.11%
本题有效填写人次	**216**	

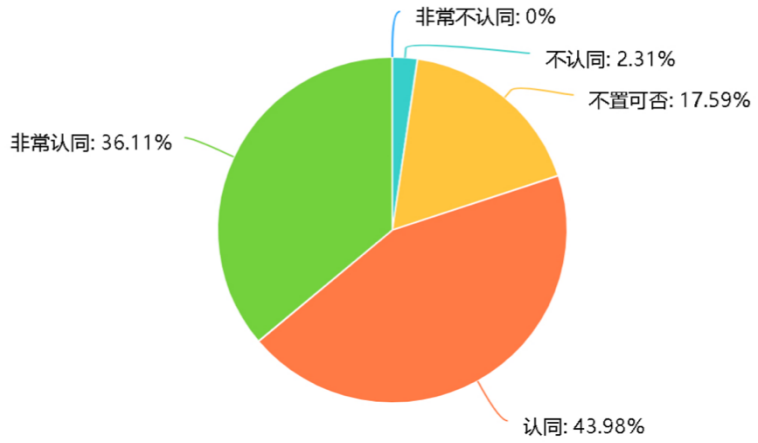

Figure E.10 Statistical Results of Q10 (in Chinese)

[Q11] Potential positive effect II: Promoting the application of public health big data in public services. Now, with the advancement of China's big data strategy, public health authorities at all levels collect, store, and manage a large amount of public health big data. However, these big data must be applied to generate benefits; otherwise, their collection, storage, and management will consume a large number of resources and costs. The comprehensive and real-time information disclosure of public health events will surely attract forces from all sectors of society to engage in the development of public health big data applications, thus giving rise to a large number of star-level applications like the one Johns Hopkins University developed during the COVID-19 pandemic.

Strongly disagree ○1 ○2 ○3 ○4 ○5 Strongly agree

选项	小计	比例
非常不认同	2	0.93%
不认同	13	6.02%
不置可否	50	23.15%
认同	87	40.28%
非常认同	64	29.63%
本题有效填写人次	**216**	

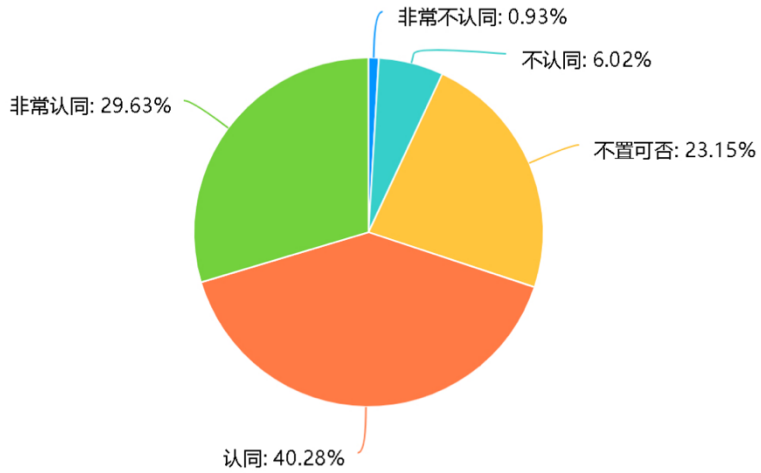

Figure E.11 Statistical Results of Q11 (in Chinese)

[Q12] Potential positive effect III: Mitigating the dilemma of public health crisis early warning. Since most public health crises evolve from ordinary public health events, the comprehensive and real-time information disclosure of public health events will make their evolution under public scrutiny from the very beginning. If certain public health events deteriorate rapidly, the public will be psychologically prepared for the possible public health crisis and may even take personal preventive measures in advance, if necessary, thus greatly easing the dilemma of public health early warning. [single-choice]

Strongly disagree ○1 ○2 ○3 ○4 ○5 Strongly agree

选项	小计	比例
非常不认同	3	1.39%
不认同	11	5.09%
不置可否	42	19.44%
认同	82	37.96%
非常认同	78	36.11%
本题有效填写人次	**216**	

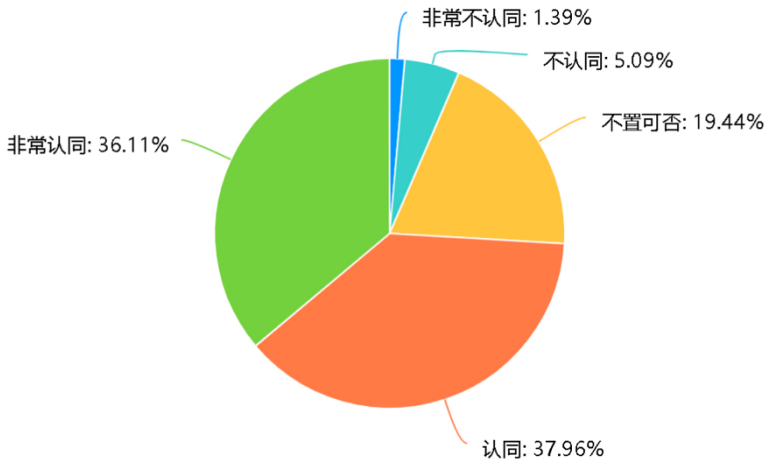

Figure E.12 Statistical Results of Q12 (in Chinese)

[Q13] Potential positive effect IV: Promoting the reform of public health governance. The comprehensive and real-time information disclosure of public health events will lead to changes in the government's public health governance environment, turning its information advantage over the public into information sharing with the public, which will certainly drive the reform of government's public health governance mode, making government decision-making more enlightened, more prudent, and more considerate of the people's will. [single choice]

Strongly disagree ○1 ○2 ○3 ○4 ○5 Strongly agree

选项	小计	比例
非常不认同	2	0.93%
不认同	9	4.17%
不置可否	41	18.98%
认同	87	40.28%
非常认同	77	35.65%
本题有效填写人次	**216**	

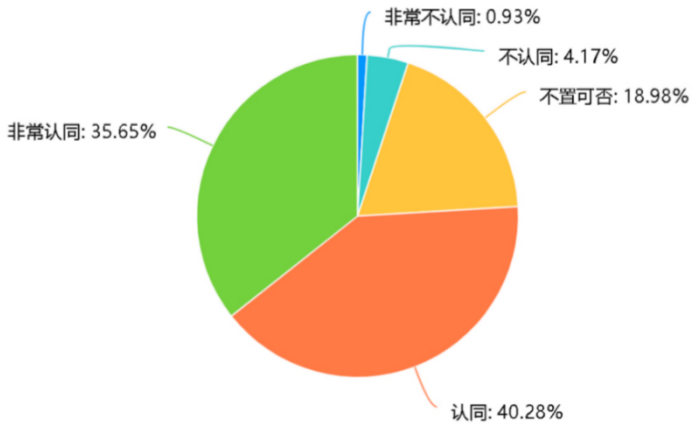

Figure E.13 Statistical Results of Q13 (in Chinese)

[Q14] Legislation to regulate information disclosure of public health events. At present, in China, government information disclosure is regulated through administrative regulations formulated by the government itself, such as the *Regulations on Government Information Disclosure of the People's Republic of China* issued by the State Council. They are administrative regulations instead of laws. It is suggested that by referring to the practices of some other countries, government information disclosure should be supervised by the Standing Committee of the National People's Congress, making government information disclosure regulated by law. [single choice]

Strongly disagree ○1 ○2 ○3 ○4 ○5 Strongly agree

选项	小计	比例
非常不认同	4	1.85%
不认同	8	3.7%
不置可否	31	14.35%
认同	101	46.76%
非常认同	72	33.33%
本题有效填写人次	**216**	

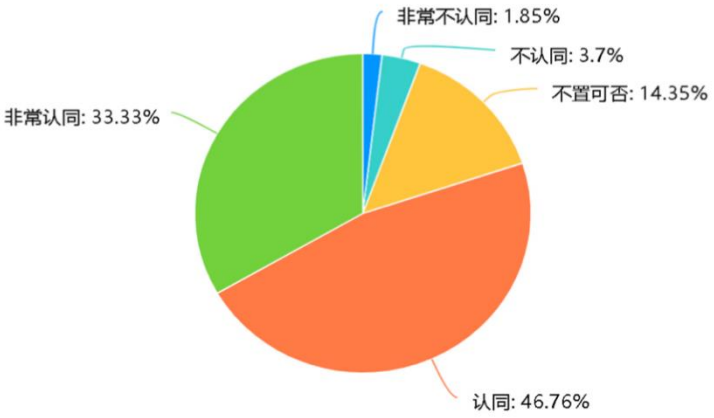

Figure E.14 Statistical Results of Q14 (in Chinese)

[Q15] Do you have any suggestions or comments? Thank you very much.

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Annex G: Basic Information of Respondents

No.	Submitting date & time	Duration	IP Address (Region)	Occupation
1	2023/1/17 9:03:29	168sec	43.227.137.171 (Wuhan, Hubei)	Undergraduate & graduate student
2	2023/1/17 9:03:45	125sec	110.229.209.99 (Baoding, Hebei)	Undergraduate & graduate student
3	2023/1/17 9:03:48	113sec	116.130.192.44 (Tianjin)	Undergraduate & graduate student
4	2023/1/17 9:03:52	119sec	117.149.23.194 (Hangzhou, Zhejiang)	Employee in enterprises and public institutions
5	2023/1/17 9:03:52	190sec	120.203.131.158 (Yichun, Jiangxi)	Civil servant
6	2023/1/17 9:03:52	191sec	60.1.36.209 (Shijiazhuang, Hebei)	Civil servant
7	2023/1/17 9:04:26	142sec	103.57.12.12 (Changchun, Jilin)	Manager of enterprises and public institutions
8	2023/1/17 9:04:54	131sec	117.136.46.186 (Nantong, Jiangsu)	Manager of enterprises and institutions
9	2023/1/17 9:04:54	253sec	223.101.207.115 (Fuxin, Liaoning)	Civil servant
10	2023/1/17 9:04:58	135sec	117.136.0.242 (Beijing)	Employee in enterprises and public institutions
11	2023/1/17 9:05:07	138sec	39.144.28.82 (Zhoukou, Henan)	Employee in enterprises and public institutions
13	2023/1/17 9:05:20	159sec	103.27.25.127 (Guangzhou, Guangdong)	Employee in enterprises and public institutions
14	2023/1/17 9:05:24	159sec	36.161.164.189 (Chizhou, Anhui)	Manager of enterprises and public institutions
16	2023/1/17 9:05:41	178sec	111.27.10.142 (Changchun, Jilin)	Freelancer
17	2023/1/17 9:05:41	113sec	223.74.111.15 (Dongguan, Guangdong)	Employee in enterprises and public institutions
18	2023/1/17 9:05:42	114sec	175.5.29.65 (Yongzhou, Hunan)	Medical personnel
19	2023/1/17 9:05:42	178sec	125.36.35.238 (Tianjin)	Medical personnel
20	2023/1/17 9:06:03	134sec	113.14.92.190 (Baise, Guangxi)	Manager of enterprises and public institutions
21	2023/1/17 9:06:56	190sec	60.15.10.21 (Yichun, Heilongjiang)	Teacher
22	2023/1/17 9:06:56	306sec	223.104.131.221 (Changsha, Hunan)	Employee in enterprises and public institutions
23	2023/1/17 9:07:06	132sec	222.218.157.52 (Beihai, Guangxi)	Manager of enterprises and public institutions
24	2023/1/17 9:07:11	137sec	106.115.157.56 (Handan, Hebei)	Manager of enterprises and public institutions
25	2023/1/17 9:07:20	210sec	120.204.133.152 (Shanghai)	Employee in enterprises and public institutions

26	2023/1/17 9:07:21	144sec	223.104.67.112 (Guangzhou, Guangdong)	Manager of enterprises and public institutions
27	2023/1/17 9:07:29	155sec	117.136.103.253 (Hefei, Anhui)	Medical personnel
28	2023/1/17 9:07:45	178sec	112.19.67.232 (Yibin, Sichuan)	Undergraduate & graduate student
29	2023/1/17 9:07:48	306sec	123.120.48.100 (Beijing)	Employee in enterprises and public institutions
30	2023/1/17 9:07:51	121sec	60.233.16.142 (Jinan, Shandong)	Employee in enterprises and public institutions
31	2023/1/17 9:07:59	127sec	114.89.30.96 (Shanghai)	Manager of enterprises and public institutions
32	2023/1/17 9:08:00	131sec	113.95.243.122 (Zhaoqing, Guangdong)	Undergraduate & graduate student
33	2023/1/17 9:08:04	127sec	117.136.9.173 (Jinan, Shandong)	Employee in enterprises and public institutions
34	2023/1/17 9:08:09	138sec	14.23.107.131 (Guangzhou, Guangdong)	R&D personnel
35	2023/1/17 9:08:10	201sec	122.192.15.254 (Suzhou, Jiangsu)	Employee in enterprises and public institutions
36	2023/1/17 9:08:21	150sec	42.84.232.10 (Dalian, Liaoning)	Civil servant
37	2023/1/17 9:08:21	150sec	42.84.232.242 (Dalian,Liaoning)	Manager of enterprises and public institutions
38	2023/1/17 9:08:33	225sec	223.88.0.52 (Zhengzhou, Henan)	Employee in enterprises and public institutions
39	2023/1/17 9:08:51	121sec	120.42.211.103 (Quanzhou, Fujian)	Employee in enterprises and public institutions
40	2023/1/17 9:08:56	243sec	117.136.52.214 (Wuhan, Hubei)	Employee in enterprises and public institutions
41	2023/1/17 9:08:59	127sec	39.144.36.226 (Bengbu, Anhui)	Employee in enterprises and public institutions
42	2023/1/17 9:09:01	130sec	122.238.1.111 (Jiaxing, Zhejiang)	Civil servant
43	2023/1/17 9:09:11	201sec	120.231.57.2 (Maoming, Guangdong)	Unidentified
44	2023/1/17 9:09:11	139sec	125.85.174.24 (Chongqing)	R&D personnel
45	2023/1/17 9:09:12	139sec	183.228.170.230 (Chongqing)	Undergraduate & graduate student
46	2023/1/17 9:09:34	284sec	119.136.122.18 (Shenzhen, Guangdong)	Employee in enterprises and public institutions
47	2023/1/17 9:09:38	474sec	112.24.32.209 (Xuzhou, Jiangsu)	Manager of enterprises and public institutions
48	2023/1/17 9:09:59	127sec	223.104.31.46 (Yichun, Jiangxi)	Employee in enterprises and public institutions
49	2023/1/17 9:10:00	121sec	175.5.87.93 (Yongzhou, Hunan)	Volunteer or public welfare individual
50	2023/1/17 9:10:09	137sec	223.242.134.13 (Bengbu, Anhui)	Manager of enterprises and public institutions
51	2023/1/17 9:10:15	139sec	36.137.240.211 (Guangzhou, Guangdong)	Employee in enterprises and public institutions
52	2023/1/17 9:10:37	164sec	123.163.127.249 (Hebi, Henan)	Employeein enterprises and public institutions
53	2023/1/17 9:10:58	308sec	117.136.38.135 (Beijing)	Manager of enterprises and public institutions

54	2023/1/17 9:11:12	259sec	27.128.15.133 (Shijiazhuang, Hebei)	Employee in enterprises and public institutions
55	2023/1/17 9:11:38	284sec	60.233.17.100 (Jinan, Shandong)	Employee in enterprises and public institutions
56	2023/1/17 9:11:44	647sec	124.166.250.12 (Yangquan, Shanxi)	Volunteer or public welfare individual
57	2023/1/17 9:14:37	193sec	183.197.242.16 (Shijiazhuang, Hebei)	Employee in enterprises and public institutions
58	2023/1/17 4:14:36	122sec	183.199.251.192 (Baoding, Hebei)	Advisor/consultant
59	2023/1/1714:14:59	123sec	124.228.181.132 (Hengyang, Hunan)	Teacher
60	2023/1/17 4:15:00	132sec	120.230.23.237 (Shanwei, Guangdong)	Undergraduate & graduate student
61	2023/1/17 4:15:26	164sec	117.11.155.228 (Tianjin)	Teacher
62	2023/1/17 4:15:27	110sec	27.128.47.18 (Shijiazhuang, Hebei)	Undergraduate & graduate student
63	2023/1/17 4:15:31	113sec	115.52.87.164 (Zhoukou, Henan)	Undergraduate & graduate student
64	2023/1/17 4:15:33	116sec	223.73.27.72 (Shanwei, Guangdong)	Employee in enterprises and public institutions
65	2023/1/17 4:17:05	140sec	113.69.248.21 (Foshan, Guangdong)	Employee in enterprises and public institutions
66	2023/1/17 4:17:26	166sec	183.9.250.97 (Jieyang, Guangdong)	Manager of enterprises and public institutions
67	2023/1/17 4:17:44	125sec	182.240.188.43 (Yuxi, Yunnan)	Employee in enterprises and public institutions
68	2023/1/17 4:18:46	119sec	171.107.207.183 (Liuzhou, Guangxi)	Undergraduate & graduate student
69	2023/1/17 4:18:47	124sec	112.20.28.198 (Taizhou, Jiangsu)	Undergraduate & graduate student
70	2023/1/17 4:18:54	126sec	175.20.241.101 (Jilin)	Manager of enterprises and public institutions
71	2023/1/17 4:19:02	140sec	124.134.140.146 (Weifang, Shandong)	Employee in enterprises and public institutions
72	2023/1/17 4:19:12	136sec	114.135.244.176 (Guiyang, Guizhou)	Employee in enterprises and public institutions
73	2023/1/17 4:19:18	153sec	117.136.71.155 (Yuxi, Yunnan)	Undergraduate & graduate student
74	2023/1/17 4:19:39	235sec	60.212.217.20 (Weihai, Shandong)	Employee in enterprises and public institutions
75	2023/1/17 4:19:53	379sec	117.182.1.221(Yulin, Guangxi)	Employee in enterprises and public institutions
76	2023/1/17 4:19:56	187sec	101.206.169.162 (Chengdu, Sichuan)	Manager of enterprises and public institutions
77	2023/1/17 4:20:02	138sec	117.183.64.44 (Wuzhou, Guangxi)	Manager of enterprises and public institutions
78	2023/1/17 4:20:08	142sec	111.183.51.64 (Huanggang, Hubei)	Employee in enterprises and public institutions
79	2023/1/17 4:20:19	149sec	113.57.247.39 (Wuhan, Hubei)	Manager of enterprises and public institutions
80	2023/1/17 4:20:20	158sec	58.251.35.162 (Shenzhen, Guangdong)	Employee in enterprises and public institutions
81	2023/1/17 4:20:23	267sec	116.233.118.122 (Shanghai)	Employee in enterprises and public institutions

82	2023/1/17 4:20:24	117sec	113.100.225.101 (Shantou, Guangdong)	Undergraduate & graduate student
83	2023/1/17 4:20:41	177sec	180.104.197.151 (Xuzhou, Jiangsu)	Undergraduate & graduate student
84	2023/1/17 4:20:46	116sec	116.178.53.47 (Kashgar, Xinjiang)	Teacher
85	2023/1/17 4:20:51	185sec	42.84.233.49 (Dalian, Liaoning)	Employee in enterprises and public institutions
86	2023/1/17 4:20:53	187sec	27.154.2.116 (Xiamen, Fujian)	Employee in enterprises and public institutions
87	2023/1/17 4:20:54	129sec	42.84.232.236 (Dalian, Liaoning)	Advisor/consultant
88	2023/1/17 4:21:11	141sec	117.136.46.157 (Nantong, Jiangsu)	Manager of enterprises and public institutions
89	2023/1/17 4:21:12	460sec	112.65.48.171 (Shanghai)	Employee in enterprises and public institutions
90	2023/1/17 4:21:23	167sec	123.185.52.64 (Dalian, Liaoning)	Employeein enterprises and public institutions
91	2023/1/17 4:21:50	182sec	120.231.145.233 (Qingyuan, Guangdong)	Employee in enterprises and public institutions
92	2023/1/17 4:22:40	153sec	114.87.104.2 (Shanghai)	Employee in enterprises and public institutions
93	2023/1/17 4:25:31	450sec	111.18.108.153 (Baoji, Shaanxi)	Volunteer or public welfare individual
96	2023/1/18 8:47:56	114sec	116.29.241.22 (Shaoguan, Guangdong)	Teacher
97	2023/1/18 8:48:03	127sec	218.12.19.166 (Qinghuangdao, Hebei)	Civil servant
98	2023/1/18 8:48:25	139sec	112.37.209.104 (Binzhou, Shandong)	Undergraduate & graduate student
99	2023/1/18 8:48:56	171sec	36.40.135.201 (Xi’an, Shaanxi)	Advisor/consultant
100	2023/1/18 8:49:12	131sec	111.58.1.6 (Yulin, Guangxi)	Employee in enterprises and public institutions
101	2023/1/18 8:50:09	121sec	123.52.29.107 (Zhengzhou, Henan)	Manager of enterprises and public institutions
102	2023/1/18 8:50:18	126sec	223.104.14.48 (Taiyuan, Shanxi)	Teacher
103	2023/1/18 8:50:34	142sec	123.244.23.96 (Tieling, Liaoning)	Medical personnel
104	2023/1/18 8:50:58	164sec	120.204.218.59 (Shanghai)	Employee in enterprises and public institutions
105	2023/1/18 8:51:12	120sec	39.155.35.149 (Tongliao, Inner Mongolia)	Advisor/consultant
106	2023/1/18 8:51:24	122sec	39.171.183.220 (Shaoxing, Zhejiang)	Unemployed
107	2023/1/18 8:51:30	130sec	111.222.81.9 (Shenzhen, Guangdong)	Manager of enterprises and public institutions
108	2023/1/18 8:51:34	135sec	106.226.146.252 (Shangrao, Jiangxi)	Employee in enterprises and public institutions
109	2023/1/18 8:51:44	208sec	120.207.152.161 (Datong, Shanxi)	Teacher
110	2023/1/18 8:51:58	164sec	116.130.208.192 (Tianjin)	Undergraduate & graduate student

111	2023/1/18 8:52:13	130sec	220.196.192.218 (Shanghai)	Employee in enterprises and public institutions
112	2023/1/18 8:52:23	310sec	117.140.156.234 (Guilin, Guangxi)	Employee in enterprises and public institutions
113	2023/1/18 8:52:26	131sec	171.82.1.134 (Wuhan, Hubei)	Teacher
114	2023/1/18 8:52:35	208sec	42.249.187.166 (Anshan, Liaoning)	Employee in enterprises and public institutions
115	2023/1/18 8:52:39	150sec	202.60.122.195 (Beijing)	Employee in enterprises and public institutions
116	2023/1/18 8:53:04	113sec	125.73.219.86 (Qinzhou, Guangxi)	Employee in enterprises and public institutions
117	2023/1/18 8:53:08	146sec	120.235.203.92 (Qingyuan, Guangdong)	Employee in enterprises and public institutions
118	2023/1/18 8:53:17	127sec	223.104.41.139 (Beijing)	Employee in enterprises and public institutions
119	2023/1/18 8:53:33	140sec	223.104.188.9 (Linyi, Shandong)	Manager of enterprises and public institutions
120	2023/1/18 8:53:37	151sec	39.144.28.238 (Zhoukou, Henan)	Undergraduate & graduate student
121	2023/1/18 8:53:58	225sec	116.9.17.70 (Guigang, Guangxi)	Undergraduate & graduate student
122	2023/1/18 8:54:00	108sec	106.112.209.223 (Cangzhou, Hebei)	Undergraduate & graduate student
123	2023/1/18 8:54:05	116sec	117.153.237.21 (Xiaogan, Hubei)	Employee in enterprises and public institutions
124	2023/1/18 8:54:28	175sec	111.59.84.119 (Guilin, Guangxi)	Employee in enterprises and public institutions
125	2023/1/18 8:54:33	135sec	116.1.230.132 (Yulin, Guangxi)	Employee in enterprises and public institutions
126	2023/1/18 8:55:08	116sec	103.78.126.116 (Chengdu, Sichuan)	Undergraduate & graduate student
127	2023/1/18 8:55:09	230sec	125.127.191.77 (Taizhou, Zhejiang)	Manager of enterprises and public institutions
128	2023/1/18 8:55:10	239sec	106.226.11.252 (Ganzhou, Jiangxi)	Employee in enterprises and public institutions
129	2023/1/18 8:55:11	116sec	1.180.122.224 (Chifeng, Inner Mongolia)	Undergraduate & graduate student
130	2023/1/18 8:55:15	122sec	222.185.189.10 (Changzhou, Jiangsu)	Employee in enterprises and public institutions
131	2023/1/18 8:55:28	131sec	27.128.47.199 (Shijiazhuang, Hebei)	Employee in enterprises and public institutions
132	2023/1/18 8:56:19	125sec	180.125.148.196 (Nantong, Jiangsu)	Employee in enterprises and public institutions
133	2023/1/18 8:56:19	122sec	122.246.1.148 (Ningbo, Zhejiang)	Manager of enterprises and public institutions
134	2023/1/18 8:56:27	123sec	58.48.208.2 (Wuhan, Hubei)	Employee in enterprises and public institutions
135	2023/1/18 8:56:36	142sec	58.63.254.88 (Guangzhou, Guangdong)	Manager of enterprises and public institutions
136	2023/1/18 8:56:50	332sec	123.179.154.229 (Bayannur, Inner Mongolia)	Retiree
137	2023/1/18 8:57:06	168sec	1.202.175.38 (Beijing)	Manager of enterprises and public institutions
138	2023/1/18 8:57:14	118sec	182.245.66.29 (Kunming, Yunnan)	Employee in enterprises and public institutions

139	2023/1/18 8:57:15	216sec	120.14.134.218 (Xingtai, Hebei)	Undergraduate & graduate student
140	2023/1/18 8:58:03	291sec	175.189.217.144 (Wuhan, Hubei)	Teacher
141	2023/1/18 8:58:18	221sec	125.75.17.216 (Lanzhou, Gansu)	Manager of enterprises and public institutions
142	2023/1/18 8:59:52	211sec	120.243.197.0 (Xuancheng, Anhui)	R&D personnel
143	2023/1/18 8:59:59	341sec	223.104.42.141 (Beijing)	Employee in enterprises and public institutions
144	2023/1/18 9:00:53	831sec	117.10.48.123 (Tianjin)	Employee in enterprises and public institutions
145	2023/1/18 9:01:33	306sec	111.35.218.48 (Yantai, Shandong)	Employee in enterprises and public institutions
146	2023/1/18 9:05:30	207sec	218.64.214.233 (Ganzhou, Jiangxi)	Civil servant
149	2023/1/18 4:17:42	113sec	114.246.0.191 (Beijing)	Employee in enterprises and public institutions
150	2023/1/18 4:17:51	122sec	223.104.237.100 (Shenyang, Liaoning)	Volunteer or public welfare individual
151	2023/1/18 4:17:52	124sec	183.208.180.121 (Changzhou, Jiangsu)	Employee in enterprises and public institutions
152	2023/1/18 4:18:52	119sec	171.82.188.35 (Jinzhou, Hubei)	R&D personnel
153	2023/1/18 4:18:56	130sec	223.104.220.29 (Chengdu, Sichuan)	Teacher
154	2023/1/18 4:19:19	153sec	117.136.89.68 (Binzhou, Hunan)	Employee in enterprises and public institutions
155	2023/1/18 4:19:34	223sec	27.189.222.165 (Langfang, Hebei)	Manager of enterprises and public institutions
156	2023/1/18 4:19:47	118sec	121.63.129.139 (Xiangyang, Hubei)	Teacher
157	2023/1/18 4:19:55	125sec	110.81.189.197 (Quanzhou, Fujian)	Employee in enterprises and public institutions
158	2023/1/18 4:19:56	181sec	36.157.165.187 (Zhuzhou, Hunan)	Employee in enterprises and public institutions
160	2023/1/18 4:20:05	135sec	123.196.17.233 (Yantai, Shandong)	Employee in enterprises and public institutions
162	2023/1/18 4:21:20	145sec	117.136.46.0 (Changzhou, Jiangsu)	Manager of enterprises and public institutions
163	2023/1/18 4:21:27	150sec	117.136.34.46 (Guangzhou, Guangdong)	Employee in enterprises and public institutions
164	2023/1/18 4:21:42	129sec	182.147.170.211 (Guangyuan, Sichuan)	Teacher
165	2023/1/18 4:21:43	112sec	117.136.0.120 (Beijing)	Employee in enterprises and public institutions
166	2023/1/18 4:21:53	120sec	111.58.16.150 (Guilin, Guangxi)	Employee in enterprises and public institutions
167	2023/1/18 4:21:56	183sec	182.138.204.111 (Chengdu, Sichuan)	Medical personnel
168	2023/1/18 4:22:02	125sec	39.144.141.179 (Zigong, Sichuan)	Employee in enterprises and public institutions
169	2023/1/18 4:22:04	129sec	115.52.85.239 (Zhoukou, Henan)	Employee in enterprises and public institutions

171	2023/1/18 4:22:11	323sec	61.181.70.234 (Tianjin)	Employee in enterprises and public institutions
172	2023/1/18 4:22:23	152sec	223.104.45.114 (Quanzhou, Fujian)	Manager of enterprises and public institutions
173	2023/1/18 4:22:33	279sec	120.243.210.1 (Xuancheng, Anhui)	Volunteer or public welfare individual
174	2023/1/18 4:22:42	169sec	223.104.218.223 (Chengdu, Sichuan)	Manager of enterprises and public institutions
175	2023/1/18 4:23:05	131sec	39.70.171.73 (Liaocheng, Shandong)	Medical personnel
176	2023/1/18 4:23:11	137sec	117.61.10.239 (Chengdu, Sichuan)	Manager of enterprises and public institutions
177	2023/1/18 4:23:12	137sec	125.43.76.92 (Luoyang, Henan)	Medical personnel
178	2023/1/18 4:23:19	141sec	223.104.106.75 (Kaifeng, Henan)	Undergraduate & graduate student
179	2023/1/18 4:23:21	142sec	36.5.191.13 (Hefei, Anhui)	Employee in enterprises and public institutions
180	2023/1/18 4:23:25	207sec	123.166.207.181 (Harbin, Heilongjiang)	Teacher
181	2023/1/18 4:23:48	232sec	117.136.68.192 (Nantong, Jiangsu)	Employee in enterprises and public institutions
183	2023/1/18 4:23:54	147sec	27.148.43.248 (Fuzhou, Fujian)	Employee in enterprises and public institutions
184	2023/1/18 4:24:19	143sec	182.97.149.213 (Nanchang, Jiangxi)	R&D personnel
185	2023/1/18 4:24:34	209sec	183.44.210.104 (Shantou, Guangdong)	Manager of enterprises and public institutions
186	2023/1/18 4:24:42	164sec	125.94.208.13 (Guangzhou, Guangdong)	Manager of enterprises and public institutions
188	2023/1/18 4:24:53	299sec	220.191.233.200 (Taizhou, Zhejiang)	Manager of enterprises and public institutions
189	2023/1/18 4:24:54	109sec	223.104.41.61 (Beijing)	Undergraduate & graduate student
190	2023/1/18 4:24:57	115sec	120.227.54.251 (Changsha, Hunan)	Undergraduate & graduate student
191	2023/1/18 4:25:01	123sec	36.143.113.214 (Tangshan, Hebei)	Manager of enterprises and public institutions
192	2023/1/18 4:25:21	140sec	39.144.169.174 (Yichun, Jiangxi)	Manager of enterprises and public institutions
193	2023/1/18 4:25:22	145sec	219.156.173.199 (Nanyang, Henan)	Undergraduate & graduate student
194	2023/1/18 4:26:26	319sec	222.71.42.206 (Shanghai)	Manager of enterprises and public institutions
195	2023/1/18 4:27:06	246sec	101.82.90.134 (Shanghai)	Employee in enterprises and public institutions
196	2023/1/18 4:27:27	317sec	123.138.249.147 (Baoji, Shaanxi)	Employee in enterprises and public institutions
197	2023/1/18 4:27:32	268sec	218.26.55.216 (Xinzhou, Shanxi)	Employee in enterprises and public institutions
198	2023/1/18 4:27:35	276sec	223.104.60.245 (Guangzhou, Guangdong)	Civil servant
199	2023/1/18 4:28:58	666sec	60.233.16.28 (Jinan, Shandong)	R&D personnel

200	2023/1/18 4:29:07	369sec	183.162.47.111 (Hefei, Anhui)	Employee in enterprises and public institutions
202	2023/1/18 4:35:15	860sec	120.235.212.159 (Jieyang, Guangdong)	Employee in enterprises and public institutions
203	2023/1/19 0:42:38	450sec	183.232.230.245 (Guangzhou, Guangdong)	Employee in enterprises and public institutions
204	2023/1/19 9:02:58	117sec	27.128.24.203 (Shijiazhuang, Hebei)	Manager of enterprises and public institutions
205	2023/1/19 9:03:00	115sec	183.225.118.68 (Chuxiong, Yunnan)	Undergraduate & graduate student
206	2023/1/19 9:03:08	120sec	36.99.89.142 (Jiaozuo, Henan)	Media personnel
207	2023/1/19 9:03:22	128sec	171.95.208.138 (Nanchong, Sichuan)	Undergraduate & graduate student
208	2023/1/19 9:03:41	154sec	117.23.69.233 (Shangluo, Shaanxi)	Volunteer or public welfare individual
209	2023/1/19 9:04:14	127sec	36.142.155.165 (Pingliang, Gansu)	Undergraduate & graduate student
210	2023/1/19 9:04:23	165sec	61.161.149.246 (Shenyang, Liaoning)	Employee in enterprises and public institutions
211	2023/1/19 9:04:23	194sec	110.19.167.193 (Hohhot, Inner Mongolia)	Catering staff
212	2023/1/19 9:04:25	135sec	112.12.174.172 (Wenzhou, Zhejiang)	Employee in enterprises and public institutions
213	2023/1/19 9:04:37	142sec	116.176.90.125 (Jiuquan, Gansu)	Employee in enterprises and public institutions
214	2023/1/19 9:04:38	115sec	101.82.102.57 (Shanghai)	Employee in enterprises and public institutions
215	2023/1/19 9:05:09	116sec	125.76.208.227 (Xi’an, Shaanxi)	Manager of enterprises and public institutions
216	2023/1/19 9:05:14	176sec	112.226.152.182 (Qingdao, Shandong)	Employee in enterprises and public institutions

Annex H: The Respondents' Responses to Q15

	15、你有什么建议或评论，欢迎指正 (Do you have any suggestions or comments? Thank you very much.)
1	暂无 (No)
2	群众也要宽容 (The public should also be tolerant.)
3	无 (No)
4	有政府出门公布，必须是实事求是的不得谎报 (When the government makes public announcements, it must be truthful and not lie.)
5	无 (No)
6	无 (No)
7	无 (No)
8	没什么别的建议 (No)
9	公开的前提是做好背景科普 (The premise of disclosure is to do a good job of background knowledge popularization.)
10	无 (N)
11	无意见 (No)
12	无 (No)
13	建议数据公开，让百姓认识到真真切切的疫情实况 (It is recommended that the data be made public so that people can know about the true situation of the pandemic.)
14	无 (No)
15	暂时没有哦 (No)
16	关于卫生问题，要有所改变 (With regard to sanitation, something has to change.)
17	真实报道 (Honest reporting.)
18	烦人 (Annoying)
19	没有 (No)
20	非常好的问卷内容，很现实 (Very good questionnaire. Very realistic.)
21	没有什么建议 (No)
22	要保证信息的真实性 (Ensure the authenticity of the information.)
23	感觉最好是信息透明化，公开化(I think it is better to be transparent and open.)
24	暂时没有 (No)
25	相关消息在网站公布 (The relevant information is published on the website.)
26	无 (No)
27	没有 (No)
28	加强政策，加强管理，提高大众认同感 (Strengthen policies, strengthen management, and enhance public identity.)
29	无 (No)
30	问题的信息可以与观点稍微分离一下，现在有点很难看到观点 (The message of the question can be separated a little bit from the point of view. It is a bit difficult to find the point of view right now.)
31	希望有公开透明的政策 (We want an open and transparent policy.)
32	没有 (No)

33	无 (No)
34	无 (No)
35	没有 (No)
36	目前来说的话，最好的建议就是，政府应该让民众具备最基本的知情权，这样的话，政府才会具备一定的公信力，民众也会更加信任和依赖政府 (At present, the best suggestion is that the government should let the people have the most basic right to know, so that the government will have a certain degree of credibility, and the people will also trust and rely on the government more.)
37	无 (No)
38	建议确身落实，加大宣传 (It is recommended to be implemented and promoted rigorously)
39	无 (No)
40	无 (No)
41	应该建立制度，规范(Systems and norms should be established.)
42	应该对这方面多加强管理和制定相关的法律(We should strengthen the management of this area and formulate related laws.)
43	实时 ，准确的说明试试，更能让公众信服，但是要考虑是否会引起不必要的恐慌 (A real-time, accurate explanation will be more convincing to the public, but we should also consider whether it will cause unnecessary panic.)
44	加强群众素质教育 (Strengthen quality education for the public.)
45	无 (No)
46	没什么建议 (No)
47	目前想不到 (No)
48	没有好的建议 (No)
49	没有 (No)
50	没 (No)
51	无 (No)
52	无 (No)
53	实时播报有好处 (Real-time disclosure is good.)
54	希望有更多的问题 (Hope there are more questions.)
55	加大对公共卫生事业的管理 (Strengthen the management of public health affairs.)
56	提高发布信息的权威性和准确性 (Improve the authority and accuracy of the information released)
57	无 (No)
58	无 (No)
59	无 (No)
60	无 (No)
61	信息透明，做事透明公正公开 (Transparent information; transparent, fair, and open conduct.)
62	我没有意见 (No)
63	暂无其他建议 (No)
64	无 (No)
65	无 (No)
66	无 (No)
67	严惩养狗人 (Punish dog-owners severely.)
68	无 (No)
69	无 (No)

70	无 (No)
71	无 (No)
72	无 (No)
73	暂无 (No)
74	无 (No)
75	无 (No)
76	可以纳入法律法规 (It can be incorporated into laws and regulations)
77	无 (No)
78	无 (No)
79	没有 (No)
80	无 (No)
81	提高警惕 (Be on the alert.)
82	无建议 (No)
83	无 (No)
84	没有建议 (No)
85	没有 (No)
86	更多的知情权 (More right to know)
87	应该科学公开 (Should be scientific and open)
88	无 (No)
89	增加透明度 (Increase transparency)
90	新闻媒体加大舆论监督作用 (The news media should strengthen the supervision role of public opinion)
91	无 (No)
92	无 (No)
93	没有 (No)
94	无 (No)
95	无 (No)
96	无 (No)
97	实时披露非常必要(Real-time disclosure is essential.)
98	希望政府多考虑人民的意愿，从民众意愿出发 (It is hoped that the government will take into account the will of the people and proceed from their wishes)
99	暂无 (No)
100	无 (No)
101	合理化 (Rationalization)
102	无 (No)
103	无 (No)
104	准确性以及及时性 (Accuracy and timeliness)
105	无 (No)
106	节育流浪动物 (Birth control of stray animals)
107	希望广大市民积极参与，做好个人防护 (It is hoped that the general public will be actively engaged and take personal protection measures)
108	政府支持(government support)
109	希望加大力度科普一些健康公共卫生事件的常识 (It is hoped that more efforts will be made to popularize the common sense related to public health events)
110	公共卫生事件要及时，依法公开 (Public health events should be made public in a timely manner and in accordance with the law.)
111	无 (No)

112	暂时没有 (No)
113	没有 (No)
114	时效性 (Timeliness)
115	我没有建议 (No)
116	问卷调查题目数量要合适，题目内容设计尽量简明扼要，通俗易懂 (The number of questionnaire items should be appropriate, and the content of the questions should be concise and easy to understand)
117	无 (No)
118	无 (No)
119	无 (No)
120	加强合作，民主交流 (Strengthen cooperation and democratic exchanges)
121	公共卫生事件应该及时通告(Public health events should be notified promptly.)
122	无 (No)
123	公共卫生安全主要靠大家的自觉,不过政府可以适当的出行一些政策，比如关于宠物这一块的 (Public health security mainly depends on people’s consciousness, but the government can issue some policies as appropriate, such as policy related to pets)
124	Asfhjkzxcvb78
125	无 (No)
126	无 (No)
127	反馈即时，实施妥当，完善措施 (Prompt feedback, proper implementation, measure improvement)
128	无 (No)
129	没有 (No)
130	主要看落实及追责条款 (The implementation and accountability provisions are more important.)
131	没有，谢谢 (No)
132	无建议 (No)
133	希望可以多一些公益宣传活动 (I hope there can be more public welfare promotion activities)
134	全面披露同时尊重隐私 (Comprehensive disclosure while respecting privacy)
135	无，很满意 (No, quite satisfied)
136	信息公开，不断改进，市民参与 (Open information, continuous improvement, citizen participation)
137	我们都知道这次疫情，虽然说公开但是还隐瞒了不少死亡 (We all know about this pandemic. Although the information is said to be public, many deaths are concealed.)
138	希望时实公开，透明。并且真实有原可查 (We hope it to be real-time, open, and transparent. It should also be authentic based on traceable facts.)
139	无 (No)
140	希望能透明化 (I hope it can be transparent.)
141	无 (No)
142	无 (No)
143	公开，真实，客观，令人信服 (Open, authentic, objective, convincing)
144	上面提到的内容很全面，期待在实际当中实行 (The above mentioned content is very comprehensive. I look forward to its implementation in practice)

	一定要做到执法必严！合理合法 (We must enforce the law strictly!
145	Reasonable and lawful)
146	无 (No)
147	无 (No)
148	没有了 (No)
149	无 (No)
150	暂无 (No)
151	无建议 (No)
	公共卫生事件与百姓的生活息息相关应该摆到最高的位置 (Public
152	health issues that affect people's lives should be given the highest priority)
153	无 (No)
	对一些社情民意反映渠道 (Channels for acknowledging social
154	conditions and collecting public opinion)
155	无 (No)
156	无 (No)
157	提高质量(Improve the quality)
	大数据化实施最新动态(The latest development of big data
158	implementation)
159	无 (No)
160	没有 (No)
161	没有 (No)
162	无 (No)
163	无 (No)
	希望可以更明了的了解情况 (I hope to understand the situation more
164	clearly)
165	并无建议 (No)
166	无 (No)
167	无 (No)
168	做事公开透明 (Be open and transparent)
169	无 (No)
	希望能有更正规的公共卫生事件信息发布 (Hope there can be more
170	regulated public health information disclosure)
	法制化是好事。如何执行试目以待 (Legalization is a good thing. We
171	will see how it can be executed.)
	搭建专业平台，由专业团队负责披露公共卫生相关信息 (Build a
	professional platform, where a professional team is responsible for
172	disclosing information related to public health)
173	无 (No)
	公共卫生数据公开同时得做好保护，避免被不法分子利用 (While
	public health data is made public, it should also protected to avoid being
174	exploited by criminals)
175	信息透明化 (Information transparency)
	无论是哪个平台哪个层级的公开，都希望提高公开信息的真实性和即
	时性 (No matter which platform and which level of openness, we hope to
176	improve the authenticity and timeliness of the disclosed information.)
177	无 (No)
178	木有 (No)
179	无 (No)
180	群众有知情权 (The public has the right to know.)
181	无 (No)

182	无 (No)
183	暂时无 (No)
184	没有 (No)
185	无 (No)
186	公共卫生事件透明化的过程中，要注意其给民众带来的影响，避免群众过于恐慌 (When making public health events transparent, attention should be paid to their impact on the public to avoid excessive panic)
187	并无其他建议 (No)
188	并无意见 (No)
189	并无意见 (No)
190	我没有意见 (No)
191	加强监管 (Strengthen supervision)
192	暂时没有 (No)
193	公开透明(Open and transparent)
194	没有什么 希望病毒别传染 (Nothing. Hope the virus won't spread anymore.)
195	没有了 (No)
196	创新 (Innovation)
197	占时没有 (No)
198	做好安全措施，保护人民 (Put security measures in place to protect people)
199	无 (No)
200	无 (No)
201	无 (No)
202	工作 (Work)
203	无 (No)
204	无健议 (No)
205	无 (No)
206	无 (No)
207	政府信息公开化有助于市民及时得到信息，以便于对自己及家人及时避免(The openness of government information helps citizens get timely information so that they can take timely prevention measures for themselves and their families.)
208	无 (No)
209	切实保证民生 (Ensure people's livelihood)
210	暂无 (No)
211	多多公布一些涉及民生的实时新闻 (Release more real-time news related to people's livelihood)
212	一些学者应树立榜样，提供好的建议 (Some scholars should set an example and give good advice)
213	没有 (No)
214	无 (No)
215	希望有专门的单位管理处理公共卫生事件 (Hope there can be a dedicated unit to manage and deal with public health events)
216	没有了 (No)

Annex I: AMOS Output for SEM model Fit and Path Estimation

The following is the AMOS calculation output, which can be used to examine the fitting degree of the CIRD-PHE SEM model and the significance level of the path coefficients.

I.1 Model Fit

CMIN

Model	NPAR	CMIN	DF	P	CMIN/DF
Default model	29	188.027	62	.000	3.033
Saturated model	91	.000	0		
Independence model	13	564.054	78	.000	7.231

RMR, GFI

Model	RMR	GFI	AGFI	PGFI
Default model	.086	.891	.840	.607
Saturated model	.000	1.000		
Independence model	.170	.577	.507	.495

Baseline Comparisons

Model	NFI Delta1	RFI rho1	IFI Delta2	TLI rho2	CFI
Default model	.667	.581	.749	.674	.741
Saturated model	1.000		1.000		1.000
Independence model	.000	.000	.000	.000	.000

Parsimony-Adjusted Measures

Model	PRATIO	PNFI	PCFI
Default model	.795	.530	.589
Saturated model	.000	.000	.000
Independence model	1.000	.000	.000

NCP

Model	NCP	LO 90	HI 90
Default model	126.027	88.559	171.124
Saturated model	.000	.000	.000
Independence model	486.054	414.374	565.215

FMIN

Model	FMIN	F0	LO 90	HI 90
Default model	.875	.586	.412	.796
Saturated model	.000	.000	.000	.000
Independence model	2.624	2.261	1.927	2.629

RMSEA

Model	RMSEA	LO 90	HI 90	PCLOSE
Default model	.097	.082	.113	.000
Independence model	.170	.157	.184	.000

AIC

Model	AIC	BCC	BIC	CAIC
Default model	246.027	250.067	343.910	372.910
Saturated model	182.000	194.677	489.150	580.150
Independence model	590.054	591.865	633.933	646.933

ECVI

Model	ECVI	LO 90	HI 90	MECVI
Default model	1.144	.970	1.354	1.163
Saturated model	.847	.847	.847	.905
Independence model	2.744	2.411	3.113	2.753

HOELTER

Model	HOELTER .05	HOELTER .01
Default model	94	104
Independence model	38	42

I.2 Path estimation

Scalar Estimates (Group number 1 - Default model)

Maximum Likelihood Estimates

Regression Weights: (Group number 1 - Default model)

			Estimate	S.E.	C.R.	P	Label
CRIDPHE	<---	Necessity	.645	.152	4.241	***	par_6
CRIDPHE	<---	Feasibility	.650	.190	3.429	***	par_7
Effectiveness	<---	CRIDPHE	1.053	.196	5.362	***	par_8
Q5	<---	Necessity	1.000				
Q4	<---	Necessity	1.287	.258	4.982	***	par_1
Q3	<---	Necessity	.469	.185	2.533	.011	par_2
Q2	<---	Necessity	.954	.199	4.797	***	par_3
Q9	<---	Feasibility	1.000				
Q8	<---	Feasibility	1.369	.381	3.595	***	par_4
Q10	<---	Effectiveness	1.000				
Q7	<---	CRIDPHE	1.000				
Q6	<---	CRIDPHE	1.301	.229	5.688	***	par_5
Q14	<---	Effectiveness	.872	.189	4.618	***	par_9
Q12	<---	Effectiveness	1.349	.227	5.952	***	par_10
Q13	<---	CRIDPHE	1.030	.207	4.980	***	par_11
Q11	<---	Effectiveness	1.184	.325	3.647	***	par_12

Standardized Regression Weights: (Group number 1 - Default model)

			Estimate
CRIDPHE	<---	Necessity	.697
CRIDPHE	<---	Feasibility	.695
Effectiveness	<---	CRIDPHE	1.011
Q5	<---	Necessity	.557
Q4	<---	Necessity	.634
Q3	<---	Necessity	.219
Q2	<---	Necessity	.491
Q9	<---	Feasibility	.413
Q8	<---	Feasibility	.515
Q10	<---	Effectiveness	.497
Q7	<---	CRIDPHE	.475
Q6	<---	CRIDPHE	.573
Q14	<---	Effectiveness	.377
Q12	<---	Effectiveness	.561
Q13	<---	CRIDPHE	.428
Q11	<---	Effectiveness	.501

Variances: (Group number 1 - Default model)

			Estimate	S.E.	C.R.	P	Label
CRIDPHE	<---	Feasibility	.650	.190	3.429	***	par_7
Effectiveness	<---	CRIDPHE	1.053	.196	5.362	***	par_8
Q5	<---	Necessity	1.000				
Q4	<---	Necessity	1.287	.258	4.982	***	par_1
Q3	<---	Necessity	.469	.185	2.533	.011	par_2
Q2	<---	Necessity	.954	.199	4.797	***	par_3
Q9	<---	Feasibility	1.000				
Q8	<---	Feasibility	1.369	.381	3.595	***	par_4
Q10	<---	Effectiveness	1.000				
Q7	<---	CRIDPHE	1.000				
Q6	<---	CRIDPHE	1.301	.229	5.688	***	par_5
Q14	<---	Effectiveness	.872	.189	4.618	***	par_9
Q12	<---	Effectiveness	1.349	.227	5.952	***	par_10
Q13	<---	CRIDPHE	1.030	.207	4.980	***	par_11
Q11	<---	Feasibility	1.184	.325	3.647	***	par_12