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PUBLIC HEALTH AND RISK COMMUNICATION:
THE EXPERIENCE OF
THE SEVERE ACUTE RESPIRATORY SYNDROME (SARS)
EPIDEMIC
AND THE SWINE INFLUENZA PANDEMIC

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Public Health and Risk Communication: The Experience of
the Severe Acute Respiratory Syndrome (SARS) Epidemic
and the Swine Influenza Pandemic

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A thesis submitted in partial fulfillment of the requirements for
the degree of Doctor of Philosophy

August 2016

CERTIFICATE OF ORIGINALITY

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ABSTRACT

This study aims at enhancing the understanding of public health and risk communication through linguistic investigations of the use of modality to express risk and uncertainty in the discourses of the 2003 severe acute respiratory syndrome (SARS) epidemic and the 2009 swine influenza pandemic.

The two incidents are both major public health threats confronting the world in the 21st century. The discourses of these two events are chosen in this study because the events exemplify serious public health threats: the disease causative agents - the SARS coronavirus and the influenza A (H1N1) were of novel nature; and in the initial periods of the disease outbreaks, there were no treatments and no vaccines available. These properties of the events are also observed in other public health threats, such as the Ebola outbreak in 2014, the Middle East Respiratory Syndrome (MERS) outbreak in Middle East and the Republic of Korea in 2015, and the recent Zika virus in 2016. The attributes of risk and uncertainty inherent to the discourses of these diseases pose an enormous challenge to public health authorities in terms of public health and risk communication on the nature of diseases, which is crucial for control of disease transmission and containment. As pointed out by the World Health Organization (2003b), it is important to learn from the past and shape future strategies against subsequent infectious epidemics, and this study attempts to contribute with a linguistic approach.

The linguistic resource of modality enables a writer/speaker to convey different degrees of certainty, and to express his/her stance or opinion or commitment to the truth of his/her proposition (Davidse & Simon-Vandenberg, 2008; Halliday, 1994; Huddleston & Pullman, 2002). In the theories of systemic functional linguistics, Halliday (1994) takes the idea that polarity is a choice between ‘yes’ and ‘no’ and modality is various kind of intermediate degrees between the positive and negative poles. The indeterminacy on modality implies that the status of what is being said depends on the speaker’s judgment or requests the judgment of the listener. Accordingly, the study derives a framework of systemic functional approach to modality for analyzing different level of certainty presented in the two incidents.

The data set is a collection of approximately 217,000 words from a variety of sources including press updates and conferences held by the World Health Organization, newspaper reports and websites information concerning the 2003 SARS epidemic and the 2009 swine influenza pandemic. The texts were analyzed at the clause level, referring to the analytical framework modality, in terms of *type of assessment, value, manifestation and orientation* (Argamon, Whitelaw, Chase, Hota, Garg & Levitan, 2007; Halliday & Matthiessen, 2014). The analysis has identified the variety of levels and types of modality, including modal adjuncts,

finite modals, interpersonal metaphors presented in projecting clauses presenting modality in the discourses of the two events. These linguistic features identified constitute the properties of risk and uncertainty communication in the discourses of the two public health threats.

Results indicate that *probability* is the major type of modality presented in the discourses of the SARS epidemic and the swine influenza pandemic selected for the study. The SARS epidemic and the swine influenza pandemic have provided a good ground for studying issues of risk and uncertainty from a linguistic perspective. The detailed linguistic analysis shows how risk messages were conveyed to the public, in particular the language used to present risk and uncertainty. The study is practically valuable to public health authorities in the development of effective tools for better pandemic preparedness planning for credible communication to mitigate the impact in subsequent disease epidemics and pandemics. The study also theoretically adds to the body of knowledge and explores the theoretical contributions to current debates on modality, the discourses of public health and risk communication, with the framework of systemic functional linguistics.

CONFERENCE PAPER & PRESENTATION

- Cheung, Germaine (2014) “Modality in influenza pandemic discourse”, paper presented at the Conference on The Language of Medicine: Science, Practice and Academia, CERLIS, University of Bergamo, Italy in June 2014
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Chapter 1 Introduction

1.1 Chapter Overview

This introductory chapter presents the social background, the research questions and research objectives, significance of the study and the organization of the thesis.

This study aims at enhancing the understanding of public health and risk communication through linguistic investigations focusing on the use of modality to express risk and uncertainty in the discourses of the 2003 severe acute respiratory syndrome (SARS) epidemic and the 2009 swine influenza pandemic. It is essential to first briefly define some key terms such as *public health*, *risk communication*, *epidemic*, *pandemic* and *modality* in Section 1.2 to facilitate the readers a better understanding of the research topic and research objectives presented in this chapter. Other related concepts and theories of these terms will be introduced in more detail in Chapter 1 and Chapter 3.

The data of the study are drawn from the SARS epidemic and the 2009 swine influenza. Section 1.3 provides a short description of the two events, which constitutes the social context of the study, and their associated research gaps and problems to be tackled in this study.

Section 1.4 introduces some examples from the swine influenza pandemic to illustrate the role language and linguistics can play in communicating risk and uncertainty during public health crisis, aiming at providing a short description of the theoretical background underpinning the study.

The chapter will then introduce the research questions and objectives in Section 1.5, and the deliverables and significance of the research in Section 1.6. The structure of the thesis will be presented in Section 1.7.

1.2 Defining Key Terms

The definitions of several important technical terms provided in this section, help readers to understand the research topic and the objectives of the study. As the present study concerns public health communication and modality is adopted as the linguistic analytical framework, the relevant terms *public health*, risk, *risk communication*, epidemic, pandemic and *modality* are briefly explained here. Other concepts and theories related to these terms will be presented in more detail in the next two chapters.

Public health is a specific area of medicine that concerns the health of the entire population rather than just the treatment of individual patients. According to

Schneider (2011), public health is defined as "The science and the art of preventing disease, prolonging life, and promoting physical health and efficiency through organized community efforts" (Schneider, 2011: 4-5). Other related concepts of public health will be introduced in detail in Section 2.2 of Chapter 2.

Risk in everyday language refers to "the possibility of loss, injury, disadvantage or destruction" (Webster 1971 cited in Garland, 2003: 50). Risk, if defined from public health perspective, refers to "the probability that an event will occur (e.g. that a person will be affected by, or die from, and illness, injury, or other health condition within a specified time or age span" (Centers for Disease Control and Prevention (CDC), 2012a: Glossary: 17) . Other related theories and concepts will be introduced in detail in Section 2.3 of Chapter 2.

Risk communication is "an interactive process of exchange of information and opinion among individuals, groups and institutions. It involves multiple messages about the nature of risk" (US National Research Council 1989 cited in Aven and Renn, 2010:159) . Other related concepts and theories of risk communication will be introduced in Section 2.3 of Chapter 2.

Epidemic is defined as “the occurrence in a community or region of cases of an illness, specific health-related behavior, or other health-related events clearly in excess of normal expectancy.” (Porta, 2008: 79). The discourse of the SARS epidemic is analyzed in this study. The background of the 2003 SARS epidemic will be introduced in Section 1.3 of this chapter.

Pandemic is defined as "an epidemic occurring worldwide or over a very wide area, crossing international boundaries, and usually affecting a large number of people” (Porta, 2008: 179). In other words, pandemic is a worldwide epidemic (Porta, 2008). The discourse of the swine influenza pandemic is analyzed in the study. The background of the 2009 swine influenza pandemic will be introduced in Section 1.3 of this chapter.

Modality is a linguistic resource that expresses the meaning that lies in the area between 'yes' and 'no', and its major function is to reflect the speaker's/writer's attitude towards degrees of his/her proposition: probability, usuality, obligation, inclination, ability, about an utterance (Green, Yang & Li, 2009; Halliday & Matthiessen, 2014; Thompson, 2014) . Cummings (2010: 54) also states that “polarity refers the affirmation or denial of a claim, and that modality refers to the intermediate degree to which a claim is valid”. Modality is expressed or realized

through different ways such as auxiliary verbs or modal verbs (e.g. *should*, *may*, *can*), modal adjuncts (e.g. *perhaps*, *probably*, *possibly*), interpersonal metaphors presented by projecting clauses such as *I think* or *it is likely that...*) (Halliday & Matthiessen, 2014). Other related concepts and theories of modality will be introduced in Section 2.4 of Chapter 2 and Section 3.3 and Section 3.4 of Chapter 3.

1.3 Social Background of the Study

The previous section defines some key terms related to this study e.g. epidemic, pandemic etc. This section turns to present the social background of the study: the 2003 SARS epidemic and the 2009 swine influenza pandemic. As indicated in Section 1.1, this study draws on the discourses of the two events, both of which have significant implications for public health and risk communication. A brief introduction of the development of the two incidents and their implications is essential because, if viewing from language and communication perspectives, the two events provide important lessons to learn on the significance of communicating risk and uncertainty during public health crisis. The social background also forms a base for identifying the research problem of this study.

The 2003 Severe Acute Respiratory Syndrome (SARS) Epidemic

SARS is the first severe emerging infectious disease caused by a newly identified coronavirus (SARS-CoV) in the 21st century (World Health Organization, 2003c). SARS was first known as an outbreak of atypical pneumonia in Guangdong Province, China in November 2002 (Heymann & Rodier, 2004; World Health Organization, 2003c). As the new pathogen has a distinctive capacity of readily transmissible among human, it spread rapidly along the routes of international air travel to Hong Kong, Hanoi, Singapore, Taiwan and Toronto in a short period of time in early 2003 (Lewison, 2008; World Health Organization, 2003b, 2003c). The disease swept quickly the globe and appeared on five continents (Duffin, 2006). The global spread resulted in a SARS epidemic, as defined in Section 1.2 by reference to the excess of normal expectancy of the occurrence of an illness or health-related behavior or events (or an outbreak) in a community or region (Porta, 2008). Limitations of diagnostic tests due to non-specific symptoms and poorly understood epidemiology and pathogenesis created a substantial degree of uncertainty for containment of the disease (World Health Organization, 2003c). Initially, there was no vaccine and no treatment for the novel coronavirus. The control tools relied on standard interventions or ancient methods such as contact tracing, strict isolation or quarantine of the sufferers and their contact (Duffin, 2006; World Health Organization, 2003b). More importantly, most patients required intensive care, and the SARS victims also included hospital staff, nurses and

doctors, leading to a considerable strain and tensions to the health care systems of the affected countries and regions such as mainland China, Hong Kong, Singapore, Canada etc. (Duffin, 2006; Powers, 2008; World Health Organization, 2003b). For example, in Hong Kong, SARS was classified as a medical emergency. The epidemic made profound demands of public health experts and health-care workers (Duffin, 2006). Considerable resources were allocated to invite collective actions (e.g. revision of medical procedures regarding the use of gowns and face masks; quarantine policy for people who exposed to SARS; broad contact tracings in the community etc.) so as to conclude the health threat as soon as possible (Powers, 2008).

The SARS epidemic became a serious global threat in mid-April and May 2003, lasting for few months and concluded by July 2003 (Kleinman & Watson, 2006; Powers, 2008). According to a summary report of the WHO (based on the data as of 31 December 2003), 29 countries were affected by SARS and 8,096 people contracted the disease with 774 deaths worldwide (World Health Organization, 2003c). Although the health impact of SARS was not devastating when compared to other public health crises such as the 1918 influenza pandemic, in which more than 40 million people died (Smith, 2006), the massive implication of the SARS epidemic was a significant global socio-economic disruption occurred in the affected countries and regions, mainly due to the travel and tourism affected

(Bandara, 2003; Heymann & Rodier, 2004; Lau, Griffiths, Choi, & Tsui, 2009; Smith, 2006; World Health Organization, 2003c). For example, it was estimated that the global economic impact of SARS was around US\$30-100 billion (Smith, 2006). The economies of some South-East Asian countries and regions like Singapore, Hong Kong and China were estimated to have lost about 3% of GDP due to the impact of SARS (Bandara, 2003). Regarding the social disruptions, the general public felt panic and worry, leading to emotional turmoil. People wore masks in the public. They stayed at home and avoided going out for social activities and travelling to other countries (Cauchemez, Ferguson, Wachtel, Tegnell, Saour, Duncan & Nicoll, 2009; Duffin, 2006; Lau et al., 2009). Brookes & Khan (2005: 1) also commented that the SARS epidemic was ‘a disturbing and dangerous momentum’ in which ‘everything is confusion and turmoil’. For examples, schools and borders were closed; tourism was affected; numerous people were kept in quarantine; doctors, nurses and many healthcare workers were upsetting because of contracting the disease, and even died of it; public panic was widespread, and some government officials even lost their jobs as a result of the disease (Heymann & Rodier, 2004; World Health Organization, 2003c).

The 2009 Swine Influenza Pandemic

The second public health incidence constituting the social background of this study is the 2009 swine influenza pandemic. In April 2009, a new strain of influenza virus A (H1N1) was first identified in Mexico. Since the virus was found genetically related to viruses circulated in pigs, it is generally referred to as the 'swine flu' or 'swine influenza' (Girard, Tam, Assossou, & Kieny, 2010). Within two months' time of its Mexican origin, the virus quickly spread worldwide and evolved into an influenza pandemic, referring to an epidemic of communicable disease affecting worldwide across international boundaries with a large number of people being affected in a high morbidity and mortality rate (Porta, 2008; World Health Organization, 2013). On 11 June 2009, the WHO also declared the alert level up to its highest Phase 6, indicating that the virus could spread easily and substantially among humans (World Health Organization, 2013). In August 2010, the Director-General of the WHO announced that the pandemic was over (World Health Organization, 2010a). According to the WHO statistics as of August 2010, more than 214 countries and territories reported laboratory confirmed cases of pandemic influenza A/H1N1, including over 18449 lab-confirmed deaths. (World Health Organization, 2010c)

As the new influenza virus spread rapidly around the world for which people have practically no immunity to it, mitigating its effects became a priority in public

health (World Health Organization, 2010b). Accordingly, global health authorities, local governments and communities had a rapid response to the disease. For example, in Hong Kong, the first case of swine influenza, a Mexican traveler, was reported in early May 2009. Due to the 2003 SARS experience where 299 lives were lost, Hong Kong health authorities quickly ordered the closure and isolation of the hotel where the victim accommodated. More than 350 guests and staff were put in quarantine for eight days. The alert level was raised to its highest 'Emergency Response Level' in Hong Kong (Lau et al., 2009).

The social impacts of the swine influenza pandemic also includes closure of schools (Cauchemez et al., 2009), which also creates the economic impact of the pandemic. The closure of school creates a cost to the workforce because the working parents need to be absent from work to look after their children. It is estimated that the total cost of school closure for 12 weeks constitutes from £0.2 billion to £1.2 billion per week in UK. If the school closes for 12 weeks, it is estimated that it will cost 0.2-1% of Gross Domestic Product (GDP) (Cauchemez et al., 2009). This also applied to the quarantine of contact victims and their close contact, another standard interventions or non-pharmaceutical interventions to mitigate the pandemic (Cauchemez et al., 2009). The social impact also includes the psychological response and behavioral changes such as a decrease in consumption of pork (Goodwin, Haque, Neto, & Myers, 2009; G. J. Rubin, Amlôt,

Page, & Wessely, 2009), and effects on the health care services (Cauchemez et al., 2009; Coker, 2009)

Apart from the social, economic and public health impact, the swine influenza pandemic also raises another major issue concerning the uptake rate of the vaccine to prevent the novel H1N1 influenza virus. By the late summer of 2009, the vaccine against the H1N1 virus was developed (Henrich & Holmes, 2011). The vaccine has been regarded as one of the most effective ways to protect people against the viruses or pathogens of during influenza epidemics or pandemics (French & Raymond, 2009). Nonetheless, the uptake of swine influenza vaccine from the public was unsatisfactory or even disappointing in many regions in 2009. For example, reports from the Centers for Disease Control and Prevention (CDC) in the United States have indicated that the estimated vaccinated coverage among health care personnel was 37.1% for 2009 pandemic influenza A (H1N1) (CDC, 2010). In Canada, the actual uptake rate was approximately 41% (Henrich & Holmes, 2011). Lee (2010) argues that in Hong Kong, the swine flu vaccination programme started in December 2009. By March 2010, only about 9% of the two million people in 'high risk' groups, including elderly, patients with chronic illness, pregnant women, health care workers, poultry workers, children aged over six months and under six years, have taken the swine flu shots. Lee (2010) also mentioned about the critics that poor government organization and poor public communication, in particular

the adverse reactions (e.g. Guillain-Barre syndrome) after taking the vaccine, were the main reasons for the low intake of the swine flu vaccination programme in Hong Kong. However, if people believe that the vaccine is for protection of their health, one may suppose that they will make judgments about the risks and benefits for such action. This judgment will highly rely on the information of risk and benefit provided, and how such information is being presented. This point establishes one of the rationales for the study - how the health authorities present the information concerning the swine influenza vaccine to the general public. However, studies focusing on a detailed analysis of communication and discursive practices during influenza pandemics are lacking. Accordingly, it is worth exploring the nature of language use in public health and risk communication during infectious disease outbreaks such as the 2003 SARS epidemic and the 2009 swine influenza pandemic.

Implications of the SARS Epidemic and the Swine Influenza Pandemic

The associated social consequences of the 2003 SARS epidemic and the 2009 swine influenza pandemic include significant impact on public health and health service systems, psychological and behavioral changes and consequences for the economy of the affected countries and regions, as indicated in the development of the two incidents as described above. Another major implication is the concern of public health and risk communication during public health crises such as the SARS epidemic and the swine influenza pandemic. The Centers for Disease Control and Prevention (CDC), a principal public health institution of the United States, emphasizes that not counting the tools of surveillance, isolation, quarantine and travel restriction, timely health communication is an essential element to ensure that the public, media and health-care providers get information about preventive measures for containing the infectious disease outbreaks (Arguin, Navin, Steele, Weld, & Kozarsky, 2004). However, apart from timely health communication, it is challenging to communicate information about a new and emerging infectious disease such as SARS or swine influenza.

In this regard, Powers (2008: 1) commented that the SARS epidemic is ‘the first international health-related crisis’ and also ‘international health communication crisis’ in the 21st century because of its unknown origins, manner of transmission and unprecedented rapid spread globally within a few months. Bandara (2003) also

states that the uncertainties about the disease transmission and lack of information about the treatment and cure of SARS created fear and panic for the public. Thus, it is extremely challenging for public health authorities to manage such unknown, uncertain and unfavorable circumstances, in particular risk communication in the initial periods of the disease outbreak (Powers, 2008).

Accordingly, after the SARS outbreak, the WHO in its document *Severe Acute Respiratory Syndrome (SARS); Status of the Outbreak and Lessons for the Immediate Future* (World Health Organization, 2003c) mentioned that the new disease of SARS provides a good lesson to learn for the management of an emerging infectious disease. The key lessons learnt from a new disease include: the prompt and open report of any disease with a potential to spread internationally; a timely global alert to prevent the spread of the disease; screening measures and travel recommendations to control the international spread; collaboration of the world's public health for control measures of an emerging infectious disease etc. (World Health Organization, 2003c). More importantly, the WHO takes on an added importance of risk communication by establishing guidelines and preparedness plan for subsequent crisis and risk communication, and management of disease outbreak. For example, the following extract is from the *WHO Outbreak Communication Guidelines* (World Health Organization, 2005c) :

“Disease outbreaks are *inevitable*, and often *unpredictable*, events. The environment surrounding an outbreak is unique in all of public health. Outbreaks are frequently marked by *uncertainty*, *confusion* and a sense of *urgency*. Communication, generally through the media, is another feature of the outbreak environment. Unfortunately, examples abound of communication failure which have delayed outbreak control, undermined public trust and compliance, and unnecessarily prolonged economic, social and political turmoil. The World Health Organization (WHO) believes it is now time to acknowledge that communication expertise has become as essential to outbreak control as epidemiological training and laboratory analysis. But what are the best practices for communicating with the public, often through the media, during an outbreak?” (World Health Organization, 2005c: 1)

As the WHO states above, the features of *inevitability*, *unpredictability*, *uncertainty*, *confusion* and *urgency* are common attributes in disease outbreaks like the SARS epidemic and the swine influenza pandemic. Apart from epidemiological and laboratory analysis, effective outbreak communication is a crucial tool to achieve a public health goal – control the outbreak as soon as possible and avoidance of social disruption as little as possible (World Health Organization, 2005c). However, it is a huge challenge to communicate risk concerning new and emerging infectious diseases like SARS and swine influenza because it is important to ensure that accurate and unambiguous information is communicated to the general public (Knobler, Lemon, Mack, Sivitz, & Oberholtzer, 2004). The importance of risk communication is further discussed by the WHO in its report 'SARS: lessons from a new disease' of its document *The World Health Report 2003 - Shaping the Future:-*

“Risk communication about new and emerging infections is a great challenge, and it is vital to ensure the most accurate information is successfully and unambiguously communicated to the public.” (World Health Organization, 2003b)

As stated by the WHO above, risk communication is challenging, in particular about new and emerging infectious diseases such as SARS and swine influenza. Communicating information unambiguously is essential but it is rather complex and problematic. This point will be further discussed in Section 1.4 by drawing examples from the discourse of the 2009 swine influenza pandemic selected for the study.

Another complex and practical issue related to public health communication is that it is unacceptable to wait until facts are certain (Vaughan & Tinker, 2009). Vaughan & Tinker (2009) claim that communication about prevention, treatment, recovery and containment of an emerging infectious disease such as SARS and swine influenza is challenging because it may be difficult to foretell initially the potential mortality and morbidity of the diseases. Vaughan & Tinker (2009) further argue that the assumptions about risk communication, message development and participation of the public in risk reduction may not be plausible. Nevertheless, the socioeconomic, psychological and cultural factors may affect people to interpret health risk communications and ability or eagerness to act timely and appropriately. It is important to develop preparedness strategies to guide communication during a

pandemic so as to convey critical information without bringing harm to the public or losing cooperation from the community.

The above description raises the importance of public health communication of risk and uncertainty in public health crises such as the SARS epidemic and the swine influenza pandemic.

To summarize, this section provided some general facts about the 2003 SARS epidemic and the 2009 swine influenza pandemic and their associated social consequence and implications. The two incidents have some common features: SARS is a new infectious disease and swine influenza is caused by a new strain of influenza virus; the diseases spread quickly and resulted in serious global public health threats; the two events created considerable socio-economic disruptions in the affected countries and regions; there were no vaccine and treatment for SARS and the novel swine influenza virus in the initial periods of the outbreaks, communicating risk and uncertainty plays an important role to allay fear in such public health catastrophes, in particular to motivate the public to take actions especially those non-pharmaceutical interventions (e.g. frequent hand-washing) to prevent the spread of the disease. (Cowling, Ng, Ip, Liao, Lam, Wu, Lau, Griffiths, & Fielding, 2010)

Both events have been criticized for disappointing or even failure in risk communication. SARS was considered as under-estimating the effect of the virus, leading to a public health crisis and huge number of deaths globally. In contrast with the SARS outbreak, the threats and severity of the 2009 swine influenza was far less than that had been predicted. Such gaps have received high profile of criticisms: failure of crisis or risk communication (Abraham, 2010). However, the primary aim of the present study is not to assess the successfulness of the health authorities or the media in risk communication about the two public health crises, but to ‘learn the lesson’ through analysis of the discourses of the two events.

As the trend of emerging new diseases have been continuing, for example, the Ebola outbreak in 2014, the Middle East Respiratory Syndrome (MERS) outbreak in Middle East and the Republic of Korea in 2015, and the recent Zika virus in 2016, it is important to learn from the past and shape future strategies against subsequent infectious epidemics (World Health Organization, 2003b). Accordingly, the SARS epidemic and the swine influenza pandemic give a good ground for studying the issues risk and uncertainty presented in public health and risk communication from language and linguistic perspectives, a detailed analysis of how the risk messages are conveyed to the public, in particular the language use to present risk and uncertainty.

Regarding other theories and concepts related to public health and risk communication, they will be discussed in more detail in Chapter 2.

1.4 The Role Linguistics Can Take in Disease Outbreaks

With considerable and indispensable features of risk and uncertainties presented during SARS epidemic and swine influenza pandemic discussed in the previous section, the main focus of this study is to examine public health and risk communication from language and linguistic perspectives, in other words, what role linguistics can take during disease outbreaks, which is discussed in this section.

The Centers for Disease Control and Prevention (CDC) (2013) of the United States raises the consideration on the issues of culture and language when conveying meaning. In other words, language is one of the important considerations when expressing meaning. The CDC (2013) also states that communicating public health science is challenging and problematic because intricate and conflicting messages make the public difficult to understand and to take action on health information. As indicated in Section 1.3, such challenges become particularly obvious when communicating risk and uncertainty in public health emergencies such as the SARS epidemic and the swine influenza pandemic. The following two examples illustrate

the complexity of communicating risk and uncertainty. They are extracted from the press conferences of the WHO concerning the swine influenza pandemic:

- (i) “So currently cases are mild and we see cases which appear to be quite severe, although again we don't know the exact relationship of this specific swine flu viruses to be the serious cases, you know, we don't know how often it causes serious disease as opposed to mild disease” (WHO, press conference dated 26-04-2009)

- (ii) “The vaccines which are produced now are much better purified than the way they were in 1976, so we really do not think that it is likely that we will have these side effects again, but to be absolutely honest, of course it is only when you have a large scale distribution of vaccines that you know with certainty the safety profile of the vaccine” (WHO, press conference dated 13-07-2009)

The attributes of risk, uncertainty, ambiguity and ignorance (Andrew Stirling, 2007; A Stirling & Gee, 2002) are inherent to the messages of emerging infectious diseases. These four attributes will be further elaborated in the Risk Analytical Model: The Depth of Incertitude (Andrew Stirling, 2007; A Stirling & Gee, 2002) in Section 2.3.3 of Chapter 2. Some of the features such as risk, uncertainty and ignorance were also presented in the SARS epidemic and the swine influenza pandemic. Examples (i) and (ii) above constitute either the ignorance (e.g. *we don't know*), or the uncertainty (e.g. *appears to be, we really do not think, it is likely that we will...*) of the swine influenza or the swine influenza vaccine. The speaker expressed his/her assertion to a certain degree of (un)certainty. When uncertainties exist in the initial periods of a pandemic, lack of commitment to the proposition becomes the major strategy rather than making strong commitment. In the

pandemic and disease outbreaks, uses of the modality expressions enable the speaker/writer to express different degrees of commitment to his/her statement (Davidse & Simon-Vandenberg, 2008; Halliday, 1994; Huddleston & Pullman, 2002). Detailed description about the theories and concepts of modality will be provided in Chapter 3.

The SARS epidemic and the swine influenza pandemic are two typical incidents to study the public health and risk communication, in particular a detailed analysis of the communication phenomenon of the two events. However, as mentioned in Section 1.3, most studies about SARS and the influenza pandemics are discussed from medical and public health perspectives, and relatively few are discussed from linguistic and communicative perspectives (Powers, 2008). It is against this background that this study aims to study how the media, public health officials and health care professionals present messages of risk and uncertainty by using modality and its expressions as defined in Section 1.2. The study provides an opportunity to fill this research gap.

1.5 Research Questions and Objectives

Emerging from the research background discussed in the previous three sections, this study aims to answer the following research questions:

- (i) What are the choices and features of modality present in public health and risk communication in the discourses of the 2003 SARS epidemic and the 2009 swine influenza pandemic?
- (ii) What functions does modality perform in public health communication and risk communication?
- (iii) How can the theories of modality be applicable to the study of public health and risk communication?

To answer these research questions, the study has the following aims and objectives:

- (i) To explore how modality and its expressions that are used to present the features of risk and uncertainty in public health and risk communication during the 2003 SARS epidemic and the 2009 swine influenza pandemic;
- (ii) To examine the functions of modality in public health and risk communication;

(iii) To contribute to existing theories of modality: integrate and explicate theories and analytical models of modality; and

(iv) To enrich the body of knowledge on risk communication in public through a linguistic analysis.

The above section presents the research questions and objectives. The significance of the study will be discussed in next section.

1.6 Deliverables and Significance of the Study

As stated in the research questions and research objectives in the previous section, the primary objective of the study is to enhance the understanding of public health and risk communication through linguistic investigations of the use of modality to express risk and uncertainty in the discourses of the 2003 severe acute respiratory syndrome (SARS) epidemic and the 2009 swine influenza pandemic. The two incidents were the major public health threats confronting the world in the 21st century. The discourses of these two events are chosen because the disease causative agents the SARS coronavirus and the influenza A (H1N1) were of novel nature; and in the initial periods of the disease outbreaks, there were no treatment and no vaccine available. These properties of the events are also observed in other public health threats, the Ebola outbreak in 2014 and the Middle East Respiratory Syndrome (MERS) outbreak in Middle East and the Republic of Korea in 2015,

and the recent Zika virus in 2016. The attributes of risk and uncertainty inherent to the discourses of these diseases pose an enormous challenge to public health authorities and officials in terms of public health and risk communication on the nature of diseases, which is crucial for control of disease transmission and containment. This study attempts to contribute with a linguistic approach.

The SARS epidemic and the swine influenza pandemic have provided a good ground for studying issues on risk and uncertainty from a linguistic perspective. The detailed linguistic analysis shows how risk messages were conveyed to the public, in particular how modality and its expressions are used to present risk and uncertainty in public health and risk communication. The use of modality reflects the speaker's commitment to the truth of his/her proposition (Davidse & Simon-Vandenberg, 2008; Halliday, 1994; Huddleston & Pullman, 2002), which may affect the audiences (the general public) in making informed decisions on mitigation strategies and preventive measures such as hand-washing, quarantine and taking flu vaccine.

The study is practically valuable to public health authorities and health officials for credible communication to mitigate the impact in subsequent disease outbreaks. The study also theoretically adds to the body of knowledge and explores the

theoretical contributions to current debates on modality, the discourses of public health and risk communication, with the framework of systemic functional linguistics.

1.7 Outline of the Thesis

The study carries out a detailed analysis of how modality and its expression are used to express risk and uncertainty in public health and risk communication in the discourses of the 2003 SARS epidemic and the 2009 swine influenza pandemic. The thesis comprises eight chapters, with this chapter, Chapter 1, offering an overview of the research background, research questions and objectives, and the significance of the study as well as the outline of the thesis.

Risk and uncertainty are features inherent to public health and risk communication of the two events selected for the study. Thus, Chapter 2 reviews literature related to the fundamental concepts and theories of public health and risk communication underpinnings of the study.

In the pandemic and disease outbreaks, uses of the modality expressions enable the speaker/writer to express different degrees of commitment to his/her statement (Davidse & Simon-Vandenberg, 2008; Halliday, 1994; Huddleston & Pullman,

2002). Thus, Chapter 3 provides a detailed description about the theories and concepts of the SFL approach to modality.

As the discourses of the 2003 SARS epidemic and the 2009 swine influenza pandemic are chosen for the study, the data come from various sources including press updates and press conferences held by the WHO, newspaper reports and website information concerning the 2003 SARS epidemic and the 2009 swine influenza pandemic. Details about the research methodology including the data and data collection methods, data compilation, data analysis will be presented in Chapter 4.

The findings of the study are presented in three separate chapters. First of all, Chapter 5 presents the quantitative findings of the study by introducing the general statistics of the data sets and frequency of occurrences of modality in the data presented in the SARS epidemic and the swine influenza pandemic.

As mentioned in Chapter 1, the primary objective of the study is to investigate how modality and its expressions are used in public health and risk communication during the 2003 SARS epidemic and the 2009 swine influenza pandemic. Accordingly, Chapter 6 will first introduce the qualitative findings of the study by

drawing examples from various extracts of the data sets of the two events to illustrate how modality is presented in public health communication. Chapter 7 will present findings of modality presented in risk communication of the two events.

Chapter 8 is a conclusion on how the study achieved the research objectives. The implications and contributions to theories and practice, limitations of the study and recommendations for future research are also stated.

Chapter 2 Literature Review

2.1 Chapter Overview

The social background of this study, the 2003 SARS epidemic and the 2009 swine influenza pandemic and their associated implications, has been introduced in the previous chapter. Both events are caused by novel viruses and are considered as a public health crisis. After the diseases have been contained, one of the key components of public health, risk communication, is accentuated by the WHO for planning subsequent emerging communicable diseases (World Health Organization, 2005a, 2005b). Thus, this chapter turns to review literature related to the fundamental concepts and theories of public health and risk communication.

Section 2.2 first gives a more detailed description of the definitions, major roles and scope of services of public health. Effective risk communication is crucial in public health services, in particular the prevention, control and containment of infectious diseases such as SARS and swine influenza. Thus, Section 2.3 introduces the theories and concepts related to risk and risk communication. As indicated by the examples in Section 1.4 of Chapter 1, the 2003 SARS epidemic and the 2009 influenza pandemic provide a golden opportunity to refine our current understanding on how public health authorities and the media communicate risk and uncertainty with the public. Accordingly, Section 2.4 introduces the main thesis of the study – the communication of risk and uncertainty in adversative

public health incidents – with an introduction of modality as the linguistic framework of analysis, which will be further elaborated in Chapter 3.

2.2 Public Health and Public Health Communication

As mentioned in the previous section, the prevention, control and containment of communicable or infectious diseases such as SARS and swine flu is one of the major functions of public health. This section begins with a description of definitions, major roles and scope of services of public health. It then moves on to describe the concepts of public health communication as communication plays an important role to fulfill the function of mitigation of infectious diseases such as SARS and swine flu. Examples are extracted to illustrate public health communication problems arose during epidemics and pandemics.

2.2.1 Public Health: Definition and Scope of Services

As compared to general medical practice, public health is a special area of medicine that concerns with the health of the entire population rather than just the treatment of individual patients. Schneider (2011: 6) further confers that "Medicine focuses on healing patients who are ill. Public health focuses on preventing illness". Here are two major definitions from the WHO and Charles-Edward Amory Winslow, an American bacteriologist and public health expert.

- i. According to the WHO (1998: 3), public health aims at “improving health, prolonging life and improving the quality of life among whole populations through health promotion, disease prevention and other forms of health intervention”.
- ii. According to Charles-Edward Amory Winslow (1923 cited in Schneider, 2011: 4-5), the definition of public health in the Encyclopedia of Public Health is “The science and the art of preventing disease, prolonging life, and promoting physical health and efficiency through organized community efforts”.

The above two definitions characterize the major function of public health: to ensure the maintenance of health for every individual in the community through different public health services and interventions such as food and water safety, environmental sanitation, control and prevention of communicable diseases, health education of the importance of personal hygiene etc. (Schneider, 2011: 4-5). There are two core elements in the activities of public health: first, the focus is on the health of the ‘public’, and second, the mode of intervention requires action and participation collectively by people in societies and coordinated by government (Dawson, 2009). This explains why public health communication is often through public health experts, health authorities and the media – the major source of data of this study. Table 2.1 shows the core functions and scope of services of public health.

Table 2-1 Three Core Functions and Ten Essential Public Health Services

Three Core Functions and Ten Essential Public Health Services

Assessment

1. Monitor health status to identify community health problems
2. Diagnose and investigate health problems and health hazards in the community

Policy development

3. *Inform, educate, and empower people about health issues*
4. Mobilize community partnerships to identify and solve health problems
5. Develop policies and plans that support individual and community health efforts

Assurance

6. Enforce laws and regulations that protect health and ensure safety
7. Link people to needed personal health services and assure the provision of health care when otherwise unavailable
8. Assure a competent public health and personal healthcare workforce
9. Evaluate effectiveness, accessibility, and quality of personal and population-based health services

Serving all functions

10. Research for new insights and innovative solutions to health problems

(Source: Schneider, 2011: 6)

As shown in Table 2.1, there are three core functions of public health (*Assessment, Policy development* and *Assurance*) and ten essential public health services (Schneider, 2011: 6). One of the essential services in public health policy development is to “inform, educate and empower people about health issues”

(Schneider, 2011: 6). Health issues include non-communicable and communicable diseases. According to the WHO (2015), non-communicable diseases are defined as diseases that are not transmitted from person-to-person. They are also known as chronic illnesses or diseases such as stroke, heart disease and diseases of diabetes and cancer. Communicable diseases are defined as diseases that are caused by pathogenic microorganisms e.g. viruses, bacteria, fungi or parasites. They are also known as infectious diseases that can be spread from person-to-person. For those diseases like HIV/AIDS, hepatitis, Ebola, SARS and influenza, they are categorized as communicable diseases or infectious diseases. For communicable diseases, it is crucial to deliver important information concerning the control measures of specific infectious diseases (e.g. SARS) such as how the disease is transmitted and how infectious it is (Nuffield Council on Bioethics, 2006). Accordingly, this study is focused on how the health authorities and the media 'inform' people about public health issues related to disease outbreaks, in particular the presentation of risk and uncertainty during the 2003 SARS epidemic and the 2009 swine influenza pandemic, which has been introduced in Section 1.2 as the social background of this study.

2.2.2 Public Health Communication

As mentioned in the previous section and listed in Table 2.1, one of the major public health services is to “inform, educate and empower people about health

issues” (Schneider, 2011: 6). The services involve language to perform the activities related to the health issues. For example, in the case of infectious disease outbreak like SARS epidemic and influenza pandemic, the main function of public health services is to inform, educate people about the nature of the disease in order to make necessary actions to prevent the spread, and at the same time to control and contain the disease epidemics or pandemics (Schneider, 2011). Such processes involve governments or health authorities and the general public. This brings in the concept of health communication or public health communication. The U.S. Department of Health and Human Services defines health communication as follows (cited in Parrott, 2004):

Health communication is “The art and technique of *informing, influencing, and motivating* individual, institutional, and public audiences about important health issues. The scope of health communication includes disease prevention, health promotion, health care policy, and the business of health care as well as enhancement of the quality of life and health of individuals within the community” (U.S. Department of Health and Human Services, 2000, cited in Parrott, 2004: 751; CDC, 2011)

From the above definition, health communication is concerned with the ways that health issues are being informed to individuals or the general public, in order to influence and motivate them to enhance their well-being and quality of life. Halliday (1994) states that language functions as meaning making. Health communication involves appropriate language to convey meaning to 'inform', 'educate' and 'empower' people so as to facilitate effective communication. For example, the discourses of the two events selected for this study also perform the

functions to deliver the information, knowledge (educate) about the diseases and empower the general public to take appropriate actions to fight against the diseases. Those examples of the discourses will be presented in Chapter 5 and 6.

The above description raises the importance of public health communication of risk and uncertainty in public health crises such as the SARS epidemic and the swine influenza pandemic. However, many studies on public health issues are from medical and public health perspectives such as the effectiveness of hand-washing (Fung & Cairncross, 2006) and facemasks (Tang & Wong, 2004) ; treatment effects of SARS (Stockman, Bellamy, & Garner, 2006); or the swine influenza vaccine (Henrich & Holmes, 2011; Lundström, Ekborg, & Ideland, 2012; Ward & Draper, 2008; Wong, Wong, Chor, Kung, Chan, Wong, & Griffiths, 2010); infection control of the epidemic (Wenzel, Bearman, & Edmond, 2005). Other discussions include the ethical issues raised from SARS and swine influenza such as quarantine (Singer, Benatar, Bernstein, Daar, Dickens, MacRae, Upshur, Wright, & Shaul, 2003); psychological and behavioral responses to influenza pandemic (Cowling et al., 2010; Lau, Griffiths, Au, & Choi, 2011).

Studies on SARS and the media (Eagleton, 2004; Huang & Leung, 2005; Lewison, 2008; Washer, 2004; Zhang, 2006); swine influenza and the media (Blakely, 2003;

Fogarty, Holland, Imison, Blood, Chapman, & Holding, 2011; Nerlich & Koteyko, 2012) are ample. In terms of how the two incidents were communicated in the media, both the SARS epidemic and the swine influenza pandemic were categorized as severe global threats. Thus, both events received massive coverage in the international media. For example, during the SARS epidemic, there were more than 250 stories of SARS coverage in newspaper media in the U.K. in the first week of May 2003 (Wallis & Nerlich, 2005), that is, more than 30 articles per day. Toronto in Canada also showed similar statistics (Drache, Feldman, & Clifton, 2003).

For studies analyzing from a linguistic perspective, Wallis and Nerlich (2005) argue that the media has a style of writing with a significant use of metaphor such as '*SARS is a killer*' to describe the nature of the disease and its associated human impact. They conducted a study to investigate how the UK press reported and framed SARS through linguistic metaphor. Study findings indicate that the metaphor '*SARS as wars*' was absent in the UK media, rather, '*SARS as a killer*' was used in most news coverage in the UK. There have been many studies for disease metaphors (Larson, Nerlich, & Wallis, 2005; Wallis & Nerlich, 2005) or linguistic metaphor studies in SARS (Chiang & Duann, 2007; Wallis & Nerlich, 2005) and the swine influenza (Angeli, 2012; Scherer, Scherer, & Fagerlin, 2015); framing of swine flu in press (Holland & Blood, 2010); and studies on influenza

preparedness plan (Garoon & Duggan, 2008). Using linguistic tools of metaphors may draw the attention of the public as an alarm. Although there may be drawbacks, such as militaristic metaphors used in AIDS, which may create stigmatization for AIDS sufferers (Wallis & Nerlich, 2005), these works on metaphor should be at best to be used as a way to show communication of these incidents and have attracted scholarly attention in language studies. However, studies on using modality to express risk and uncertainty in the SARS epidemic and the swine influenza pandemic are lacking. It is hoped that the present study could provide an opportunity to fill this research gap.

During the initial period of disease outbreaks, it is rather difficult and daunting for health authorities to obtain accurate information about the diseases . Thus, the following section introduces the concepts and theories concerning risk and risk communication.

2.3 Risk and Risk Communication

As discussed in the previous section, risk is one of the features in public health communication particularly in the circumstances of emerging infectious disease outbreaks such as SARS and swine flu. Thus, the main purpose of this section is to review concepts and theories of risk and risk communication.

This section begins with the definition of risk in Section 2.3.1. Following this, Section 2.3.2 introduces the perspectives of risk as risk is a complex concept with different scopes in different disciplines. For risk analysis, a model called 'The Depth of Incertitude' is introduced in Section 2.3.3. Section 2.3.4 discusses the issues of risk communication and public health followed by a review of the studies on risk communication.

2.3.1 Defining Risk

This section introduces the concepts related to risk. Historically, there was rarely the concept of risk in the Middle Age. It was until the sixteenth and seventeenth centuries that the word 'risk' was used by Western explorers who exposed themselves to danger, such as mariners who set off on their voyages across the world (Luhmann, 1993: IX). Later, the notion of risk was used in the business world (e.g. banking and investment, insurance contracts etc), where lenders or borrowers used for calculation of probable outcomes of investment (Giddens, 1999/2002). Risk in everyday usage refers to "the possibility of loss, injury, disadvantage or destruction" (Webster's 1971 cited in Garland, 2003: 50). Risk is a quintessential element in modern society (Jaeger, Renn, Rosa, & Webler, 2001; Lupton, 1999) . Very often risk has the connotations of 'bad things'. For example, we confront and relate various types of risk in our daily life to natural hazards, human activities and communicable diseases e.g. climate change and global

warming, plane crash, traffic accidents, natural disasters, chemical explosions, nuclear power, bioterrorism, international terrorism (e.g. 911), epidemic and pandemics (e.g. AIDS, and SARS, swine flu as discussed in Chapter 1) (Arnoldi, 2009; Renn, 2008; Zinn, 2008).

Regarding the definition of risk, Ropeik and Gray (2002: 4) states that “Risk is defined as the probability that exposure to a hazard will lead to a negative consequence” (Ropeik & Gray, 2002). This definition indicates that probability is one of the components of risk, and risk is something hazardous with a negative outcome. Also, the National Research Council (1989, cited in Morrow, 2009: 3), suggests that '*Risk = Hazard x Exposure x probability*'. This implies that risk communication (will be discussed in detail in Section 2.3.4) aims to gather information of the hazards of the matters of event, level of exposure and an estimation of probability in an understandable way so as to assist people to evaluate their risk level and make decisions. However, obtaining accurate information is difficult and daunting because there is always uncertainty when making decisions. Morrow (2009) also points out that "uncertainty in risk is probably the only certainty to expect" (Breakwell, 2007 cited in Morrow, 2009: 21). This explains why uncertainty is an inherent feature of risk, which also accounts for the use of modality, a linguistic device to express the indeterminacy between 'yes' and 'no' (Halliday, 1994), to investigate the presentation of risk and uncertainty in

discourses of public health infectious disease outbreaks such as the SARS epidemic and swine influenza pandemic in the present study.

In addition, Aven & Renn (2010) classified risk into two categories: “(i) risk is expressed by means of probabilities and expected values and (ii) risk is expressed through events/consequences and uncertainties” (Aven & Renn, 2010: 3). This further explains why the features of probability and uncertainty are inherent to the concept of risk and such features are presented in risk communication.

This section defined the meaning of risk and its related concepts. There are different perspectives of risk, which will be introduced in next section.

2.3.2 Risk Perspectives

As defined in the previous section, risk is the probability that exposure to something hazardous will lead to negative outcome (Ropeik and Gray: 2002). However, risk is not simple to understand as indicated by this definition. Rather, risk is a complex and multidimensional concept involving various perspectives and approaches in different disciplines (Morrow, 2009) such as science and medicine, social science, economics, philosophy, psychology, and language and communication. For example, in epidemiology of public health, the main focus of risk is to predict or measure the chance or probability of the disease occurring and

its associated negative events, while in social science, the main emphasis is on how individuals identify and respond to risk (Berry, 2004). Thus, Möller (2012) suggests three broad approaches to risk. The first is the scientific approach to risk which is something that can be measured and described by statistical and probabilistic tools. The second perspective is the psychological approach to risk with the aim of studying people's perception and beliefs about risk or estimate risk and the way they relate or make choices to them. The third approach is called the cultural approach to risk. This approach takes a broader perspective to study how culture is mediated and formed by social contexts in societies such as the issues of identity and power.

Although the main focus of these three approaches is not from a linguistic perspective, all the three approaches involve language in communicating risk. For example, for scientific approach (Möller, 2012), risk is often presented with numerical value of probability such as 1 in 1000, 25% etc.

In addition, Garland (2003) also gives the following comment on the term 'risk':

“Today's accounts of risk are remarkable for their multiplicity. Risk is a calculation.....Risk is subjective and scientifically knowable. Risk is subjective and socially constructed. Risk is a problem, a threat, a source of insecurity.....Risk is the means whereby we colonize and control the future.” (Garland, 2003: 49).

From the above description, it can be recognized that the multiplicity and complexity of the concept of risk. One important issue is that risk is concerned with the future, which is indispensable with the concepts of probability and uncertainty (Jaeger et al, 2001; Garland, 2003; Arnoldi, 2009). This implies that in risk communication, it is hard to get everything certain in reality. As such, this study underlines the important issues of probability and uncertainty from a linguistic perspective, in particular the use of modality to present public health and risk communication.

With the importance of studying risk, there are various models for this pursuit, e.g. *Social Amplification of Risk* (Kasperson, Renn, Slovic, Brown, Emel, Goble, Kasperson, & Ratick, 1988), among which one is called *the Depth of Incertitude*, proposed by Stirling & Gee (2002), and Stirling (2007). This model is discussed because there are four features in the model: *risk*, *uncertainty*, *ambiguity* and *ignorance* (Stirling & Gee, 2002) for analysis of risk, which are inherent features in risk communication as illustrated by the examples shown in Section 1.4 of Chapter 1. The model *Depth of Incertitude* will be discussed in the next section.

2.3.3 Risk Analytical Model: The Depth of Incertitude

The *Depth of Incertitude* is a model for risk analysis adopted by Stirling & Gee (2002) and Stirling (2007) in studies of risk in science. It provides a detailed description of the related concepts of risk. From a scientific perspective, the concept of risk is based on the expression of two major factors: first is the knowledge about the possible outcomes of the things that might happen; second is the knowledge about the probability or likelihood of the things that might happen (Stirling, 2007). In other words, it is the knowledge about “the likelihood of an impact and its magnitude” (Stirling & Gee, 2002: 521). However, it is hard to get complete knowledge of all these parameters. Accordingly, Stirling & Gee (2002) and Stirling (2007) present a model ‘The Depth of Incertitude’, which is drawn by a combination of four possible states (*Risk, uncertainty, ambiguity and ignorance*) of incomplete knowledge. Table 2.2 indicates the features of the Depth of Incertitude model.

Table 2-2 The Depth of Incertitude

Knowledge about outcomes

Knowledge about likelihood/Probabilities	Outcomes well defined	Outcomes poorly defined
Some basis for probabilities	Risk: some basis for probabilities outcomes well defined	Ambiguity: some basis for probabilities outcomes poorly defined
No basis for probabilities	Uncertainty: no basis for probabilities outcomes well defined	Ignorance: no basis for probabilities outcomes poorly defined

(Adapted from: Stirling, A & Gee, 2002: 521-533)

Stirling (2007) argues that one of the attributes of this model is that these states are not discrete or mutually exclusive. In other words, in the real world, all these states occur together in various degrees.

This can be explained by referring back to the Example (i) presented in Section 1.4 below:

“So currently cases are *mild* and we see cases which *appear to be quite severe*, although again *we don't know* the exact relationship of this specific swine flu viruses to be the *serious* cases, you know, *we don't know* how often it causes *serious* disease as opposed to *mild* disease” (WHO, press conference dated 26-04-2009)

The above example illustrates that the WHO public health official presented the information about the risk of the swine flu virus. Also, uncertainty is an inherent feature in risk. Thus, the lexical items such as 'mild', 'serious', 'severe' are used to communicate the risk of swine flu virus in different levels, while the features of uncertainty, probability, or ignorance is realized by 'appear to be' (uncertainty, probability) , and 'we don't know' (ignorance).

However, the messages delivered by the health authorities may not always include both information about probabilities and outcomes, whether they are poorly or well defined. Accordingly, the model '*The Depth of Incertitude*' provides a reference of assessment model of risk.

Apart from assessment of risk by risk analytical model such as *The Depth of Incertitude* proposed by Stirling and Gee (2002), communicating risk to the public is crucial in particular during emerging infectious disease outbreaks such as SARS epidemic and influenza pandemic. The concepts and theories of risk communication will be discussed in the next section.

2.3.4 Risk Communication

As mentioned in Section 1.3 and also indicated by the example discussed in the previous section, the features of risk and uncertainty are inherent features in disease outbreaks (World Health Organization, 2005c) such as SARS epidemic and swine flu pandemic. Such contexts pose a challenge of risk communication to public health authorities and public health experts. As stated in Section 1.5, the first objective of this study is to explore how the features of risk and uncertainty are communicated and presented in public health and risk communication during the 2003 SARS epidemic and the 2009 swine influenza pandemic. Thus, the concepts and theories related to risk communication will be discussed in this section.

Risk communication is critical because its goal is to assist the general public to understand the matters of concern and make informed choices and risk-based decision or judgment related to risk (Berry, 2004; Aven and Renn, 2010). Cevello, Slovic and Von Winterfeldt (1986 cited in Renn 1992: 467) define risk communication as follows:

“Risk communication is defined as any purposeful exchange of information about health or environmental risks between interest parties. More specifically, risk communication is the act of conveying or transmitting information between parties about (a) levels of health or environmental risk; (b) the significance or meaning of health or environmental risk; or (c) decisions, actions, or policies aimed at managing or controlling health or environmental risks. Interested parties include government agencies, corporations and industry groups, unions, the media, scientists, professional organizations, public interest groups, and individual citizens.”

Renn (1992: 467) also states that “The term ‘message’ implies that the informer intends to expose the target audience to a system of meaningful signals, which in turn may change their perception of the issue of their image of the sender. If the above definition of risk communication is applied to public health practice, the goal of risk communication is to 'inform, educate and empower' (Schneider, 2011) the general public about the risk related to health issues and assist the general public to take appropriate action to prevent or to combat or mitigate the diseases. In addition, Covello (1991 cited in Berry, 2004: 23) categories four major areas which are applied in risk communication as follows:

- informing and education
- stimulating behavioral change and taking protective measures
- issuing warnings and emergency information
- exchange of information and a common approach to risk issues

One of the major services for public health is to "inform, educate and empower about health issues" (Schneider, 2011: 21). Similarly, one of the major areas of risk communication is 'informing and education'. In the case of the scientific or epidemiological approach to risk, very often, it is communicated through a presentation of numerical value of probability such as 1 in 1000 or 25% etc. However, as mentioned in the previous section, risk is a complex concept that

communicating risk becomes inevitably challenging, particularly in health information and communication. Berry (2004) argues that the major reason is cognitive and emotional limitations and biases. For example, Berry (2004) states that in a German study, over one third of German respondents did not give the correct answer of the following question:

What does 40% mean?

- 1 in 4
- 4 out of every 10
- every 40th person

The above example does not solely reflect a common problem about interpretation on probabilistic information; it also implies a gap between technical experts and the public. Regarding this issue, Aven and Renn (2010: 161) argue that most technical experts try to communicate in technical details. Conversely, the general public may be only interested in the chances of getting exposure to risk and the impact to their health. Thus, the first step in risk communication is to find a common denominator or a common language and assess the need of the audience.

With the importance of studying risk communication, the following section reviews some of the existing work done on risk communication, which provides some understanding of risk communication from different perspectives.

2.3.5 Studies on Risk Communication

Risk communication has been studied and analyzed in different contexts under different disciplines such as genetic counseling (Sarangi et al 2003; O'Doherty, 2006; O'Doherty & Suthers, 2007; N. L. Green, 2010) and cancer (Bottorff et al., 1998), and food hazards (Miles & Frewer, 2003).

Regarding the reporting of the risks from SARS, Lewison (2008) has conducted a study to investigate fifteen news media (altogether 1014 news articles) from seven countries (Canada, France, Germany, Hong Kong, Spain, the UK and the USA). The aim is to study how the media frame the news stories in terms of 'scariness' as High, Medium or Low. Three categories of risk: to human health, to financial losses and to lack of political action, were coded in the selected news articles. However, results mainly indicated in statistical information. Details on the language (e.g. the words or lexical terms) used of the news articles were not the major focus of the study.

Fagerlin, Zikmund-Fisher & Ubel (2011) states that many cancer patients were presented with statistics of risk and were asked to compare the risk and benefits of treatment options and then made related medical decisions. However, these decisions are burdened with emotion. Patients may also have cognitive difficulty in

numeracy skills. They made ten steps to help patients decide among treatment options and achieve better risk communication. The first recommendation, which talks about language, is that “Use plain language to make written and verbal materials more understandable” (Fagerlin, Zikmund-Fisher & Ubel, 2011: 1437). Although it mentioned using plain language to express risk information, it did not discuss it in details. Accordingly, it is worthy to study the discourses of risk and investigate the language used in presentation of risk from a linguistic perspective such as the risk communication in epidemics and pandemics of the current study. Then, the language issue can be related to other aspects such as social and cultural factors that affect people’s understanding and interpretation in further research of risk communication.

Fage-Butler (2011) investigates how risk is constructed in Patient Information Leaflets (PILs) discursively. The aim of Fage-Butler’s study is to reveal the function of the statements that constitute the PILs discourses. For example, in the source text of the drug Neurontin, the statement is “Like all medicines, Neurontin can cause side effects, although not everybody gets them” (Fage-Butler, 2011: 66) and the function of the statement on the PILs is “To warn about side effects and patients’ need to be prepared to take appropriate action” (Fage-Butler, 2011: 66). One of the important implications of the study is that the study contributes how the discourses of risk are presented in the statements and their functions in PILs.

However, the study only focuses on the function of the statement but not on the lexicogrammar used in the statement. For example, the use of modal verb *can* to indicate the possibility of the side effects of the drug Neurontin. The modality used in Patient Information Leaflets provides a further research opportunity.

From a linguistic perspective, Hamilton et al (2007) commented that risk analysis has been studied in the areas of risk perception and risk communication by social scientists using a range of methodologies. However, the linguistic approach to risk seems to be overlooked. Thus, they have conducted a study on the meaning of risk in corpus linguistics from a semantic perspective. They commented that both risk perception and risk communication are problematic because it can be impossible to 'getting the facts right'. They also claim that risk, both as a noun or as a verb, "emphasized actions, agents or protagonists, and bad outcomes such as loss of a valuable asset" (Hamilton et al, 2007: 178). The study provides a more clear understanding on the semantics of the word 'risk' based on corpus linguistic evidence. Their work provides a fruitful meaning of the word 'risk' that is relevant to the current study for discussion of risk communication, and generates a strong motivation to seek more empirical findings from risk discourses of SARS and swine influenza pandemic using a linguistic approach.

Irrespective of which discipline, the goal is to contribute to public understanding and to take action and mitigate risk or hazards ultimately. However, studies are lacking on the discourses of public health and risk communication, in particular a detailed analysis of discursive and communication practice during disease outbreaks. Accordingly, this study is from a linguistic perspective and examines how the messages (or the language texts) are presented in public health and risk communication during the SARS epidemic and the swine influenza pandemic.

2.4 Communicating Risk and Uncertainty

The previous two main sections review the concepts and theories related to this study, including the public health and risk communication. The presentations concern the roles and functions of public health and the importance of effective risk communication in case of new and public health crisis such as SARS epidemic and swine flu pandemic. In case of new and emerging infectious diseases such as SARS and swine flu, many uncertainties exist. This has been discussed by using the examples shown in Section 1.4. As indicated in Section 1.5, how the level of risk and uncertainty in public health and risk communication presented in the discourses of the SARS epidemic and the swine influenza pandemic, in particular the associated lexicogrammatical features, is the primary objective of this study. One of the approaches to study uncertainty is by means of modality, a linguistic resource that expresses the meaning that lies in the area between 'yes' and 'no', and

its major function is to reflect the speaker's/writer's attitude towards degrees of his/her proposition about an utterance (Green, Yang & Li, 2009; Halliday & Matthiessen, 2014; Thompson, 2014). Thus, this section aims at providing a brief overview of modality, the analytical framework of this study. Apart from the linguistic approach, the philosophical approach to modality is also reviewed as there are some correspondences between the two disciplines. The section goes on to introduce some examples from the swine influenza pandemic to illustrate how risk and uncertainty are presented with modality during epidemics and pandemics.

2.4.1 Defining Modality: Philosophical and Logical Perspectives

To begin with, a definition of modality from *The Concise Dictionary of Linguistics* is presented in the following:

“A term applied variously to grammatical or lexical indications either of a kind of speech act, or of the degree of uncertainty with which something is said. Thus *He left at once*, as a declarative, can be said to differ in modality from *Leave at once!*, as an imperative; or *He has perhaps left*, where an assertion is qualified by *perhaps*, from *He has left* or *He has definitely left*. Hence of distinctions, in particular, among modal verbs: thus between *He can't have left*, where the meaning is epistemic, and *You can't leave now*, where it is deontic; also between *You must leave*, where *must* has a meaning of obligation, from *You can leave*, where *can* could have one of permission.” (Matthews, 2014: 216)

Another definition is from a grammar book *English Grammar Today*. Modality is defined as follows:

“Modality is about a speaker’s or a writer’s attitude towards the world. A speaker or writer can express certainty, possibility, willingness, obligation, necessity and ability by using modal words and expression. Speakers often have different opinions about the same thing. e.g. I think it’ll rain soon or I think it might rain soon” (Carter et al, 2011: 288-9)

From the definitions and examples shown on the above two quotes, it is recognized that the notion of modality is considered elusive as there are infinite variations in definitions, categories and interpretations. Frawley (2006) states that modality has been commonly used in the field of philosophy and linguistics. Thus, this section aims at providing an overview of modality from a philosophical perspective.

Bybee & Fleischman (1992: 4) also state that “linguistic understanding of modality has its roots in modal logic (a branch of philosophy)”. Aristotle is the first philosopher who opened up the discussion about modal relationship and inferences. He worked out the notions of possibility and necessity or contingency, in his *De Interpretatione*, which provides the basis of modal logic (Konyndyk, 1986: 18-19; Perkins, 1983: 6). Von Wright, a Finnish philosopher, in his *An Essay in Modal Logic* (1951: 1-2, cited in Perkins, 1983: 2), distinguishes modal logic in four modes:

- i. The *alethic* modes or modes of truth (necessary, possible, contingent, impossible) (Perkin, 1983: 2);

- ii. The *epistemic* modes or modes of knowing (verified, undecided, falsified) (Perkin, 1983: 2);
- iii. The *deontic* modes or modes of obligation (obligatory, permitted, indifferent, forbidden) (Perkin, 1983: 2);
- iv. The *existential* modes or modes of existence (universal, existing, empty) (Perkin, 1983: 2).

In addition, Von Wright (1951: 28, cited in Perkins, 1983: 3) also discusses *dynamic modality*, which is concerned with ability and deposition. Nicholas Rescher, an American philosopher worked out eight modalities:- (Rescher,1968: 24-26 cited in Perkins, 1983: 9)

- (i) alethic;
- (ii) epistemic;
- (iii) temporal;
- (iv) boulomaic;
- (v) deontic;
- (vi) evaluative;
- (vii) causal;
- (viii) likelihood

Table 2.3 shows a comprehensive summary of Rescher's eight types of modalities (Rescher,1968: 24-26 cited in Perkins, 1983: 9).

Table 2-3 Nicholas Rescher's Framework of Modality

Nicholas Rescher's Framework of Modality		
	Types of modalities	Examples:
(i)	Alethic modalities, relating to the notion of truth itself:	It is <u>necessarily</u> true (or: false) that p It is <u>actually</u> true (or: false) that p It is <u>possibly</u> true (or: false) that p
(ii)	Epistemic modalities, relating to knowledge and belief:	It is <u>known</u> (or: X knows) that p It is <u>believed</u> (or: X believes) that p It is <u>accepted</u> (or: <u>supposed</u> , <u>assumed</u>) that p
(iii)	Temporal modalities, relating to time:	It is <u>sometimes</u> the case that p It is <u>mostly</u> the case that p It is <u>always</u> the case that p It <u>has always been</u> the case that p It <u>was</u> yesterday the case that p
(iv)	Boulomaic modalities, relating to desire:	It is <u>hoped</u> that (or: X hopes) that p It is <u>feared</u> that (or: X fears) that p It is regretted that (or: X regrets) that p It is desired that (or: X desires) that p
(v)	Deontic modalities, relating to duties:	It is <u>ought to</u> be brought about that p It is <u>ought to be avoided</u> (or: prevented) that p It is <u>forbidden to</u> bring it about that p It is <u>permissible to</u> bring it about that p
(vi)	Evaluative modalities:	It is <u>good</u> thing that p It is <u>perfectly wonderful</u> thing that p

		It is a <i>bad</i> thing that p
(vii)	Causal modalities:	The existing state of affairs <u>will</u> bring it about that p The existing state of affairs <u>will</u> prevent (or: merely: <u>will</u> impede) that p
(viii)	Likelihood modalities:	It is <i>likely</i> that p It is <i>probable</i> that p

(Adapted from Perkins, M. R., 1983)

The aim of introducing the notions of modality in modal logic is to reflect the plurality of modality. As indicated in Table 2.3, different modalities indicate different functions. For example, epistemic modality is related to knowledge and belief while deontic modality is related to duties. These two types of modality are also adopted by other models of modality such as Palmer’s modality. The SFL perspective also uses these two types of modality and presented as degree of probability and degree of obligation, which also perform the functions of epistemic modality and deontic modality respectively.

As mentioned previously, there are many approaches and definitions of modality in different disciplines such as philosophy and linguistics. Even in the same discipline of linguistics, there are different classification and approaches to modality. Thus, the following section briefly introduces modality from different linguistic approaches, aiming at providing a broad understanding of various linguistic approaches to modality.

2.4.2 Modality in Linguistic Perspective

From a semantic/conceptual perspective, the classification of modality by Palmer (2001) is considered as broad and extensive. Palmer (2001: 7-10) describes that tense, aspect and modality are three categories of a clause or an event. Tense is concerned with the time of the event while aspect is concerned with the nature of the event. Modality is concerned with the status of the proposition that described the event. Palmer (2001: 7-10) classified modality into Propositional Modality and Event Modality with different sub-categories as follows:

i) **Propositional modality:**

- a) **Epistemic modality** – speakers express their judgments about the factual status of the proposition. There are three kinds of (epistemic) judgment – Speculative, Deductive and Assumptive (Palmer, 2001).
- b) **Evidential modality** – speakers indicate the evidence they have for its factual status. The Central Pomo examples included five types of evidence: (i) general knowledge; (ii) first-hand personal experience (usually visual); (iii) auditory evidence; (iv) hearsay; (v) inference. The first four of these exemplify categories of Reported (gen), Visual, Auditory and Reported (I), while the last (‘inference’) is the epistemic category Deductive (Palmer, 2001).

ii) Event Modality

- a) **Deontic modality** – the conditioning factors are external to the relevant individual. It relates to obligation or permission, emanating from an external source (Palmer, 2001).

e.g. (i) John may/can come in now (permission)

(ii) John must come in now (obligation)

- b) **Dynamic modality** – the conditioning factors are internal to the relevant individual. It relates to ability or willingness, which comes from the individual concerned (Palmer, 2001).

e.g. (iii) John can speak French (ability)

(iv) John will do it for you (willingness)

The first two (examples) exemplify the typological categories of (Deontic) Permissive and Obligative. The second pair exemplifies the categories of (Dynamic) Abilitive and Volitive.

Palmer's model puts epistemic modality, deontic modality and dynamic modality into the categories of modality. These types of modality are also similar to the degree of probability, obligation and ability and inclination of the SFL approach to

modality. The SFL approach is selected as the analytical framework of this study because it provides the *type, value, orientation* and *manifestation* assessments of modality, which are more comprehensive for the analysis. The concepts of SFL approach to modality in more detail will be described in Chapter 3.

Apart from Palmer's model of modality, Bybee, Perkins & Pagliuca (1994:177) classify modality into three major categories with subcategories:

- i) **Agent-oriented modality** (Obligation; Necessity; Ability; Desire),
- ii) **Speaker-oriented modality** (Imperative; Prohibitive; Optative; Hortative; Admonitive; Permissive)
- iii) **Epistemic modality** (Possibility; Probability).

The model of modality of Bybee, Perkins & Pagliuca focuses on whether the modality is related to the agent or the speaker. For examples, Obligation, Necessity, Ability and Desire are categories as Agent-oriented modality. The Speaker-oriented modality includes Imperative, Permissive etc. The Epistemic modality includes Possibility and Probability. Apart from epistemic modality, the model of modality of Bybee, Perkins & Pagliuca has different names for modality. Nevertheless, some types of modality, for examples, Obligation, Prohibitive, and Permission also have similar meanings of deontic modality of Palmer's modality.

These categories of modality also have similar meanings of the degree of Obligation of the SFL approach. The concepts of SFL approach to modality in more detail will be described in Chapter 3.

From the above descriptions, modality within the linguistic perspectives has different definitions and classifications. They are not comprehensive enough to cover the meaning and scope of modality. The difficulty of making a discrete categorization on modality also reflects its problematic indeterminate characteristic of modality. Indeed, there are some overlaps in terms of the definitions and classifications. For examples, epistemic modality and deontic modality are the categories of modality adopted by Coates (1987), Palmer (1983; 2001), Perkins (1983), Nuyst (2006), Bybee, Perkins, and Pagliuca (1994), etc.

Other models of modality also provide concepts of modality for analysis of the data of the study. For example, Halliday (1994), Eggins & Slade (1997), Halliday and Matthiessen (2004, 2014) and Martin, Matthiessen and Painter (2010) do not have the same terminologies of epistemic, deontic and dynamic modality, yet the systemic functional framework of *Modalization* and *Modulation* has similar senses (e.g. obligation, probability, ability) of modality to indicate the speaker's interpersonal meaning or the status of what is being said by the speaker. More

importantly, the semantic approach and systemic functional approach should not be competitive. Rather, they are complementary in analyzing discourse.

As the SFL approach to modality is the analytical framework of this study, details of the theories and concepts and the reasons for chosen SFL model will be presented in Chapter 3.

2.4.3 Studies on other Models of Modality

The previous section introduces the concepts and classification of modality, which is not the SFL approach. Details of the SFL model of modality will be presented in Chapter 3. In this section, studies on other model of modality such as epidemic modality, deontic modality are presented.

Panocová (2008) investigates the presentations of modality in biomedical texts. The study compared the presentations of epistemic modality, modal verbs and modal adverbials in the sections of Abstract, Introduction, Material and Methods, Results and Discussion of ten biomedical research articles written by English scientists and another ten articles written by Slovak scientists. Results indicate that modal verbs and modal adverbs were considerably used by native English scientists

in research articles. Native English scientists tend to use the modal verb *may* while the Slovak scientists use more modal verb *can*. The differences are associated with the writing conventions of the Slovak community. Panocová's study adopted the framework of epistemic modality of Palmer and Coates to study the biomedical articles in different language. However, it is not enough to just count the number of occurrences of modal verbs and modal adverbials in the biomedical texts. We may question about the scales or levels of epistemic modality, which express possibility or the stance/opinion of the speaker. For this aspect of modality, the SFL modal of modality can answer this question. Details of the SFL model of modality and its studies will be presented in Chapter 3.

Rubin (2010) investigates the epistemic modality based on a model from a dichotomy of uncertainty to certainty. The study is based on a dataset of 80 articles from the New York Times published in 2000. The sentences were analyzed by the author to identify the certainty level presented by markers and each marker was assigned to different level of uncertainty including absolute certainty, high certainty, moderate certainty, low certainty and uncertainty. For example, absolute certainty is 'unambiguous or undisputable conviction' and high certainty is 'high probability or firm knowledge'. Results indicate that about 59% of the date set is presented with epistemic modality markers. However, the paper only shows results of occurrences of different levels of certainty. It does not present with examples of

what kind of markers or lexical items or grammatical items are presenting absolute certainty or high certainty. Thus, there will be difficulties in manual annotation for different levels of certainty in the model.

Vold (2006) compares the uses of epistemic markers in research articles written in English, French and Norwegian. Epistemic modality is used to “qualify the truth of a propositional content” (Vold, 2006: 65). Examples of modality markers include *perhaps, probably* etc. A selection of 120 research articles written in English, French and Norwegian in the disciplines of linguistics and medicine were used for studying the occurrence of epistemic markers. More epistemic markers were used in the linguistic discipline and also in English and French research articles. Vold (2006) concludes that the frequency of occurrence of epistemic markers is related to language and nationality. The implication of Vold’s study is that it is important to aware the style of academic writing in different language so as to avoid misunderstandings and misjudgments.

This section presented studies of other modality model. Although they are not from SFL perspective, the studies provide different perspectives in studying modality.

2.4.4 Communicating Risk and Uncertainty during Epidemics and Pandemics

As discussed in the Section 2.4, one way to study uncertainty is by means of modality. According to systemic functional approach to modality, modality is a linguistic resource that expresses the meaning that lies in the area between 'yes' and 'no', and its major function is to reflect the speaker's/writer's attitude towards degrees of his/her proposition about an utterance (C. Green et al., 2009; Halliday & Matthiessen, 2014; Thompson, 2014). Other related concepts and theories of SFL model of modality will be introduced in Chapter 3. Thus, in this section, examples of the swine influenza pandemic are included to illustrate the language use for expressions of risk and uncertainty of the disease, aiming at providing an overview of how modality, an analytical framework of the study, is applied to the discourses of emerging infectious diseases such as SARS and swine flu.

In the event of influenza pandemic, effective public health and risk communication is vital for protecting the health of the general population and avoiding negative consequences. The swine influenza pandemic in 2009 is considered by Jones and Slather (2009) as causing vast apprehension in the world because of the high uncertain characteristics, especially the mortality and transmissibility of the virus. It was common to recognize the language of uncertainty over the messages conveyed from the media, government and health authorities worldwide. Covello

Peters, Wojtecki, and Hyde (2001) state that communication to the public about nature of risk is crucial, in particular for making decision on any actions associated with the risk.

The following examples are extracted from the press conference held by the WHO to illustrate how the WHO officials talk about uncertainty by using linguistic resources of modality, the main analytical framework of this study.

Example (1)

“...it is important again to remember that the properties of flu viruses *can* change over time. They *can* go from mild to being more severe as time goes on and they *can* also move from being more severe to less severe over time. It is way too early right now to predict whether we *might* see a mild pandemic or a severe pandemic, but again we *will* keep you updated as we understand.” (World Health Organization, 2009f)(WHO, Press Conference dated 26-04-2009)

In example (1), the degree of probability of the statement is realized by using of modal verb *can*, *might* so as to indicate the tentativeness of the situation. Instead of stating the truth as ‘the properties of flu viruses change over time’, the speaker/writer (the text producer) expresses the uncertainty or possibility of the statement by making use of a modality device, a finite modal *can* - ‘the properties of flu viruses *can* change over time’.

Example (2):

“In terms of the mildness of the cases out there and whether people *may* take a pandemic seriously or not seriously, *I think* the main point I want to make here, the most important point to make here, is that it is *probably* premature to think of this as a mild pandemic or as a severe pandemic, and *it is very clear* that we *cannot* predict what the cause of this *will* be”. (World Health Organization, 2009g) (WHO, Press Conference dated 29-04-2009)

Example (3)

“At this juncture, *I think* that a fair question to ask is where we are going. Is it theoretically *possible* that this epidemic *could certainly* stop for unknown reasons, although this is *probably unlikely* at this point?” (World Health Organization, 2009g) (WHO, Press Conference dated 29-04-2009)

Example (2) and (3) also reflect the characteristics of uncertainty in the messages by using modal verb *will* or adverb *probably* to indicate the degree of certainty. In addition, interpersonal metaphor like *I think* or *it is clear that* is an alternate approach to express modality which performs the function as presenting the proposition put forward by the speaker. Such words ‘*I think*’, ‘*possible*’, ‘*could*’, ‘*certainly*’, ‘*probably*’ and ‘*unlikely*’ are the speaker’s choices to express modality.

2.5 Chapter Summary

This chapter reviewed literature related to the fundamental concepts and theories of public health and risk communication e.g. public health and public health communication, risk and risk communication. The communication of risk and uncertainty in adversative public health incidents was also presented with a brief introduction of modality as the linguistic framework of analysis.

The next chapter turns to introduce the theoretical framework of this study. The concepts and theories of modality will be introduced.

Chapter 3 Theoretical Framework

3.1 Chapter Overview

The previous chapter reviews the social background of the study (the 2003 SARS epidemic and the 2009 swine influenza pandemic) and its related theories and concepts of public health and risk communication. This chapter will turn to present the literature review of modality in systemic functional linguistics – the framework of analysis adopted for studying the discourses of the two events.

As there are many theories of systemic functional linguistics (SFL), it is impossible to provide a comprehensive presentation of all the concepts and theories of SFL in this thesis. Thus, this chapter only focuses on some fundamental concepts of SFL, which are most relevant to this study. First, Section 3.2 presents the concepts of the three metafunctions (*ideational*, *interpersonal* and *textual*) of systemic functional linguistics (Halliday & Matthiessen, 2014), in particular focusing on the interpersonal metafunction and its lexicogrammar and semantics as modality; the analytical framework of the study, is one of the systems of interpersonal metafunction. Section 3.3 describes more details about modality within the framework of systemic functional grammar. Section 3.4 provides a comprehensive understanding of the uses of modal verbs. Section 3.5 discusses studies on modality from a systemic functional approach. Section 3.6 is a summary of the chapter.

3.2 Systemic Functional Linguistics

Systemic functional linguistics (SFL) is a theory of language, founded by M.A.K. Halliday in the 1960s. He developed the theory of SFL from the inspirations of his tutor J.R. Firth. Other scholars who make major contributions to SFL include Ruqaiya Hasan, Christian M.I.M. Matthiessen, Jim Martin and many others (Chapman & Routledge, 2009). According to Halliday (1994), language is described and modeled as a ‘social semiotic system’. The term *systemic* refers to a network of ‘systems of choices’ for making meanings in social context. The term *functional* refers to viewing language as a means of communication in different social processes.

In this section, the main theories and concepts of SFL will be introduced. First, Section 3.2.1 will review the three metafunctions (ideational, interpersonal and textual) because modality, the main analytical framework of the study, belongs to the interpersonal metafunction. Next, the interpersonal lexicogrammar and semantics will be outlined in Section 3.2.2.

3.2.1 The Three Metafunctions in Systemic Functional Linguistics

In SFL, language is viewed as a network of systems with different options or choices for making meanings. Thompson (2014: 28) describes “meaning is essentially equated with function”. In SFL theories, language is conceived of having three basic functions or three metafunctions (ideational, interpersonal and textual). The metafunctions refer to the three separate strands that contribute to the overall meaning in a text (Halliday, 1994; Halliday & Matthiessen, 1999; 2014: Thompson, 2014). Halliday & Hasan (1985) define text as language that is functional. Text may be either written or spoken. It is functional because “language that is doing some job in some context” (Halliday & Hasan, 1985).

Figure 3.1 shows the three metafunctions of systemic functional linguistics.

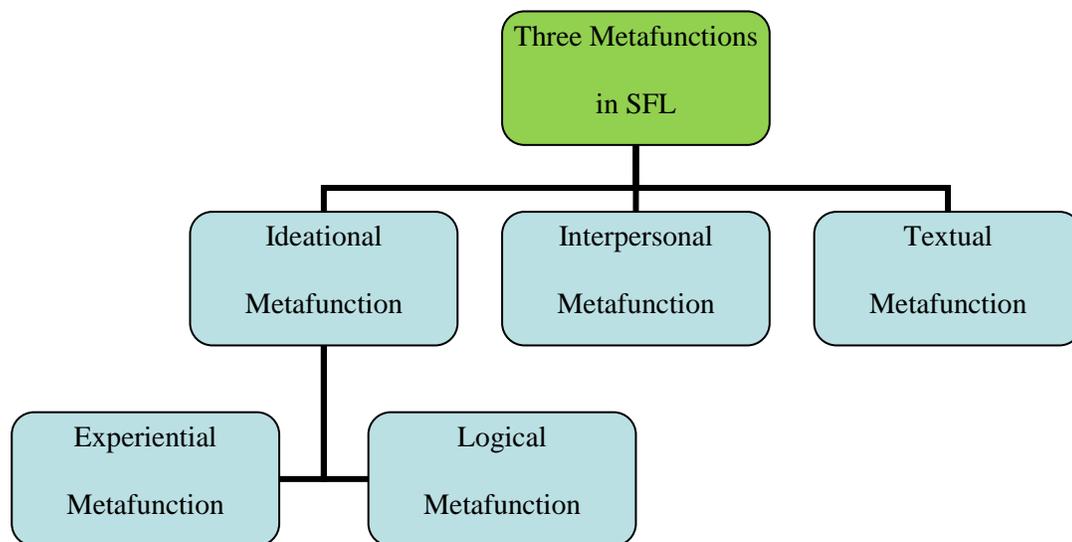


Figure 3-1 Three Metafunctions in Systemic Functional Linguistics

The **ideational** metafunction in language serves for making sense or construing human experience in the world such as using language to name things (e.g. *green*, and *red* and *yellow* etc. are categorized as *colour*). The ideational metafunction is further divided into the **experiential** metafunction and **logical** metafunction. The *experiential* meanings encode our experiences and understanding of the world, and the *logical* meanings show the relationship between our reasoning on the experiences (Halliday & Matthiessen, 2004; Butt, Fahey, Feez, Spinks & Yallop, 2001: 5; Derewianka & Jones, 2010: 9).

The **interpersonal** metafunction provides the resources for interacting with other people or enacting social relationships in social process (Halliday & Matthiessen, 2004). The interpersonal meaning “uses language to encode interaction with others, to show how defensible we find our propositions, to encode ideas about obligation and inclination and to express our attitudes” (Butt et al , 2001: 5).

The **textual** metafunction organizes the ideational (experiential and logical) and interpersonal meanings to create coherent texts, in written and spoken language, as discourse – as meaning that is contextualized and shared (Halliday & Matthiessen, 2004; Butt et al, 2001: 5; Derewianka & Jones, 2010: 9).

As states in Section 1.5, the primary objective of this study is to explore how modality and its expressions are used to present the features of risk and uncertainty in the discourses of the SARS epidemic and the swine influenza pandemic. Modality belongs to interpersonal metafunction in SFL (Halliday & Matthiessen, 2014). Accordingly, the theory of interpersonal metafunction related to lexicogrammar and semantics will be introduced in the next section.

3.2.2 The Interpersonal Lexicogrammar and Semantics

This section presents the concept of stratification, a way to construe meaning by different levels or strata. According to Halliday and Matthiessen (1999: 4), language is a system for making meaning through the hierarchy of stratification, a central notion of systemic functional grammar. There are four strata: Phonology, Lexicogrammar, Semantics and Context. The strata relate with each other by means of ‘realization’ (Butt, Fahey, Feez & Spinks, 2012; Halliday and Matthiessen, 2014). Figure 3.2 presents the hierarchy of stratification. Each stratum is realized by another level of stratum. For example, semantics (system of meaning) is realized by lexicogrammar (system of wording – grammatical structures and lexical items, and system of signing); lexicogrammar is realized by phonology (system of sounding), gestures and graphology (system of writing) (Butt et al, 2012).

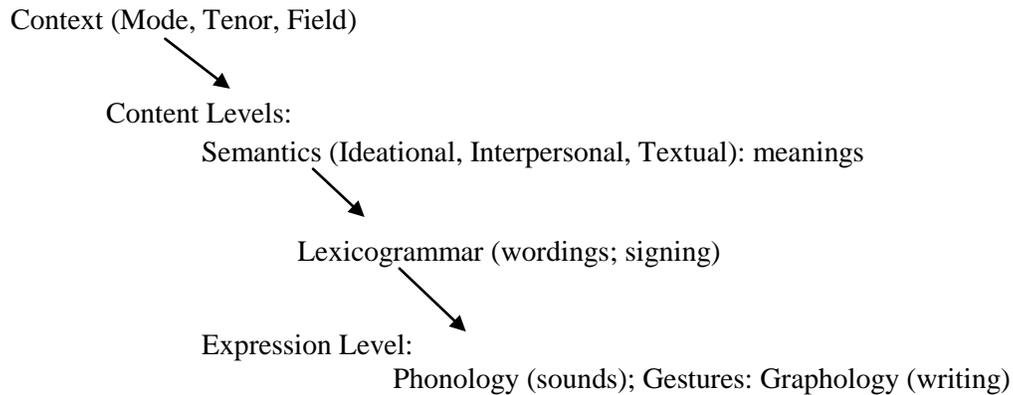


Figure 3-2 Stratification

(Adapted from Butt et al, 2012: 25)

As shown in Figure 3.2, there are different levels of stratum. The meanings of each stratum are described in the followings:

The first level is the **Context**. Thompson (2014: 9) states that if we want to find out the different choices or options used to express a particular meaning, it is important to ask the question “What are the contextual factors that make one set of meanings more appropriate or likely to be expressed than another?” (Thompson, 2013: 9). In other words, the context has to be identified. **Context** is further divided into three aspects (Field, Tenor and Mode). Halliday also defines context as Register (cited in Thompson, 2014), ‘variation according to use’, as stated by Thompson “we

typically use certain recognizable configurations of linguistic resources in certain context” (Thompson, 2014: 40). For example, in the context of the current study, the SARS epidemic and the swine influenza pandemic, are composed of high degree of uncertainty regarding the nature of diseases and their associated treatment and prevention strategies. Thus, how the health authorities express such contexts will be realized by using different lexicogrammatical choices to construe the meanings (semantics). There are three aspects of context: Field, Tenor and Mode. The field is about ‘What is going on?’ (Thompson, 2014). For example, one of the study areas of the current study is the press conference held by the WHO to convey messages about the swine influenza pandemic in 2009. The Field of the context is to ask “What is the role of language in the activity?” (Thompson, 2014: 40). The tenor concerns the social roles and the relationships between the participants (e.g. speaker and hearer or writer and reader) involved in the communication (Butt, et al, 2012; Thompson, 2014). For example, the role of the health authorities in the press conferences held by the WHO is to deliver public health messages concerning the swine influenza pandemic to the journalists and the general public. The mode is the channel of communication or interactions between the participants of the activity, whether the text being made is spoken or written (Thompson, 2014). For example, the mode of the newspaper reports concerning the SARS and the swine influenza in the current study is written.

The second level is **Semantics**, the system of meanings. The meanings of the language used in the activity is realized or construed by the lexicogrammatical options or ‘the kind of reflexivity’ (Thompson, 2014). As mentioned in the previous sections, there are three systems of meanings: ideational, interpersonal and textual meanings. The third level is the **Lexico-grammar**, which is about “the syntactic organization of words into utterance”. (Halliday, 1975 cited in Singh, 2015: 362)

As mentioned in the previous section, in SFL, language is viewed as a network of systems with different options or choices for making meanings. These choices are presented in different strata as described above. The major focus of the current study is on the modality system of the interpersonal meaning of language to encode interaction, to show how defensible we find our propositions, to encode ideas about obligation and inclination and to express our attitudes with degrees of certainty, usuality, possibility, obligation and inclination. (Martin, Matthiessen & Painter, 2010: 56-63; Butt et al, 2001: 5). Accordingly, the next section provides more detailed description of functional model of modality.

3.3 Systemic Model of Modality

This section introduces the analytical framework of the study, the system of MODALITY, which belongs to the interpersonal metafunction of the language. The SFL approach to modality is chosen as the analytical framework of this study because it provides remarkable features of the aspects of *type*, *value*, *orientation* and *manifestation* of modality. Instead of just finding a marker to indicate the indeterminacy between yes and no, it is important to analyze modality in a more comprehensive way so that the function of the modality operators, whether it is respective or irrelative to the speaker (subjective or objective) can be assessed. Details about different aspects of SFL model of modality will be introduced in Section 3.3.2. The next section first introduces the concept of the Mood system.

3.3.1 The Mood System

Apart from the MODALITY system (which will be presented in the next section), the MOOD system is also introduced here because it is one of the systems of interpersonal metafunction and also one of the units of analysis of the study. In SFL theory, the MOOD system is a key attribute of the interpersonal metafunction of language. It provides grammatical resource for realizing interaction between the

speaker and the addressee. Figure 3-3 shows the Mood types.

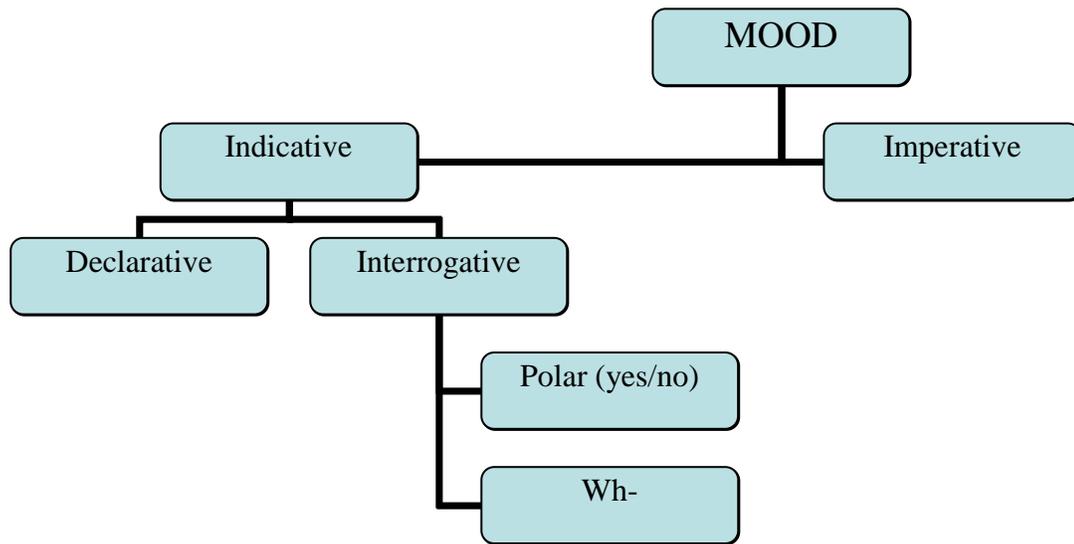


Figure 3-3 Mood Types

As shown in Figure 3.3, there are two major Mood types: indicative and imperative. For Indicative Mood, there are declarative and interrogative: polar (yes/no) and Wh-. (Martin, Matthiessen and Painter, 2010)

How do the social relationships enact in social processes? Different social purposes are realized by different language patterns and their associated lexicogrammatical features in each text (Halliday & Matthiessen, 2004; Martin, Matthiessen, & Painter, 2010). Table 3-1 shows the system of MOOD and examples.

Table 3-1 The Mood System

Mood	Example
declarative	Severe acute respiratory syndrome (SARS) is a viral respiratory infection caused by a coronavirus (SARS-CoV).
interrogative: yes/no	Is it possible to get swine flu to contract it from simply flying on a plane?
interrogative: Wh-	What could Mexican authorities do in this period?
imperative	Wet hands under running water.

As shown in Table 3.1, ‘*Severe acute respiratory syndrome (SARS) is a viral respiratory infection caused by a coronavirus (SARS-CoV)*’ (Department of Health, 2015b) is a declarative; ‘*Is it possible to get swine flu to contract it from simply flying on a plane?*’ (World Health Organization, 2009d) is an interrogative-yes/no; ‘*What could Mexican authorities do in this period?*’ (World Health Organization, 2009d) is an interrogative-Wh-; ‘*Wet hands under running water*’ (Department of Health, 2015) is an imperative.

For instance, in health care settings, there are different sorts of interactions and activities such as public health education and health promotion. The major purpose of these activities is to provide knowledge and instructions concerning public health. For example, *mood declaratives* (e.g. ‘*SARS is a serious illness*’) are chosen to explain the nature of the disease, while *mood imperatives* (e.g. ‘*Always*

perform hand hygiene’) are used to give instructions to patients or the general public. As such, language and meaning has an important role in constructing knowledge (Renzl, 2007).

We use language to interact with people, e.g. making statements, asking questions and giving commands. Table 3-2 shows the four speech functions in communicative exchange: *statement*, *question*, *command* and *offer*. These four labels represent the commodity exchanges of the speech roles: giving goods-&-services and demanding goods-&-services, and giving information and demanding information.

Table 3-2 Speech Function and Mood

<i>commodity exchange</i> <i>role in exchange</i>	goods-&-services	information
giving	OFFER <i>declarative</i> I will pick you up at the station.	STATEMENT <i>declarative</i> The weather is fine today.
demanding	COMMAND <i>imperative</i> Bring your umbrella!	QUESTION <i>interrogative: yes/no:</i> Did you bring your umbrella yesterday? <i>interrogative: Wh-</i> How is the weather today?
	Proposal	Proposition

(Adapted from Martin, J. R., Matthiessen, C. M. I. M., & Painter, C., 2010: p.57)

In any social activity, language is used for communication or as exchange of either ‘information’ or ‘goods-and-services’. They are realized by a clause with grammatical variations in forms or pattern. The exchange of information is realized by (i) asking questions (e.g. What is Mary studying?) or (ii) making statements (e.g. I am available for the meeting), or exchanges of goods-and services by (iii) giving commands (e.g. Give me some sugar!) or (iv) making offers (e.g. Would you like

some milk?)(Halliday, 1994; Thompson, 2014; Eggins, 2004; Martin, Matthiessen & Painter, 2010) . The utterance is considered as proposition if information is being exchanged. On the other hand, if the commodity exchanged is goods-&-services, the utterance is a proposal (Eggins & Slade, 1997; Martin, Matthiessen & Painter, 2010; Halliday & Matthiessen, 2014; Thompson, 2014).

The framework of speech function helps to analyze the data in terms of the role of exchange of goods and services or information which indicates the function of modality as proposal or proposition.

3.3.2 Modality

In addition to Mood system, modality is another aspect of interpersonal meaning. As defined in Section 1.2 and Section 2.4.3, modality is a linguistic resource that enables a writer/speaker to convey different degrees of certainty of an utterance and to express the stance or proposition contained in the message. Here, Halliday (1994) gives a definition of modality. He takes the idea that polarity is a choice between ‘yes’ and ‘no’ and modality is various kinds of intermediate degrees between the positive and negative poles. The indeterminacy on modality implies that the status of what is being said depends on the speaker’s judgment or the judgment of the listener (Halliday and Matthiessen, 2004). Modality may be realized through a modal verb, (e.g. *should, would, will, could, can, may, must and shall*), an adverbial

adjunct (e.g. *possibly, probably*) or an interpersonal metaphor presented by projecting clauses (e.g. *I think (that)...* or *it is likely (that)....*).

Each modality expression is expressed in four aspects (Halliday & Matthiessen, 2014; Argamon et al, 2007). Figure 3.4 shows the four aspects of modality.

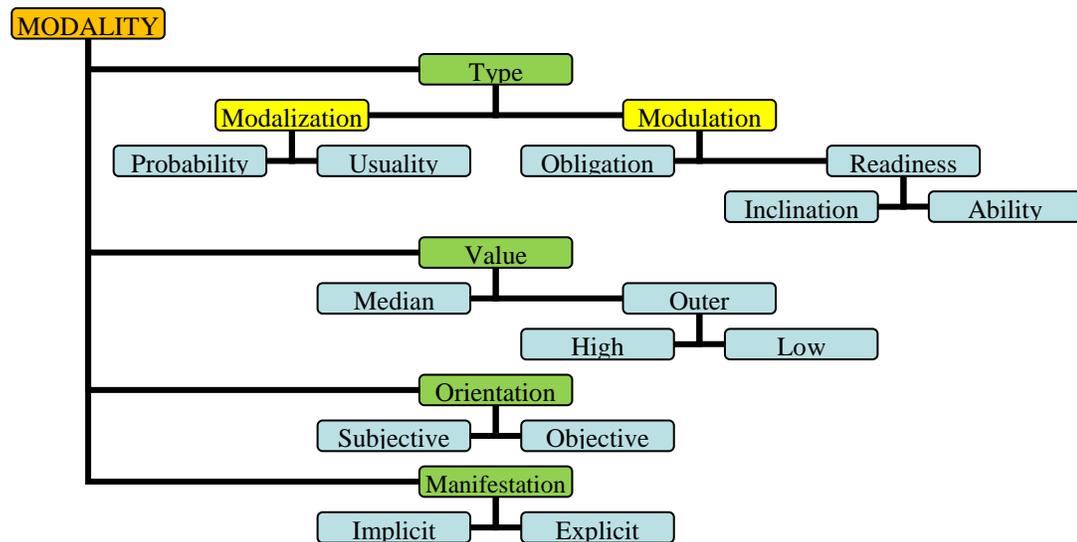


Figure 3-4 System Network for Modality

(Adapted from Gibbons, J., & Markwick-Smith, V., 1992: 40)

As shown in Figure 3.4, the system network of modality includes: the *type of assessment of modality: probability, usuality, obligation, inclination and ability*. The value includes *high, median and low*. Orientation includes *subjective and objective*. *Manifestation* includes *implicit and explicit*. In the following three

sections, the four aspects of modality, *Type of Assessment*, *Value*, *Orientation* and *Manifestation* of modality will be described in detail.

3.3.2.1 Type of Assessment

As shown in Table 3.2 in Section 3.3.1, modality is used for exchange of propositions or proposals, by which a proposition involves an exchange of information while a proposal engages an exchange of goods-&-services. In proposition, the modality related is to assess the degree of *probability* (how likely the information is to be true) or the degree *usuality* (how frequently the information is true). In proposal, the modality related is to assess the degree of *obligation* in commands and the degree of *inclination* (or willingness) in offers. The degree of probability and the degree of usuality are also referred to as *modalization*, whereas the degree of *obligation* and the degree of *inclination* are called *modulation* (Butler, 2003; Halliday & Matthiessen, 2014; Thompson, 2014:70-71). Apart from the four main types of modality, ability or potentiality, though not concerned with judgment and attitudes of the speaker, is another area of modality. For example, modal verb *can* is usually used to express *ability* or potentiality (Lock, 1996).

The framework helps to analyze the data of this study in terms of assessment of whether the modality is to express degree of usuality, probability, obligation, inclination or ability.

3.3.2.2 Value

Modality can be expressed in different degrees or scales to indicate higher or lower degree of certainty in probability. Halliday & Matthiessen (2004) state that modality is used to express indeterminacy and it is organized in a system of three values: *high*, *median* and *low*. For example, in presenting the degree of probability, it may be construed by modal verbs or modal adjuncts (adverbs or adjectives) or combination of the two or modal phrases (interpersonal metaphors or projecting clauses). For example in, “*Short-distance airborne transmission of influenza viruses may occur, particularly in crowded enclosed spaces*” (World Health Organization, 2010b), the modal verb *may* functions to express the degree of probability of low value. Table 3.3 shows different values of modality and their realizations.

Table 3-3 Modality: Value and its realizations

	High Modality	Medium Modality	Low Modality
Modal verbs (auxiliaries)	must, ought to	would, should will, shall	may, might, can, could
Modal Adverbs	(un)certainly, definitely, absolutely, surely, always, never	probably, (un)likely, usually, often	possibly, perhaps, maybe, sometimes
Modal Adjectives	certain, definite, absolute, uncertain, rarely, seldom	probable, usual	possible
Modal Nouns	certainty, necessity, requirement, obligation	probability	possibility
Interpersonal Metaphors	I know... It is certain that...	I think (that)... It is likely that...	I guess that... It is possible that...

(Adapted from Halliday, M.A.K. & Matthiessen, C.M.I.M., 2004 & Jordan, R.R., 1999)

As shown in Table 3.3, high modality is presented by using modal verbs such as *must*, modal adverbs such as *absolutely*, *definitely*, or interpersonal metaphors presented by projecting clauses such as *I think...it is certain that...* Table 3.3 shows examples of different values of modality, which aids to identify the values of

modality in the data analysis of the study. It provides a framework and scales to help to differentiate how people make strategy to different style of communication. For example, ‘*the SARS virus might spread more broadly through the air (airborne spread)*’ (CDC, 2012b). The use of modal *might* is to signal a lower degree of certainty of the proposition. The example ‘*Antiviral agents must be used under doctor’s prescription*’ (Department of Health, 2015a), the use of modal *must* is to signal a higher degree of obligation in a command of proposal. More examples from the data analysis of the Values of modality will be presented in Chapter 6 and 7.

3.3.2.3 Orientation and Manifestation

This section introduces the aspects of *Orientation* and *Manifestation* of modality in SFL. *Orientation* shows the relation between the modality expression and the text producer. *Subjective* means the modality is related to the judgment of the speaker while *objective* modality is the opposite, irrespective of the speaker (Argamon et al, 2007). *Manifestation* asks the question “How is the modal assessment related to the event being assessed?” (Argamon et al, 2007: 819). Table 3.4 shows examples of *Orientation* and *Manifestation* aspects of modality.

Table 3-4 Modality: Orientation and Manifestation

	Subjective:	Subjective:	Objective:	Objective:
	explicit	implicit	implicit	explicit
Modalization: probability	I think [In my opinion] Mary knows	Mary will know	Mary probably knows [in all probability]	It is likely that Mary knows
Modalization: usually		Fred will sit quite quiet	Fred usually sit quite quiet	It is usual for Fred to sit quite quiet
Modulation: obligation	I want John to go	John should go	John is supposed to go	It is expected that John goes
Modulation: inclination		Jane will help	Jane is keen to help	

(Adapted from Halliday, M. A. K., & Matthiessen, C. M. I. M., 2004: 620)

Table 3.4 shows examples of different types of assessment of Modality: *Orientation* and *Manifestation*. The *Orientation* and *Manifestation* of modality provides the framework to study or differentiate whether the modality is subjective or objective, implicit or explicit. The following two examples present the subjective implicit and objective implicit of modality:

Example (1): The virus *can* spread rapidly (subjective implicit)

Example (2): The virus *probably* spread rapidly (objective implicit)

As shown in Example (1) and (2), *Implicit* modality is realized congruently by modal verbs (e.g. *can, may* etc.) or modal adjuncts (e.g. *probably, possibly* etc) within the clause. On the other hand, *Explicit* modality is expressed non-congruently, using interpersonal metaphors, in a separate clause or projecting clause such as ‘*I think...*’ or ‘*It is likely that...*’ (Halliday, 1994: 354; Simon-Vandenberg, 1997:344-5). Examples are shown below:

Example (3): *I think* the viruses spread rapidly (explicit)

Example (4): *It is likely* that the viruses spread rapidly (explicit)

In Example (3) and (4), ‘*I think...*’ and ‘*It is likely...*’ are projecting clauses (also served as an adjunct like ‘*probably*’) and ‘...the virus spread rapidly’ is the projected clause, the event or proposition that is being assessed.

3.3.3 Interpersonal Metaphor

As mentioned in the previous section, most of the explicit modality is presented by interpersonal metaphor such as *I think...* (subjective explicit), *it is likely...* (objective explicit) etc. (Halliday, 1994: 354; Simon-Vandenberg, 1997:344-5).

In this section, the concept of interpersonal metaphor is introduced.

Halliday (cited in Cummings, 2010) states that interpersonal metaphor is one type of grammatical metaphors that “language employs grammar metaphorically, using one grammatical structure to mean what is normally expressed by some other grammatical structure” (Cummings, 2010: 155). When a grammatical structure such as a yes/no question performs its original function as a question, it is called ‘congruent’. However, when a grammatical structure of a yes/no question performs different function such as an additional functional meaning as command, it is called ‘non-congruent’ or ‘metaphorical’ (Cummings, 2010). The concepts and theories of interpersonal metaphors provide framework of the current study to differentiate whether the data are presented by interpersonal to express modality.

Taverniers (2003) states that MOOD and MODALITY are the two systems in interpersonal grammar, thus there are also two kinds of interpersonal grammatical metaphor: the **metaphors of mood** (or indirect speech act metaphor mentioned above) and **metaphors of modality**.

In **metaphors of mood**, the mood means “is not expressed in the clause, but rather as an explicit element outside the clause” (Taverniers, 2003: 11). One of the examples of mood metaphor, Halliday called it ‘speech-functional formulae’

(Halliday, 1994/1985: 365 cited in Taverniers, 2003: 11). The followings are the examples.

(5) she'd better →..

(6) Congruent: She should...

Example (5) and (6) illustrates a modulated 'command', typically functioning as 'advice'.

In **metaphors of modality**, in the system of MODALITY, the interpersonal metaphor is realized by the subjective explicit modality (e.g. *I think..*) and objective explicit modality (*it is likely...*). The metaphor of modality is represented by grammatical variation based 'logico-semantic relationship of projection' (Taverniers, 2003: 10). This means that while modal meanings are congruently realized in modal operators such as modal verbs and mood adjuncts. in the clause, e.g. He *may* be in his office. However, interpersonal metaphors are 'expressing modal meanings *outside the clause*' (Taverniers: 2003: 10), e.g. *I think* he is in his office.

The following two examples are extracts from the data of the study to illustrate the interpersonal metaphor.

Example (7):

“In terms of the mildness of the cases out there and whether people *may* take a pandemic seriously or not seriously, *I think* the main point I want to make here, the most important point to make here, is that it is *probably* premature to think of this as a mild pandemic or as a severe pandemic, and *it is very clear* that we *cannot* predict what the cause of this *will* be”. (World Health Organization, 2009g) (WHO, Press Conference dated 29-04-2009)

Example (8)

“At this juncture, *I think* that a fair question to ask is where we are going. Is it theoretically *possible* that this epidemic *could certainly* stop for unknown reasons, although this is *probably unlikely* at this point?” (World Health Organization, 2009g) (WHO, Press Conference dated 29-04-2009)

In Example (7) and (8), the uses of modal verb *will* or Mood Adjunct *probably* function to indicate the degree of certainty and to express the characteristics of uncertainty in the messages. Such words ‘*possible*’, ‘*could*’, ‘*certainly*’, ‘*probably*’ and ‘*unlikely*’ are the speaker’s choices to express modality congruently. Also, interpersonal metaphor is used by adding a projecting clause like ‘*I think*’ or ‘*it is clear that...*’. Interpersonal grammatical metaphors are ‘explicit realizations of modal meanings’ (Taverniers: 2003: 10). This is an alternate approach to express modality which performs the function as presenting the proposition put forward by the speaker.

There are more examples extracted from the press conference held by the WHO to illustrate how the WHO officials talk about uncertainty by using linguistic resources of modality (both congruent and metaphorical), the main analytical framework of this study.

Example (9)

“The vaccines which are produced now are much better purified than the way they were in 1976, so *we really do not think* that *it is likely that* we *will* have these side effects again, but to be absolutely honest, of course it is only when you have a large scale distribution of vaccines that you know with *certainty* the safety profile of the vaccine” (World Health Organization, 2009e) (WHO, Press Conference dated 13-07-2009)

Example (9) has been mentioned in Section 1.4 in Chapter 1 that it constitutes the attribute of uncertainty about the swine flu vaccine. The speaker has expressed his/her assertion to a certain degree of (un)certainly. The degree of probability of the statement is realized by using interpersonal metaphor in projecting clause 'we really do not think...' or 'it is likely that...', and the use of modal verb 'will' to indicate the uncertainty. Instead of saying that *'The vaccine ... so we do not think that we have these side effects again...'*, the speaker made the statement as *"The vaccine ... we really do not think that it is likely that we will have these side effects again..."* (WHO, 2009a, PC: 1307200923) - *'we think'* is an interpersonal metaphor to express a median value of probability with subjective-explicit orientation and manifestation, while *'we really do not think'* is to indicate a negative polarity. Here, 'we' together with an adverb 'really'- an epistemic modality device - is used to

indicate a subjective emphasis of situation (Paradis, 2003). However, Paradis (2003) argues that there is no direct relationship between the evidence of truth of the propositional content and the subjective emphasis put by the speaker. Paradis (2003: 216) also argues that "Emphasizing really is intonationally non-salient. It assumes a background position in relation to the propositional content, which is natural for epistemic elements. If it comes with the tone, there will be some kind of contrast involved and it turns into a truth attester of factual evidence". In addition, the statement is also followed by another interpersonal metaphor of 'it is likely that'..., which indicates a median value of probability with objective-explicit orientation and manifestation. The whole statement, here, constitutes a negative polarity and two different levels of modality to indicate the degree of probability. It is quite problematic to interpret the exact commitment of the speaker concerning the side effect of the vaccine.

Example (10)

“...it is important again to remember that the properties of flu viruses can change over time. They can go from mild to being more severe as time goes on and they can also move from being more severe to less severe over time. It is way too early right now to predict whether we might see a mild pandemic or a severe pandemic, but again we will keep you updated as we understand” (World Health Organization, 2009f) (WHO, Press Conference dated 26-04-2009)

In example (10), the degree of probability of the statement is realized by using of modal verb *can*, *might* so as to indicate the tentativeness of the situation. Instead of

stating the truth as ‘the properties of flu viruses change over time’, the speaker/writer (the text producer) uses a modal verb *can* -‘the properties of flu viruses *can* change over time’ to express the uncertainty or possibility of changes of the flu viruses.

The concepts and theories of interpersonal metaphors provide framework of the current study to differentiate whether the data are presented by interpersonal metaphor to express modality.

3.4 Modal Verbs

This section introduces the common uses of English modal verbs: *may*, *might*, *can*, *could*, *shall*, *will*, *would*, *must* and *should*. Many scholars adopt different approaches to discuss modal verbs. For example, Palmer (1979) discusses modal verb *may* as epistemic modals and “the function of epistemic modals is to make judgments about the possibility, etc, that something is or is not the case” (Palmer, 1979: 41). Modal verb *must* is discussed as epistemic modality and deontic modality (Palmer, 1979). In other words, there are various meanings and uses in modal verbs. With the aims of interpretation of the meaning and the functions of modal verbs, the following subsections provide descriptions of modal verbs based on a grammar book written by Carter, McCarthy, Mark, & O’Keeffe (2011) which

provides a comprehensive meaning and uses of the modal verbs to analyze the data of this study.

3.4.1 MAY and MIGHT

This section describes modal verbs *may* and *might*. Table 3.5 shows the uses and examples of modal verb *may*.

Table 3-5 Uses of Modal Verb MAY

Uses	Expressing	Examples
permission	ask for permission give permission refuse permission	<i>May</i> I come in? Yes, you <i>may</i> . No, you <i>may</i> not
possibility	present weak possibility in the present or future	It <i>may</i> rain tomorrow.
general truths	describe things the speaker/writer things are generally true, more formal	The guest <i>may</i> come to the theatre.
accepting a different view or opinion	use with well and/or followed by <i>but</i>	I <i>may</i> be absent but I am going to try to come.

(Sources from: Carter, R., McCarthy, M., Mark, G., & O'Keeffe, A., 2011: 280-282)

As shown in Table 3.5, modal verb *may* can be used to express i) permission; ii) possibility; iii) general truths; iii) accepting a different view or opinion (Carter et al, 2011: 280-282). This provides a framework to analyze the data of this study to differentiate the functions of the modal verbs presented by the speakers of the texts. For example, in “*Short-distance airborne transmission of influenza viruses may occur, particularly in crowded enclosed spaces*” (World Health Organization, 2010b) , the modal *may* functions to express possibility of the degree of probability.

Modal verb *might* also has different uses. Table 3.6 shows the uses and examples of modal verb *might*.

Table 3-6 Uses of Modal Verb MIGHT

Uses	Expressing	Examples
possibility	present weaker possibility	I <i>might</i> be late.
permission	formal, is not used very often	<i>Might</i> I come in?
suggestions	give advice or suggestion in a polite way	You might like to try the coffee in this restaurant
criticisms	use <i>might have</i> + <i>-ed</i> to express criticism or disapproval	You <i>might</i> have mentioned to me you were not finishing the work.
reporting <i>may</i>	present as the past form of <i>may</i>	‘That may be wrong’, he said. He said that it <i>might</i> be wrong.

(Sources from: Carter, R., McCarthy, M., Mark, G., & O’Keeffe, A., 2011: 287-288)

As shown in Table 3.6, modal verb *might* can be used to express i) possibility; ii) permission; iii) suggestions; iv) criticisms and reporting *may* (Carter et al, 2011: 287-288). This provides a framework to analyze the data of this study to differentiate the functions of the modal verb *might* presented by the speakers of the texts. For example, “*It is way too early right now to predict whether we might see a mild pandemic or a severe pandemic...* (World Health Organization, 2009f), in which the modal verb *might* functions to express possibility of the degree of probability.

3.4.2 CAN and COULD

This section describes modal verbs *can* and *could*. Table 3.7 shows the uses and examples of modal verb *can*.

Table 3-7 Uses of Modal Verb CAN

Uses	Expressing	Examples
permission	ask or give permission	<i>Can</i> I use the computers in the library? Student <i>can</i> use the computers in the library
ability	present ability to do something in the present or future, with verbs of perception e.g. hear, see, speak etc. and mental process e.g. imagine, follow, understand etc. to imply understanding	I <i>can</i> speak Spanish and German.
general truths	present things which we think are usually true	Exercise <i>can</i> help prevention of heart diseases.
possibility	present possibility	We <i>can</i> go to holiday in summer.
guessing and prediction	present <i>can't</i> as the negative of must	It <i>can't</i> be John. He has left already.
requests	make requests in question form	<i>Can</i> you help clean the room?
reproaches	use <i>can't</i> to request other stop doing something in question form	<i>Can't</i> you stop ringing the bell?
offers	make offers in question form	<i>Can</i> we do it for you?

(Sources from: Carter, R., McCarthy, M., Mark, G., & O'Keeffe, A., 2011: 111-114)

As shown in Table 3.7, modal verb *can* can be used to express i) permission; ii) ability; iii) general truths; iv) possibility; v) guessing and prediction; vi) requests; vii) reproaches and viii) offers (Carter et al, 2011: 111-114). This provides a framework to analyze the data of this study to differentiate the functions of the modal verb *can* presented by the speakers of the texts. For example, in “*They can go from mild to being more severe as time goes on and they can also move from being more severe to less severe over time.*” (World Health Organization, 2009f), the modal verb *can* functions to express possibility of the degree of probability.

Table 3.8 shows the uses and examples of modal verb *could*.

Table 3-8 Uses of Modal Verb COULD

Uses	Expressing	Examples
possibility	express possibility in the present and the future	It could be wrong. (present) The weather could get worse. (future)
suggestions	make suggestions	Could you come earlier?
permission	ask for permission, more formal and polite than <i>can</i>	Could I take this card?
past ability	express past ability	I <i>could</i> swim fast when I was young.
past possibility	use <i>could have</i> + <i>-ed</i> form to express possibility in the past	I <i>could have been</i> a doctor
past guessing and predicting	use <i>couldn't</i> as the negative of must	She must have mistaken. It <i>couldn't</i> be wrong.
use with verbs of senses and mental processes	present ability to do something in the past, with verbs of perception e.g. hear, see, speak etc. and mental process e.g. imagine, follow, understand etc. to imply understanding	I <i>couldn't</i> remember her address when I arrived at Paris.
reporting <i>can</i>	use as the past form of <i>can</i>	'That <i>can</i> be wrong', he said. He said that it <i>could</i> be wrong.
criticism	use <i>could have</i> + <i>-ed</i> form to express criticism or disapproval	You <i>could have</i> mentioned to me you were not finishing the work.
regret	use <i>could have</i> + <i>-ed</i> form to express things that did not happen to show regret	He <i>could have been</i> a lawyer.

(Sources from: Carter, R., McCarthy, M., Mark, G., & O'Keeffe, A., 2011: 160-163)

As shown in Table 3.8, modal verb *could* can be used to express i) possibility; ii) suggestions, iii) permission; iv) past ability; v) past possibility vi) past guessing and prediction; vii) use with verbs of senses and mental processes; viii) reporting *can* and ix) criticism and x) regret (Carter et al, 2011: 160-163). This provides a framework to analyze the data of this study to differentiate the functions of the modal verb *could* presented by the speakers of the texts. For example, in “*Could you tell us whether virus samples are now being sent to pharmaceutical companies*” (World Health Organization, 2009a), the modal verb *could* functions to express a request of the degree of obligation.

3.4.3 SHALL and WILL and WOULD

This section describes modal verbs *shall*, *will* and *would*. Table 3.9 shows the uses and examples of modal verb *shall*.

Table 3-9 Uses of Modal Verb SHALL

Uses	Expressing	Examples
offers, suggestions and advice	make offers and suggestions	<i>Shall</i> I come on Thursday?
prediction, intention and decision	use with <i>I</i> and <i>we</i> to express prediction, intentions or decisions in formal contexts	We <i>shall</i> appreciate all you have done for the organization.
commands	give commands in formal contexts	The gates <i>shall</i> be kept open at all times.

(Sources from: Carter, R., McCarthy, M., Mark, G., & O’Keeffe, A., 2011: 477-478)

As shown in Table 3.9, modal verb *shall* can be used to express i) offers, suggestions and advice; ii) predictions and intentions and iii) commands (Carter et al, 2011: 477-478). This provides a framework to analyze the data of this study to differentiate the functions of the modal verb *shall* presented by the speakers of the texts. For example, in “*First I shall start by setting the context of [[what we are thinking about and what we are facing...]*” (World Health Organization, 2009f), the modal verb *shall* functions to express an intention of the degree of intention.

Table 3.10 shows the uses and examples of modal verb *will*.

Table 3-10 Uses of Modal Verb WILL

Uses	Expressing	Examples
certainty in the future	express things in the future that we think are certain	The room <i>will</i> be empty by 7 o'clock this even
making predictions	express predictions about the future	I think she <i>will</i> be out of town next month.
conditional sentences	use <i>will</i> in the main clause of conditionals	If he gets the funding, he <i>will</i> start the project.
intentions and decisions	use <i>'ll</i> , <i>not will</i> , after <i>i think</i> to express immediate intentions and decisions	I think <i>I'll</i> have some coffee before meeting Mary.
willingness and offers	express willingness to do something or make offers	I <i>will</i> show you how to do it.
promises	make promises	I <i>will</i> be back!
requests and invitations	make requests or invitations	<i>Will</i> you pass me the tea bags?
commands	give commands	<i>Will</i> you be punctual, please!
general truths	express things that the speaker thinks is generally truth	Some people <i>will</i> always make complaint
habitual events	express events that often happen	Mary <i>will</i> start to cry if she feels hungry.
disapproval	express other's repeated behavior which the speaker does not approve	He <i>will</i> make the kitchen untidy. It drives me mad.
inanimate objects	use <i>won't</i> to refer to inanimate objects	The recorder <i>won't</i> run.

(Sources from: Carter, R., McCarthy, M., Mark, G., & O'Keeffe, A., 2011: 584-589)

As shown in Table 3.10, modal verb *will* can be used to express i) certainty in the future; ii) making predictions; iii) conditional sentences; iv) intentions and decisions; v) willingness and offers; vi) promises; vii) requests and invitations; viii) commands; ix) general truths; x) habitual events; xi) disapproval and xii) inanimate objects (Carter et al, 2011: 584-589). This provides a framework to analyze the data of this study to differentiate the functions of the modal verb *will* presented by the speakers of the texts. For example, in “*We know that if this situation evolves, one of the questions that will come up very soon, is what is the availability of vaccines.*” (World Health Organization, 2009f), the modal verb *will* functions to express prediction of the degree of probability.

Table 3.11 shows the uses and examples of modal verb *would*.

Table 3-11 Uses of Modal Verb WOULD

Uses	Expressing	Examples
requests	make request in more polite and less direct way	Would you wash the clothes?
conditional sentences	use would in the main clause of conditionals	If we had more funding, we <i>would</i> have been started the project
habitual actions in the past	express habitual actions in the past	She had a friend, Mary. They <i>would</i> meet in the church every Sunday.
the future in the past	express the future in the past	When I had the car accident, I would I <i>would</i> never walk again.
reported clauses	function as past form of <i>will</i> in reported clauses	She said that she <i>would</i> join the party last month.
willingness in the past	express willingness in past time situation, in negative form would not	The recorder was not working but the staff <i>would</i> not give me a refund.
being less direct	use with verbs such as suggest, think, advise etc to express in less direct way	I'd suggest you to keep working on the project.

(Sources from: Carter, R., McCarthy, M., Mark, G., & O'Keeffe, A., 2011: 603-605)

As shown in Table 3.11, modal verb *would* can be used to express i) request; ii) conditionals; iii) habitual actions in the past; iv) the future in the past; v) reported clauses; vi) willingness in the past; and vii) being less direct (Carter et al, 2011: 603-605). This provides a framework to analyze the data of this study to

differentiate the functions of the modal verb *would* presented by the speakers of the texts. For example, in “*I think that it would be very helpful again [[to know how often infections of these viruses do lead to death...]*” (World Health Organization, 2009f), the modal verb *would* functions to express possibility of the degree of probability.

3.4.4 MUST and SHOULD

This section describes modal verbs *must* and *should*. Table 3.12 shows the uses and examples of modal verb *must*.

Table 3-12 Uses of Modal Verb MUST

Uses	Expressing	Examples
deduction and conclusions	express deductions and conclusion from facts	The meat is so big. She <i>must</i> be more than one pound.
obligation and necessity	express strong obligation and necessity	Drivers <i>must</i> wear seat belt.
rules and laws	use <i>must not</i> to express what is not permitted	You <i>must not</i> drive with expired license.
invitations and encouragement	express polite invitation or encouragement	You <i>must</i> come for our gathering.
criticism	express criticism in question form	<i>Must</i> you keep creating the noise?

(Sources from: Carter, R., McCarthy, M., Mark, G., & O’Keeffe, A., 2011: 305-309)

As shown in Table 3.12, modal verb *must* can be used to express i) deduction and conclusions; ii) obligation and necessity; iii) rules and laws; iv) invitations and encouragement and v) criticism (Carter et al, 2011: 305-309). This provides a framework to analyze the data of this study to differentiate the functions of the modal verb *must* presented by the speakers of the texts. For example, in “*The two important things we must do are control the spread of the disease and step up publicity to allay people’s fears, Health Department Chief Huang Qingtao said.*” (Leu, Lee, & Benitez, 2003), the modal verb *must* functions to express obligation and necessity of the degree of obligation.

Table 3.13 shows the uses and examples of modal verb *should*.

Table 3-13 Uses of Modal Verb SHOULD

Uses	Expressing	Examples
what is ideal of desired	express ideal or best thing in a situation	There <i>should</i> be more restaurants.
advice and suggestions	give advice or suggestions	You <i>should</i> leave now to catch the bus.
what is likely to happen	express what is likely to happen	There <i>should</i> be crowded in Christmas Eve.
conditional sentences	use in hypothetical conditional clauses to express possibility in a formal way	If you <i>should</i> decide to cancel the trip, you will need to pay the administrative cost.
thanking	use <i>shouldn't</i> to express thanking	Oh Mary, you <i>shouldn't</i> have! (thanks Mary to give a gift to you)
surprise of regret	express surprise of regret	I am sorry that she <i>should</i> be so distressed by what I told her.

(Sources from: Carter, R., McCarthy, M., Mark, G., & O'Keeffe, A., 2011: 478-481)

As shown in Table 3.13, modal verb *should* can be used to express i) what is ideal or desired; ii) advice and suggestions; iii) what is likely to happen; iv) conditional sentences; v) thanking and vi) surprise of regret (Carter et al, 2011: 478-481). This provides a framework to analyze the data of this study to differentiate the functions of the modal verb *should* presented by the speakers of the texts. For example, in “...however, WHO *should* also monitor the situation very carefully and *should*

facilitate the process to develop a vaccine against this new swine H1N1 influenza virus.”(World Health Organization, 2009b), the modal verb *should* functions to express advice or suggestion of the degree of obligation.

This section presents a description of the uses of modal verbs *may, might, can, could, shall, will, would, must* and *should*, based on a grammar book, *English grammar today: an A-Z of spoken and written grammar* by Carter, R., McCarthy, M., Mark, G., & O’Keeffe, A. (2011), which provides a comprehensive descriptions of the uses of modal verbs for the data analysis of the study.

3.5 The Systemic Model at Work

This section reviews the works and studies on systemic model of modality, aiming at showing the research territory and research gap between the previous studies and this study.

For studies of SFL approach to modality, there are many aspects, for examples, in the Bible (Wang, 2014); in legal writing of second language (L2) learners (Takahashi, 2009); teacher-to-teacher talk (Kosko & Herbst, 2012). Although these studies are not from public health and risk communication perspective, they adopt the framework of systemic model of modality, which serve as good examples for

this study. The followings are some examples of studies which study modality from a systemic functional perspective.

Hayashi (2002) analyses modality in fifteen periodical essays in the eighteenth-century, which covers topics of art, literature, philosophy, religion, ethics etc. The rationale for studying the Spectator is that Hayashi (2002) argues that it is important to examine how the essayists negotiate the interpersonal meanings or establish a relationship with the readers as Hayashi states “how the essayists express and negotiate inter-subjective positions to achieve their purpose of edifying the audience” (Hayashi, 2002: 24). The results reveal that a large number of modality categories of probability and usability in low and median value are used to express politeness to the readers. The high value modality are used infrequently so as “to keep the argument from being too tentative” (Hayashi, 2002: 43). The study demonstrates clearly for analyzing interpersonal meaning, using the system of modality in SFL approach, in terms of types, value, orientation and manifestation of modality. However, the texts being used in the study are limited to fifteen. The published paper did not mention the total number of words in the 15 selected sample texts. Hayashi (2002: 44) also mentioned that “it will be necessary to take account of a larger set of linguistic resources in order to get the whole picture of how interpersonal meanings are realized in the language of the Spectator”. In other words, this is the limitation of Hayashi’s study. Nevertheless, Hayashi’s work

provides a good example of the analysis of interpersonal meaning between the writers and readers using modality for the current study which has more sample texts being analyzed.

Kosko & Herbst (2012) conducted a study on the patterns of modality usage of the speech content of teacher-to-teacher talk from six teachers in a group. The study is based on SFL classification of modality. Results indicate that teachers used more modal verbs of probability and normativity (appropriateness). Kosko & Herbst (2012) conclude that the study provides a better understanding of the practice of modality in teacher talk. However, they mention that a qualitative analysis can be combined with quantitative study of modality analysis. Thus, this study adopts both approaches with the major focus on qualitative analysis of the presentation of modality in public health and risk communication in the discourses of the SARS epidemic and the swine influenza pandemic.

Wang (2014) investigates the mood and modality presented in the Bible from a SFL perspective, particularly focuses on the interpersonal relationship between God and his people. The study involves analysis of mood to study the relationship between God and his people and statistical modality analysis in terms of modalization and modulation, i.e. different types of modality, and also

interpersonal metaphors. Wang (2014) concludes that the study helps understand the interpersonal relationship between God and his people in Bible and it can extend to study other scope in human society. However, the study has not examined the aspect of *orientation* and *manifestation* of modality. As mentioned in Section 3.3.2, *orientation* shows the relation between the modality expression and the text producer. *Subjective* means the modality is related to the judgment of the speaker while *objective* modality is the opposite, irrespective of the speaker (Argamon et al, 2007). *Manifestation* asks the question “How is the modal assessment related to the event being assessed?” (Argamon et al, 2007: 819). However, *orientation* and *manifestation* are also important aspects of modality in understanding the interpersonal relationship between the speaker and the audiences, that the current study also investigates these two aspects of modality.

Yang and other colleagues (2015) study epistemic modality (degree of probability) in 25 English medical research articles from a SFL perspective with a major focus on the aspects of value and orientation of modality. The findings of the study indicate that low value of epistemic modality and subjective implicit orientation and manifestation are most frequent in research articles of their study. This implies that the writers of the articles present their claims through a tentative and objective way (Yang, Zheng, & Ge, 2015). Although the study only focuses on the epistemic modality (degree of probability), not all types of modality of SFL approach, the

study provides a detailed analysis of *values, orientation* and *manifestation* of modality with examples. This provides a good reference of this study, which also investigates these aspects of modality.

Aritonang (2014) conducted a qualitative study concerning interpersonal metaphor in presidential debate between Mitt Romney and Barack Obama. One of the objectives of Aritonang's study, which is related to this study, is to identify the interpersonal metaphor types expressed in the texts of the debate. Results related to this objective show that high, median and low values of metaphor of modality and modality of mood: question and command were identified in the study. Although the study is not on discourses of public health and communication, the study provides a detailed analysis with examples of interpersonal metaphor, which helps the interpretation and classification of interpersonal metaphor because the current study also captures modality operators that presented by interpersonal metaphors such as projecting clauses *I think...* or *it is likely that...* .

Yuyun (2010) study the arguments in the texts of a debate activity in senior high school in Bandung by using the framework of mood and modality. Results indicate that the debates show considerable uses of questions and command presented in declarative, probability of median value, subjective explicit modality and

realization of metaphorical modality. As stated by the author, the limitation of the study is that the materials used for the study is limited, only six speakers: three Affirmatives and three Negatives in a debate. It cannot represent the discourse of debates. It is suggested that further research is needed to study the mood and modality in school debate with a bigger sample size. Nevertheless, the study provides examples of analysis in terms of type, value, orientation and manifestation of modality, which is also the analytical framework of the current study.

All these studies are not from public health context, however, they provide good demonstrations and references in studying SFL model of modality of this study.

3.6 Chapter Summary

This chapter reviewed the linguistic analytical framework of the study, systemic functional approach to modality, which is a linguistic resource to reflect the choices of presentation in degree of certainty of the writer/speaker or how they commit themselves. First, some of the fundamental theories and concepts of SFL related to the analysis of the study were introduced. The interpersonal metafunction in SFL, the systems of *mood* and *modality* and their related grammatical metaphors were presented. This chapter also described the meanings and various uses of modal verbs. Works and studies of modality in systemic functional approach were also

reviewed in the final section of this chapter so as to indicate the research territory and research gap.

The next chapter will present the research methodology of this study.

Chapter 4 Research Methodology

4.1 Chapter Overview

In the previous chapter, some major theories and concepts of SFL, which are related to the theoretical and analytical framework of the current study, are presented. They include the three metafunctions, the interpersonal lexicogrammar and semantics, the systems of Mood, Modality and interpersonal grammatical metaphor. The meanings and various uses of modal verbs are also described in the previous chapter. Some works and studies related to the system model of Mood, Modality and interpersonal grammatical metaphors are reviewed for presenting the research territory and research gap of the thesis theme.

This chapter turns to describe the methodology of the study. Section 4.2 first revisits the research questions, research aims and objectives. Section 4.3 presents the research paradigm. Section 4.4 describes the research data and method of data collection. The data includes the press updates and press conferences held by the WHO, newspaper reports and website information concerning the 2003 SARS epidemic and the 2009 swine influenza pandemic. Section 4.5 presents the data compilation and data analysis procedures. Section 4.6 is a summary of the chapter.

4.2 The Research Questions and Research Objective Revisited

This section first revisits the research questions, aims and objectives of the study as the research methodology is designed for answering the research questions and fulfilling the research aims and objectives. As mentioned in Chapter 1 and Chapter 2, risk and uncertainty are inherent features in disease outbreaks (World Health Organization, 2005c) and the WHO also emphasized the importance of communication during public health crises such as the SARS epidemic and the swine influenza pandemic. This study attempts to contribute with a linguistic approach to study risk and uncertainty in public health and risk communication by adopting the SFL framework of modality. The following are the research questions for the study:

- (i) What are the choices and features of modality that present risk and uncertainty in public health and risk communication in the discourses of the 2003 SARS epidemic and the 2009 swine influenza pandemic?
- (ii) What functions does modality perform in public health and risk communication?
- (iii) How are the theories of modality being applicable to the study of public health and risk communication?

To answer these research questions, the study has the following aims and objectives:

- (i) To explore how modality and its expressions are used to present the features of risk and uncertainty in public health and communication during the 2003 SARS epidemic and the 2009 swine influenza pandemic;
- (ii) To examine the functions of modality in public health and risk communication;
- (iii) To contribute to existing theories of modality: integrate and explicate theories and analytical models of modality; and
- (iv) To enrich the body of knowledge on risk communication in public health through a linguistic analysis.

To answer the above research questions and to achieve the above aims and objectives, data are drawn mainly from the media, including the press updates and press conferences held by the WHO, newspaper reports, and website information, concerning the SARS epidemic in 2003 and the swine influenza pandemic in 2009. The research paradigm, data sets, methods of data collections, data compilation and data analysis procedures will be presented in the next sections.

4.3 Research Paradigm

The major paradigm of this study is functionalism, particularly focusing on using the SFL model of modality to investigate the features of uncertainty in public health and risk communication in the discourses of the SARS epidemic in 2003 and the swine influenza pandemic in 2009. The tagging of the data was done in Excel worksheet. Details of the procedures will be presented in Section 4.5. This study adopts the method of text analysis with a major focus on the qualitative analysis of the discourses of the two events. The unit of analysis is at a clause level, that is, a clause by clause analysis of the modality item presented in a clause. As the main objective of this study is not to compare quantitatively about the modality presented in the two events, the modality items of the data sets collected for the study were also counted so as to provide a general overview of the number of modality items presented in the two events.

4.4 Research Data and Methods of Data Collection

This section introduces the data and methods of data collection of the study. There are three main sources of data (i) Press updates provided by the WHO concerning the SARS epidemic and press conferences held by the WHO concerning the swine influenza pandemic; (ii) Newspaper reports of the two incidents; and (iii) Website information concerning the SARS and swine influenza. Table 4.1 shows the total number of texts and total number of words in each data set.

Table 4-1 Number of Texts and Number of Words in Data Sets

	Total no. of texts	Total no. of words
Press Updates of the SARS Epidemic	30	19,837
Newspaper Reports of the SARS Epidemic	43	26,088
Website Information the SARS Epidemic	4	2,980
Press Conferences of the Swine Influenza Pandemic	32	154,772
Newspaper Reports of the Swine Influenza Pandemic	35	16,300
Website Information of the Swine Influenza Pandemic	4	3,516
Total:	148	223,493

As shown in Table 4.1, there are in total 148 texts and 223,493 words in the data sets collected for this study. Table 4.2 presents the length of the texts.

Table 4-2 Length of Texts in Data Sets

Data Set	Longest Text (no. of words)	Shortest Text (no. of words)
Press Conferences of the Swine Influenza Pandemic	7728	2689
Press Updates of the SARS Epidemic	1125	234
Newspaper Report of the Swine Influenza Pandemic	710	198
Newspaper Report of the SARS Epidemic	1184	242
Website Information of the Swine Influenza Pandemic	2061	171
Website Information of the SARS Epidemic	930	460

As shown in Table 4.2, the longest text is a press conference of the swine influenza pandemic with a word count of 7728 words. The shortest is a text of the website information of the SARS epidemic with 930 words in total.

The study does not raise any ethical issues such as informed consent because the study subjects are the texts selected for the study and there were no human beings as research participants. The study does not have any infringement of copyright because all the texts in the data set are openly accessed via the internet. For examples, the Press Conferences and the Press Updates held by the WHO

concerning the swine influenza pandemic and the SARS epidemic were accessed via the website of the WHO. The Newspaper Reports were accessed by WiseNews Search of the library website of the Hong Kong Polytechnic University. The Website Information data of concerning the two diseases were accessed via the websites of the health authorities selected for the study. Also, the sources of the texts are addressed in the references or in-text citations of the thesis.

The texts selected for this study were collected in the year of 2012 and 2013. As mentioned previously, the texts selected for the study for data analysis are from three major sources: Press Conferences and Press Updates of the WHO, Newspaper Reports, and Website Information concerning SARS and swine influenza. Accordingly, each data set and its data collection methods and procedures, and the rationale for choosing the data will be presented in the following three subsections.

4.4.1 The Authoritative Voice: The World Health Organization (WHO)

The first data source is from the WHO. The rationale for selecting data from the WHO is, as its name, is a world health organization. Most of the health organizations in the world follow the information and instructions of the WHO for mitigation and control of diseases during epidemics or pandemics. The WHO's work aims to promote, maintain and improve the World's health. As stated in its

website, the primary role of the WHO is “to direct and coordinate international health within the United Nations’ system” (World Health Organization, 2016). One of the key working areas of the WHO is to keep surveillance and response to health emergencies by “leading and coordinating the health response in support of countries, undertaking risk assessments, identifying priorities and setting strategies, providing critical technical guidance, supplies and financial resources as well as monitoring the health situation” (World Health Organization, 2016). In other words, the WHO is an authoritative voice to provide information about public health emergencies such as the SARS epidemic and the swine influenza pandemic.

The data from the WHO are from two sources: the press updates provided by the WHO concerning the SARS epidemic and the press conferences held by the WHO concerning the swine influenza pandemic. For the data set of press updates, it consists of 30 issues of press updates concerning the SARS epidemic. The press updates were selected by convenient sampling from March to December 2003 via the websites of the WHO. For the data set of press conferences, this consists of 32 transcripts of press conferences concerning the swine influenza pandemic held by the WHO. The press conferences were selected by convenient sampling from April to December 2009 via the websites of the WHO. Apart from reporting the most recent information of the swine influenza pandemic, public health experts were present in the press conferences to answer the questions from the journalists from

all parts of the world. Details about the data compilation and analysis procedures will be presented in Section 4.5.

4.4.2 Newspaper Reports

The second data source is the newspaper reports concerning the two events. Most of the newspapers in Hong Kong are written in Chinese language and the information delivered by the WHO concerning the two incidents is in English language. Thus, the newspaper reports were selected from the *South China Morning Post*, a major English language newspaper in Hong Kong so as to maintain consistency in the interpretation of modality in English language.

For the newspaper reports of the SARS epidemic, the data set consists of 43 newspaper reports from February to April 2003. For newspaper reports of the swine influenza pandemic, the data set consists of 35 newspaper reports from April to October 2009. The newspaper reports were collected by convenient sampling from online access to the Library database of WiseNews, which was granted by the Hong Kong Polytechnic University. As one of the data sets of the study is the newspaper reports of the two events, the words searched on the database of WiseNews include severe acute respiratory syndrome, SARS, swine influenza pandemic, H1N1.

4.4.3 Relevant Website Information

The data from the website concerning the diseases of SARS and swine influenza were collected via the websites of the four major health organizations including one local health organization and three other international health organization and public health institutions. The following are the four institutions selected for website information data sets:

- i) The Department of Health of Hong Kong
- ii) The World Health Organization (WHO)
- iii) The Centers for Disease Control and Prevention (CDC) of the United States
- iv) The National Health Services (NHS) of the United Kingdom

There were eight texts for website information: four texts concerning the SARS and four texts concerning the swine influenza. The following are the URLs of the websites concerning SARS and swine influenza:

SARS: Department of Health, Hong Kong

<http://www.chp.gov.hk/en/content/9/24/47.html>

SARS: The World Health Organization (WHO)

<http://www.who.int/csr/sars/clinical/en/>

SARS: the Centers for Disease Control and Prevention (CDC)

<https://www.cdc.gov/sars/>

SARS: The National Health Services (NHS)

<http://www.nhs.uk/Conditions/SARS/Pages/Introduction.aspx>

Swine influenza: Department of Health, Hong Kong

<http://theme.gov.hk/en/theme/fightpandemic/facts.htm>

Swine influenza: The World Health Organization (WHO)

<http://www.who.int/ith/diseases/swineflu/en/>

Swine influenza: the Centers for Disease Control and Prevention (CDC)

<http://www.cdc.gov/flu/swineflu/>

Swine influenza: The National Health Services (NHS)

<http://www.nhs.uk/conditions/pandemic-flu/Pages/Introduction.aspx>

4.5 Data Compilation and Data Analysis Procedures

The previous section introduces the data and the data collection methods. This section presents the procedures of data compilation and data analysis.

4.5.1 Data Compilation

As mentioned in the previous section, the data collected from the WHO, newspaper reports and website information concerning the two incidents were either in PDF

(Portable Document Format) or HTML (Hyper Text Markup Language) format, which does not allow for further editing in analytical procedures. Accordingly, before going through the data analysis, the data collected required a procedure of compilation. The first step of the data compilation was to convert the data from the PDF or HTML format to WORD (.doc) format.

The second step was identification of clauses of the texts. The study is a text analysis within the framework of SFL focusing on modality to analyze different level of certainty presented in the 2003 SARS epidemic and the 2009 swine influenza pandemic. In SFL, the basic unit of language is the clause. The original texts of the data comprise of sentences. A sentence may comprise of more than one clause or what is called a clause complex in SFL. Accordingly, each text was divided into clauses based on the framework of systemic functional linguistics. After the clauses of each text were identified, the final step of the data compilation was to convert each text from WORD format to individual worksheet of the Microsoft Office EXCEL 2007 for data analysis.

4.5.2 Words counts and Modality Operators counts

The number of words of each text and the frequency of occurrences of the modality operators were counted in order to obtain a general statistical finding of the data.

The steps are as follows:

Step 1: The total number of words in each text of the data sets was obtained by using the ‘Word Count’ function in Microsoft Office Word 2007. After the data of total number of words for each text was obtained, they were entered in Excel for preparation of general statistical findings of all the data sets.

Step 2: The frequency of occurrences of modality operators such as modal verbs, modal adjuncts and were obtained in the Adobe Reader XI version. The function ‘Advanced Search’ was used to search the frequency of occurrences of modality operators. For example, enter ‘*could*’ in the search box and choose the criteria of ‘Whole words only’. The results displayed the total number of occurrences with the location path of each result in the document searched. The search items include (i) Modal verbs (e.g. *can, could, shall, will, would, may, might, should, must*); (ii) Mood adjuncts (e.g. *probably, possibly, certainly* etc.); (iii) Grammatical (interpersonal) metaphors (e.g. *I guess, I think, I believe, it is likely, it is certain* etc.); (iv) modal Noun group: noun (*certainty, possibility* etc.) and adjective (*possible, probable* etc.). After the numbers of the modal operators were obtained, they were entered in Excel for preparation of statistical findings of the modality operators.

4.5.3 Data Analysis on Excel Worksheet

As the primary objective of this study is to investigate how modality and its expressions are used to express risk and uncertainty in public health and risk

communication during the SARS epidemic and the swine influenza pandemic, each text collected in the data sets was analyzed according to the following analytical procedures to get the presentation of modality. There are nine parts (A to I) in the data analysis in Excel worksheet. Table 4-3 describes the analytical procedures in the Excel worksheet.

Table 4-3 Analytical Procedures

Step	Analytical Procedures
	CN: Identification of clause number
	Counting number of clause(s) in each sentence for summation (Σ) of the total clauses in each text.
	Clauses for identification of modality operators; modality assessment; Mood type and speech function; and polarity
	Identification of modality operators: modal auxiliaries, Mood adjuncts, interpersonal metaphor, projecting clause, noun group (noun), noun group (adjective)
	Expression of modality
	Identification of modality type (probability, usuality, obligation, inclination, ability); value (high, median, low), modality type-value, orientation (subjective, objective) and manifestation (implicit, explicit)
	Identification of mood type: declarative, imperative, yes/no-interrogative, wh-interrogative
	Identification of speech function: statement, offer, command and question
	Identification of polarity (positive, direct negative- direct, transferred negative)

As shown in Table 4.3, there are nine analytical procedures from Step A to I. For example, Step A presents the identification of clause. As mentioned in Section 4.4.1, the basic unit of language is the clause in SFL framework. The texts collected for the study were divided into clauses based on the SFL framework.

Each text with clauses identified was exported to individual Excel worksheet for analysis. Each clause was labeled with numbers. Figure 4-1 shows the steps of identification of clause number and how the total number of clauses of each text was counted.

Text 4: WHO PC (28042009)		
CN	Subtotal	Clause
64.1	1	And then during those non-peak periods it often appears very quiet.
65.1		So I
65.2		duction of a new virus like this,
65.3		<<w transmit among people>>,
65.4		I think
65.5		it will be very hard for us [[to know whether this]],
65.6		even if activity goes down
65.7	7	and becomes quiet over the next few weeks, very hard to know [[whether this actually disappeared until several months have gone by]].
66.1		This is infection
66.2	2	and that is something [[that we would be on the look out for]].
	10	

Figure 4-1
Identification of
Clause Number
and Clause
Counts

Total number of clauses of each text is the summation of the subtotal of the clauses.

As shown in Figure 4.1, the identification of each clause of the text and counting of the total number of clauses of each text were done in Excel worksheet. For example, CN 65.2 is the clause (CN stands for Clause Number, 65 stands for the sentence number while 2 is the clause number of the sentence). In this way, the subtotal of the clause for each sentence is counted and the total number of clauses for the whole text can be obtained by summation (Σ) of the subtotal in Excel worksheet.

4.5.4 Identification of Modality Operators

As mentioned in previous section, the clause number of each clause and the total number of clauses in each text were identified and counted. Then, each clause was analysed manually to capture the presence of modal operator. As mentioned in Section 3.3, modality is realized by modal verbs, adjuncts or interpersonal metaphors presented by projecting clauses such as *I think...* or *it is likely that....* Figure 4.2 shows the identification of modality operators for each clause in Excel worksheet.

Figure 4-2 Identification of Modality Operators

Text 4: WHO PC (28042009)									
CN	Subtotal	Clause	Modal Aux	Mood Adjunct	Interpersonal Metaphor – e.g. I think...	Interpersonal metaphor – e.g. it is likely that...	Noun Group: Noun	Noun Group: Adjective	Expressing
64.1	1	And then during those non-peak periods it <i>often</i> appears very quiet.		often					
65.1		So <i>I think</i>			I think				possibility
65.2		that when we see the introduction of a new virus like this,							
65.3		<<which clearly is able to transmit among people>>,							
65.4		<i>I think</i>			I think				possibility
65.5		it <i>will</i> be very hard for us [[to know whether this]],	will						prediction
65.6		even if activity goes down							
65.7	7	and becomes quiet over the next few weeks, very hard to know [[whether this virus is actually disappeared until several months have gone by at the very least]].							
66.1		That is the nature of this infection							
66.2	2	and that is something [[that we <i>would</i> be on the look out for]].	would						prediction
67.1		And here again, <i>I think</i>			I think				possibility
67.2		that we <i>can</i> look to avian influenza	can						possibility
67.3		and if you look at that virus							
67.4	4	you <i>will</i> see [[how it seemed to have disappeared for periods / and then reappeared with a vengeance]].	will						prediction
68.1	1	And so it is very hard to know [[when something like this disappears]].							
	15								

As shown in Figure 4.2, the modality operators were categorized according to modal verbs (e.g. *can, could, shall, will, would, may, might, should, must*); modal adjuncts (e.g. *probably, possibly, certainly* etc.); grammatical (interpersonal) metaphors presented by projecting clauses (e.g. *I guess, I think, I believe* etc. or *it is likely, it is certain* etc.); Modal noun group: noun (*certainty, possibility* etc.) and adjective (possible, probable etc.). Each modal operator identified in a clause was categorized for its function of expression such as the modal operator is expressing prediction, possibility etc.

4.5.5 Assessment of Type, Value, Orientation and Manifestation of Modality

The previous section presents the procedures of the identification of the modal operator in each clause. This section introduces the procedures of assessment of the *type, value, orientation* and *manifestation* of modality for each modality operators captured in the text. Each modality operator presented in a clause was assessed according to the analytical framework of SFL model of modality: *types of assessment, value, orientation* and *manifestation* (Halliday & Matthiessen, 2014; Argamon et al, 2007) as presented in Section 3.2.2. As mentioned in Section 3.3.2 of Chapter 3, there are five main types of modality: modalization: *probability, usuality*; modulation: *obligation, readiness-inclination, ability* (Butler, 2003;

Halliday & Matthiessen, 2014; Thompson, 2014:70-71). Modality is expressed or realized through different ways such as auxiliary verbs or modal verbs (e.g. *should*, *may*, *can*), modal adjuncts (e.g. *perhaps*, *probably*, *possibly*), interpersonal metaphors presented by projecting clauses (e.g. *I think...* or *it is likely that...*) (Halliday & Matthiessen, 2014). For example, degree of probability is usually realized by modal verbs *may*, *might* etc., modal adjuncts such as *probably*, *possibly* etc., interpersonal metaphors presented by projecting clauses such as *I think* or *it is possible that...* All these are examples of expressions of modality. When each expression of modality or modal operator was identified in the analysis, it would be categorized into the aspects of *type*, *values*, *orientation* and *manifestation* of modality. For example, *value* of modality is based on three scales: high, median or low to indicate higher or lower degree of certainty in probability. For example, in “*It is way too early right now to predict whether we might see a mild pandemic or a severe pandemic...*” (World Health Organization, 2009f), the use of modal *might* is to signal a lower degree of certainty of the proposition. The example “*The two important things we must do are control the spread of the disease and step up publicity to allay people’s fears, Health Department Chief Huang Qingtao said.*” (Leu et al., 2003) shows that the use of modal *must* is to signal a higher degree of obligation in a command of proposal. Thus, the *value* of modality in each modal expression will be categorized into high, median and low, based on the values of the modal operator as illustrated in the above examples.

Figure 4.3 illustrates the steps of assessment of the *type*, *value*, *manifestation* and *orientation* of modality operators of each clause in the texts of the study.

Text 4: WHO PC (28042009)

CN	Subtotal	Clause	Modality Type	Value	Type_Value	Orientation/ Manifestation
64.1	1	And then during those non-peak periods it <i>often</i> appears very quiet.	usuality	median	UM	Objective/ Implicit
65.1		So <i>I think</i>	probability	median	PM	Subjective/ Explicit
65.2		that when we see the introduction of a new virus like this,				
65.3		which clearly is able to transmit among people,				
65.4		<i>I think</i>	probability	median	PM	Subjective/ Explicit
65.5		it <i>will</i> be very hard for us to know whether this,	probability	median	PM	Subjective/ Implicit
65.6		even if activity goes down				
65.7	7	and becomes quiet over the next few weeks, very hard to know [whether this virus is actually disappeared until several months have gone by at the very least.				
66.1		That is the nature of this infection				
66.2	2	and that is something that we <i>would</i> be on the look out for.	probability	median	PM	Subjective/ Implicit
67.1		And here again, <i>I think</i>	probability	median	PM	Subjective/ Explicit
67.2		that we <i>can</i> look to avian influenza	probability	low	PL	Subjective/ Implicit
67.3		and if you look at that virus				
67.4	4	you <i>will</i> see how it seemed to have disappeared for periods / and then reappeared with a vengeance.	probability	median	PM	Subjective/ Implicit
68.1	1	And so it is very hard to know when something like this disappears.				
	15					

Figure 4-3 Systemic Model of Modality: Types of Assessment, Value, Orientation and Manifestation

Figure 4.3 shows the procedures of annotation and categorization of modality operators. Each clause in individual text was scanned manually to annotate the function of expression and categorize the modality operators according to the SFL approach. For *Type*, it includes Usuality, probability, Obligation, Inclination and Ability. For *Value*, it includes high, median and low. For *Type-Value*, it captures both the types and values of modality operators (e.g. PM indicates probability type of median value). For *Orientation* and *Manifestation*, it includes Subjective and Objective, Implicit and Explicit respectively. For example, in CN 66.1 “*That is the nature of this infection...*”, there is no modal operator. In CN66.2 “*....that is something that we would be on the lookout for*”, the modal operator is the modal verb ‘would’, which is used to express a prediction (Carter et al, 2011). The modality *type* is probability, *value* is median, modality type and value is probability-median (PM), *orientation* and *manifestation* is subjective-implicit.

4.5.6 Identification of Mood Type and Speech Function

This section introduces the procedures of the identification of mood types and speech functions of the clauses with modality operators in the Excel worksheet. Figure 4.4 presents the identification and categorization of mood type, speech function and polarity in the clauses of the data.

Text 4: WHO PC (28042009)					
CN	Subtotal	Clause	Mood Type	Speech Function	Polarity
64.1	1	And then during those non-peak periods it <i>often</i> appears very quiet.	declarative	statement	positive
65.1		So <i>I think</i>	declarative	statement	positive
65.2		that when we see the introduction of a new virus like this,			
65.3		which clearly is able to transmit among people,			
65.4		<i>I think</i>	declarative	statement	positive
65.5		it <i>will</i> be very hard for us to know whether this,	declarative	statement	positive
65.6		even if activity goes down			
65.7	7	and becomes quiet over the next few weeks, very hard to know whether this virus is actually disappeared until several months have gone by at the very least.			
66.1		That is the nature of this infection			
66.2	2	and that is something that we <i>would</i> be on the look out for.	declarative	statement	positive
67.1		And here again, <i>I think</i>	declarative	statement	positive
67.2		that we <i>can</i> look to avian influenza	declarative	statement	positive
67.3		and if you look at that virus			
67.4	4	you <i>will</i> see how it seemed to have disappeared for periods / and then reappeared with a vengeance.	declarative	statement	positive
68.1	1	And so it is very hard to know when something like this disappears.			
	15				

Figure 4-4 Identification of Mood System, Speech Functions and Polarity

As presented in Figure 4.4, each clause with modality operator was categorized according to Mood type and speech function of SFL. As presented in Chapter 3, the system of MOOD in SFL comprises three mood types: declarative, imperative and interrogative (yes/no, WH-) (Martin, Matthiessen and Painter, 2010). Also, there are four types of speech function: *Statement*, *Question*, *Offer* and *Command* (Halliday & Matthiessen, 2014).

For example, in CN 64.1 “*And during those non-peak periods it often appears very quiet*” (World Health Organization, 2009c) (WHO Press Conference dated 28-04-2009), the mood type is declarative; the speech function is statement; the polarity is positive. The frequencies of occurrences of mood type, speech functions and polarity were counted in Excel worksheet.

4.5.7 Presentation of Extracts in Findings of the Study

The qualitative findings of modality in different topics of public health communication and risk communication will be presented in Chapter 6 and 7 respectively. For each topic of public health communication and risk communication, various extracts from the data sets are analyzed and discussed at greater length, for example, how modality presented by different modal operators e.g. modal verbs, modal adjuncts, interpersonal metaphors etc. are expressed in the

discourses of the two events. Each extract presented in the subsections of Chapter 6 and 7 will include two tables (as shown below) to illustrate the clause(s) and the modality assessment. The first table shows the clause number (CN) and the text content of the clause(s). The second table presents the modality assessment.

SARS: DH website

Clause No. (CN)	Clause
1.1	Severe acute respiratory syndrome (SARS) is a viral respiratory infection caused by a coronavirus (SARS-CoV).
2.1	Symptoms usually appear within 2 - 7 days
2.2	after contracting the disease,
2.3	but the incubation period <i>can</i> be up to approximately 10 days.

Clause No. (CN)	Modal Operators	Expressing	Modality Type	Value	Orientation/ Manifestation	Mood Type	Speech Function	Polarity
2.1	usually	frequency	usuality	median	Objective/ Implicit	declarative	statement	positive
2.3	can	potentiality	probability	low	Subjective/ implicit	declarative	statement	positive

As presented in Section 4.4.3, each modal operator presented in a clause of the data set is assessed according to the analytical framework of SFL model of modality. Accordingly, the second table shows the modality operators identified in the clauses. For example in CN2.1 a modality operator *usually* is identified, the modality assessment includes: *type of assessment, value, orientation and manifestation; mood type, speech function and polarity* of the clause. The modality type is usuality of median value and the orientation and manifestation is objective

implicit. If the modality operator does not fall into the categories of the SFL framework, a term ‘not classified’ will be filled in the table. For example, those modal nouns (e.g. *possibility*) and modal adjectives (e.g. *possible*) that are not presented in projecting clauses, they are not classified in the aspects of *orientation* and *manifestation* in SFL theory of modality. This will be further discussed in the examples shown in Chapter 6 and 7.

4.6 Chapter Summary

This chapter provided an overview of the research methodology of the study. First, the research questions and research aims and objectives were revisited in order to have a more clear idea how the research is designed. It was then followed by a description of the research data and method of data collection. The data included the press updates and press conferences held by the WHO, newspaper reports and website information concerning the 2003 SARS epidemic and the 2009 swine influenza pandemic. Then, the data compilation and data analysis procedures were presented in the final section.

The next chapter turns to present the findings and results of the study.

Chapter 5 Quantitative Findings of the Study

5.1 Chapter Overview

This chapter together with Chapter 6 and Chapter 7 will present the findings of the study. This chapter mainly presents the quantitative findings of the study. The qualitative findings presented with different topics of public health and risk communication will be introduced in Chapter 6 and Chapter 7 respectively.

As mentioned in Section 1.5, one of the main objectives of the study is to explore how modality and its expressions are used to present risk and uncertainty in public health and risk communication during the 2003 SARS epidemic and the 2009 swine influenza pandemic. The major focus of the study is the interpretation and description in the qualitative findings presented in Chapter 6 and 7. The study is of exploratory in nature in terms of quantitative part of the findings. It is not the major focus of the study to compare the quantitative findings of modality presented in the two events. Accordingly, this chapter provides a description of the frequency of occurrences of modality presented in the data selected for this study.

As mentioned in Section 4.3, the data sets of the study include the press updates and press conferences held by the WHO, newspaper reports and website

information concerning the 2003 SARS epidemic and the 2009 swine influenza pandemic. This chapter presents the frequency of occurrences of modality and its expression in various data sets. Section 5.2 presents the general statistics such as the total number of texts, and the total number of words and clauses in each data set. As mentioned in Section 3.3, SFL model of modality is categorized into four aspects including *type of assessment*, *value*, *orientation* and *manifestation*. Thus, Section 5.3 presents the frequency of occurrences of modality in terms of the four aspects in data sets of the SARS epidemic. Section 5.4 presents the findings of modality in the swine influenza pandemic. Section 5.5 provides a summary of the quantitative findings of the study.

5.2 General Statistics of the Data Sets

As mentioned in Section 4.3, there are six data sets in the study. For the SARS epidemic, the data sets include press updates provided by the WHO, newspaper reports and website information concerning SARS. For the swine influenza pandemic, the data sets include the transcripts of press conferences held by the WHO, newspaper reports and website information concerning swine influenza. The aim of this section is to provide the general statistics, such as the total number of texts, and the total number words and clauses in each data set taken from the 2003 SARS epidemic and the 2009 swine influenza pandemic.

5.2.1 General Statistics of the 2003 SARS Epidemic Data Sets

This section provides an overview of the general statistics of the data sets of the 2003 SARS epidemic. Table 5.1 shows the total number of texts, words and clauses in each data set concerning the 2003 SARS epidemic.

Table 5-1 General Statistics of the 2003 SARS Epidemic Data Sets

	Total no. of texts	Total no. of words	Total no. of clauses
Press Updates	30	19,837	1,219
Newspaper Reports	43	26,088	1,994
Website Information	4	2,980	206
Total:	77	48,905	3,419

As shown in Table 5.1, the SARS epidemic data sets consists of 77 texts, with a total number of 48,905 words in 3,419 clauses for analysis. The texts are from three sources: press updates of the WHO, newspaper reports and website information concerning SARS. The Press Updates consists of 30 texts provided by the WHO concerning the SARS epidemic. There are in total 19,837 words in 1,219 clauses in total for the Press Updates. The Newspaper Reports consist of 43 texts selected from the *South China Morning Post*, the major English newspaper in Hong Kong. The 43 texts selected contain a total number of 26,088 words in 1,994 clauses. The Website Information consists of four texts from four sources, namely the

Department of Health (DH) of Hong Kong, the Centers for Disease Control and Prevention (CDC) of the United States, the National Health Services (NHS) of the United Kingdom, and the World Health Organization (WHO). The texts selected in Website Information data set contain a total number of 2,980 words in 295 clauses.

5.2.2 General Statistics of the 2009 Swine Influenza Pandemic Data Sets

This section provides an overview of the general statistics of the data sets of 2009 swine influenza pandemic. Table 5.2 shows the total number of texts, words and clauses in each data set concerning the 2009 swine influenza pandemic.

Table 5-2 General Statistics of the 2009 Swine Influenza Pandemic Data Sets

	Total no. of texts	Total no. of words	Total no. of clauses
Press Conferences	32	154,772	12,206
Newspaper Reports	35	16,300	1,473
Website Information	4	3,516	295
Total:	71	174,588	13,974

As shown in Table 5.2, the swine influenza pandemic data set consists of 71 texts, with a total number of 174,588 words in 13,974 clauses for analysis. The texts are from three sources: press conferences of the WHO, newspaper reports and website

information concerning the swine influenza pandemic. The Press Conferences consists of 32 texts from the WHO concerning the swine influenza pandemic. The 32 texts selected contain a total number of 154,772 words in 12,209 clauses. This data set is the biggest in terms of the total number of words and clauses for analysis. Thus, more extracts were selected to demonstrate the use of modality to express public health and risk communication in Chapter 6 and Chapter 7 respectively. There are dialogues between the WHO officials and the reporters and journalists attending the press conferences. Nevertheless, the WHO officials dominated in the conversation. The Newspaper Reports consist of 35 texts selected from the *South China Morning Post*. The 35 texts selected contain a total number of 16,300 words in 1,473 clauses. The Website Information consists of four texts from four sources, namely the Department of Health (DH) of Hong Kong, the Centers for Disease Control and Prevention (CDC) of the United States, the National Health Services (NHS) of the United Kingdom, and the World Health Organization WHO). The texts selected in Website Information data set contain a total number of 3,516 words in 295 clauses.

The above two sections provides a description of the general statistics such as the total number of texts of the data sets, and the total number of words and clauses in each data set selected for the study. As the Press Conferences of the swine influenza pandemic consists of more words and clauses for analysis when

compared to other data sets of the study, more examples are taken from Press Conferences for illustration of how modality and its expression are used to express public health and risk communication in Chapter 6 and Chapter 7.

The next section presents the findings of modality in the SARS epidemic.

5.3 Modality in the SARS Epidemic

As mentioned in Section 3.3, SFL model of modality is categorized into four aspects including *type of assessment*, *value*, *orientation* and *manifestation*. Thus, Section 5.3.1 first presents the frequency of modality types and their values in the SARS epidemic data sets and it is followed by the aspects *orientation* and *manifestation* of modality in Section 5.3.2. Section 5.3.3 presents the frequency of occurrences of modal verbs (e.g. *can*, *may* etc.) as modal verbs are generally used by the speakers to express modality, as shown in Section 5.3.1 and Section 5.3.2.

5.3.1 Modality Type and its Value

This section first focuses on the presentation of *type of assessment* of modality in the data sets of the SARS epidemic. As mentioned in Section 3.3 of Chapter 3, there are five types of modality in SFL model. Table 5.3 summarizes the frequency of occurrences of modality types of *probability*, *usuality*, *obligation*, *inclination* and *ability* in the various data sets.

Table 5-3 Frequency of Types of Modality in the SARS Epidemic

	Probability	Usuality	Obligation	Inclination	Ability	Total
Press Updates (n=294)	280 (95.2%)	1 (0.3%)	12 (4.1%)	1 (0.3%)	0 (0%)	294 (100%)
Newspaper Reports (n=420)	331 (78.8%)	11 (2.6%)	70 (16.7%)	5 (1.2%)	3 (0.7%)	420 (100%)
Website information (n=51)	36 (70.6%)	12 (23.5%)	3 (5.9%)	0 (0%)	0 (0%)	51 (100%)
Total: (n=762)	647 (84.6%)	24 (3.1%)	85 (11.1%)	6 (0.8%)	3 (0.4%)	765 (100%)

As shown in Table 5.3, the *probability* type of modality is overriding in all the data sets of the SARS epidemic. Overall, 84.6% (647 out of 765) of *probability* type of the occurrences in total is presented. For individual data set, 95.2% (280 out of 294) of *probability* type is presented in Press Updates. In Newspaper Reports, *probability* type accounts for 78.8% (331 out of 420) of the occurrences. In Website Information, 70.6% (36 out of 51) of *probability* type is presented. The second highest frequency is *obligation*, accounting for 4.1% (12 out of 294) and 16.7% (70 out of 420) of the occurrences in Press Updates and Newspaper Reports respectively. In Website Information, the second highest frequency is *usuality*,

accounting for 23.5% (12 out of 51) of the occurrences. The analysis reveals that *probability* is the most frequent type of modality presented in the discourses of the SARS epidemic selected for the study.

Probability as the dominant type of modality is also displayed in the frequency of occurrences in total number of clauses. Table 5.4 shows the frequency of occurrences of various modality types in total number of clauses in the data sets of the SARS epidemic.

Table 5-4 Frequency of Modality Type in Total Number of Clauses in the SARS Epidemic

	Probability	Usuality	Obligation	Inclination	Ability
Press Updates (total number of clauses: 1219)					
Occurrences (n=1219)	280 (23.0%)	1 (0.1%)	12 (1.0%)	1 (0.1%)	0 (0%)
Frequency in total number of clauses (%)	23.0	0.1	1.0	0.1	0.0
Newspaper Reports (total number of clauses: 1994)					
Occurrences (n=1994)	331 (16.6%)	11 (0.6%)	70 (3.5%)	5 (0.3%)	3 (0.2%)
Frequency in total number of clauses (%)	16.6	0.6	3.5	0.3	0.2
Website information (total number of clauses: 206)					
Occurrences (n=206)	36 (17.5%)	12 (5.8%)	3 (1.5%)	0 (0%)	0 (0%)
Frequency in total number of clauses (%)	17.5	5.8	1.5	0.0	0.0

As shown in Table 5.4, the frequency of *probability* type in total number of clauses is also overriding in all the data sets of the SARS epidemic. In Press Updates, 23.0% (280 out of 1219) of the occurrences of *probability* types in total number of clause is presented. *Probability* type is also the highest in frequency in the data sets of Newspaper Reports and Website Information, accounting for 16.6% (331 out of

1994) and 17.5% (36 out of 206) of the occurrences in total number of clauses respectively. Such high frequency of occurrences of probability type of modality indicates that the SARS epidemic shows uncertainty presented by the language use in the discourse.

The second aspect of modality in SFL model is the *value* of modality. As mentioned in Section 3.3, there are three values of modality: high, median and low. As indicated in the previous two tables, Table 5.3 and Table 5.4, *probability* is the most dominant type of modality presented in the data sets of the SARS epidemic. Thus, Figure 5.1 shows the frequency of occurrences of the values of probability in the three data sets.

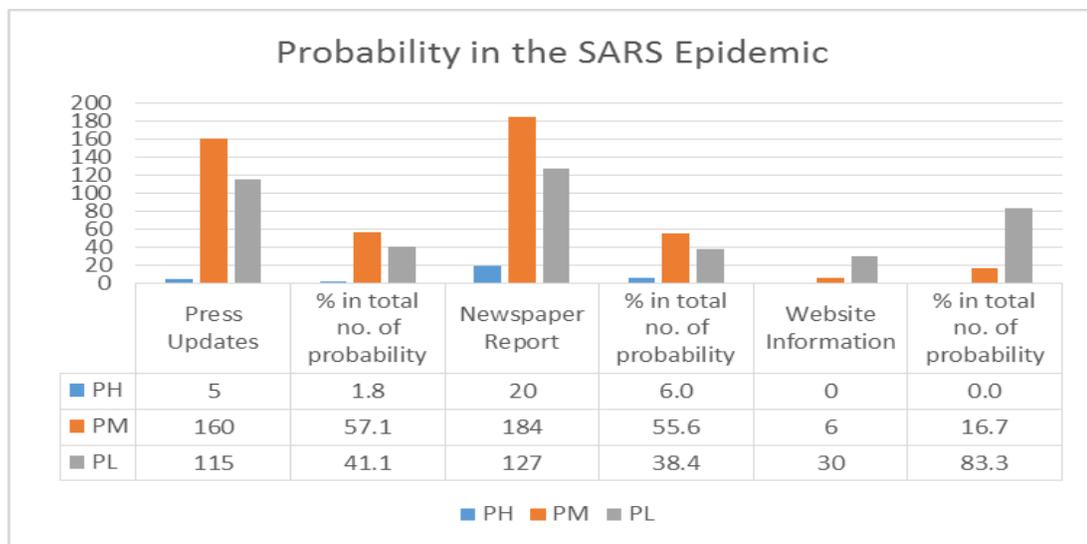


Figure 5-1 Values of Probability in the SARS Epidemic

Key: PH: probability-high; PM: probability-median; PL: probability-low

As indicated in Figure 5.1, PH stands for probability of high value, PM stands for probability of median value and PL stands for probability of low value. Probability-median (PM) is the highest frequency in data sets of Press Updates and Newspaper Reports of the SARS epidemic, accounting for 57.1%, 55.6% of the occurrences respectively. For the data set of Website Information, the highest frequency of occurrence is the probability low, accounting for 83.3%. This indicates that the speakers of the Press Updates and the Newspaper Reports use the strategy to state about the probability using median value and avoid the outer value, high or low. Instead, the speakers of the Website Information adopt the strategy to state the probability in low value.

5.3.2 Orientation and Manifestation of Modality

After showing the frequency of occurrences of *type of assessment* and *value* of modality presenting in the data sets of the SARS epidemic, this section turns to present the aspects of *orientation* and *manifestation* of modality. Table 5.5 shows the *orientation* and *manifestation* of modality presented in the three data sets.

Table 5-5 Orientation and Manifestation of Modality in the SARS Epidemic

	Subjective -Implicit	Subjective -Explicit	Objective- Implicit	Objective- Explicit	Not- Classified	Total
Press Updates	178 (60.5%)	0 (0%)	4 (1.4%)	0 (0%)	112 (38.1%)	294 (100%)
Newspaper Reports	362 (86.2%)	19 (4.5%)	19 (4.5%)	6 (1.4%)	14 (3.3%)	420 (100%)
Website information	34 (66.7%)	0 (0.0%)	12 (23.5%)	3 (5.9%)	2 (3.9%)	51 (100%)
Total:	574 (75.0%)	19 (2.5%)	35 (4.6%)	9 (1.2%)	128 (16.7%)	765 (100%)

As mentioned in Section 3.3, the aspects of *orientation* and *manifestation* of SFL model of modality are classified into four main categories: i) *subjective implicit* as realized by the uses of modal verbs e.g. *can, may* etc.; ii) *objective implicit* as realized by modal adjuncts e.g. *probably, usually* etc.; iii) *subjective explicit* as realized by interpersonal metaphors e.g. *I think, I believe* etc.; and iv) *objective implicit* as realized by projecting clauses e.g. *it is possible that...* (Halliday & Matthiessen, 2014). As shown in Table 5.5, the highest frequency of *orientation* and *manifestation* of modality is *subjective-implicit*. Overall, 75.0% (574 out of 765) of *subjective-implicit* of the occurrences in total is presented. For individual

data set of the SARS epidemic, 60.5% (178 out of 294) of *subjective-implicit* is presented in Press Updates. In Newspaper Reports, *subjective-implicit* accounts for 86.2% (362 out of 420) of the occurrences. In Website Information, 66.7% (34 out of 51) of *subjective-implicit* is presented. The high frequency of occurrences of *subjective implicit* implies that the use of modal verbs to express modality is dominant in the three data sets of the SARS epidemic.

As can be seen from Table 5.5, a column label ‘Not-Classified’ is presented. For those modal nouns (e.g. *possibility* and *certainty* etc.) and modal adjectives (e.g. *possible*, *certain* etc.) not presented in projecting clauses, they are not classified in the aspects of *orientation* and *manifestation* in SFL theory of modality. This issue will be further discussed in the examples of the extracts shown in Chapter 6 and Chapter 7.

5.3.3 Frequency of Occurrences of Modal Verbs

As mentioned in the previous section, the high frequency of occurrences of *subjective implicit* implies that the use of modal verbs to express modality is dominant in the discourses of the SARS epidemic selected for the study. Thus, this section presents the frequency of occurrences of modal verbs in the three data sets of the SARS epidemic.

Table 5-6 Frequency of Modal Verbs in the SARS Epidemic

Modal Verbs in the SARS Epidemic						
Modal Verbs	Press Updates	Relative Frequency (%)	Newspaper Reports	Relative Frequency (%)	Website Information	Relative Frequency (%)
may	30	17.8	34	9.3	14	40.0
might	9	5.3	11	3.0	2	5.7
can	29	17.2	37	10.2	14	40.0
could	12	7.1	40	11.0	0	0.0
will	63	37.3	79	21.7	2	5.7
would	7	4.1	75	20.6	0	0.0
must	7	4.1	12	3.3	0	0.0
should	12	7.1	76	20.9	3	8.6
shall	0	0.0	0	0.0	0	0.0
Total:	169	100.0	364	100.0	35	100.0

As shown in Table 5.6, the highest frequency of occurrence of modal verb is *will* in the data sets of Press Updates and Newspaper Reports, accounting for 37.3% (63 out of 169) and 21.7% (79 out of 364) of the occurrences respectively. In Website Information, two modal verbs, *may* and *can*, are the highest frequency of occurrences, both accounting for 40.0% (14 out of 35) of the occurrences.

This section presents the quantitative findings of modality in terms of the *type of assessment, value, orientation* and manifestation in the data sets of the SARS epidemic. Also, the frequencies of occurrences of modal verbs are also presented.

The next section presents the findings of modality in the swine influenza pandemic.

5.4 Modality in the Swine Influenza Pandemic

Similar to Section 5.3, this section presents the quantitative findings of modality in terms of *type of assessment, value, orientation and manifestation*. Section 5.4.1 first presents the frequency of modality types and its values in the swine influenza pandemic and it is followed by the aspects *orientation* and *manifestation* of modality in Section 5.4.2. Section 5.4.3 will show the frequency of occurrences of modal verbs (e.g. can, may etc.) in the data sets.

5.4.1 Modality Type and its Value

This section first focuses on the presentation of quantitative findings of the *types of assessment* of modality in the data sets of the swine influenza pandemic. Table 5.7 summarizes the frequency of occurrences of modality types of *probability, usuality, obligation, inclination* and *ability* in the various data sets.

Table 5-7 Frequency of Types of Modality in the Swine Influenza Pandemic

	Probability	Usuality	Obligation	Inclination	Ability	Total
Press Conferences (n=4252)	3499 (82.3%)	137 (3.2%)	257 (6.0%)	299 (7.0%)	60 (1.4%)	4252 (100%)
Newspaper Reports (n=285)	206 (72.3%)	4 (1.4%)	63 (22.1%)	11 (3.9%)	1 (0.4%)	285 (100%)
Website Information (n=77)	51 (66.2%)	10 (13.0%)	16 (20.8%)	0 (0%)	0 (0%)	77 (100%)
Total: (n=4614)	3756 (81.4%)	151 (3.3%)	336 (7.3%)	310 (6.7%)	61 (1.3%)	4614 (100%)

As shown in Table 5.7, the *probability* type of modality is also overriding in all the data sets of the swine influenza epidemic. This presentation is similar to that of the SARS pandemic. Overall, 81.4% (3756 out of 4614) of *probability* type of the occurrences in total is presented. For individual data set, 82.3% (3499 out of 4252) of *probability* type is presented in Press Conferences. In Newspaper Reports, *probability* type accounts for 72.3% (206 out of 285) of the occurrences. In Website Information, 66.2% (51 out of 77) of *probability* type is presented. The second highest frequency is *inclination* in Press Conferences, accounting for 7.0% (299 out of 4252) of the occurrences. In Newspaper Reports and Website

Information, the second highest is *obligation*, accounting for 22.1% (63 out of 285) and 20.8% (16 out of 77) of the occurrences respectively. Similar to the data sets of SARS epidemic, the findings also reflect that *probability* is the most frequent type of modality presented in the discourses of the swine influenza pandemic selected for the study.

Similar to the data sets of the SARS epidemic, *probability* as the dominant type of modality is also displayed in the frequency of occurrences in total number of clauses. Table 5.8 shows the frequency of occurrences of various modality types in total number of clauses in the data sets of the swine influenza pandemic.

Table 5-8 Frequency of Modality Type in Total Number of Clauses in the Swine Influenza Pandemic

	Probability	Usuality	Obligation	Inclination	Ability
Press Conference (total number of clauses: 12206)					
Occurrences (n=12206)	3499 (28.7%)	137 (1.1%)	257 (2.1%)	299 (2.5%)	60 (0.5%)
Frequency in total number of clauses (%)	28.7	1.1	2.1	2.5	0.5
Newspaper Report (total number of clauses: 1473)					
Occurrences (n=1473)	206 (14.0%)	4 (0.3%)	63 (4.3%)	11 (0.8%)	1 (0.1%)
Frequency in total number of clauses (%)	14.0	0.3	4.3	0.8	0.1
Website information (total number of clauses: 295)					
Occurrences (n=295)	51 (17.3%)	10 (3.4%)	16 (5.4%)	0 (0%)	0 (0%)
Frequency in total number of clauses (%)	17.3	3.4	5.4	0.0	0.0

As shown in Table 5.8, the frequency of *probability* type in total number of clauses is also overriding in the three data sets of the swine influenza pandemic. In Press Conferences, 28.7% (3499 out of 12206) of the occurrences of *probability* types in total number of clause is presented. *Probability* type is also the highest in frequency in the data sets of Newspaper Report and Website Information,

accounting for 14.0% (206 out of 1473) and 17.3% (51 out of 295) of the occurrences in total number of clauses respectively.

The second aspect is the *value* of modality in the data of the swine influenza pandemic. As mentioned, *probability* is also the most dominant type of modality presented in the swine influenza pandemic. Figure 5.2 shows the frequency of occurrences of the values of probability in the three data sets.

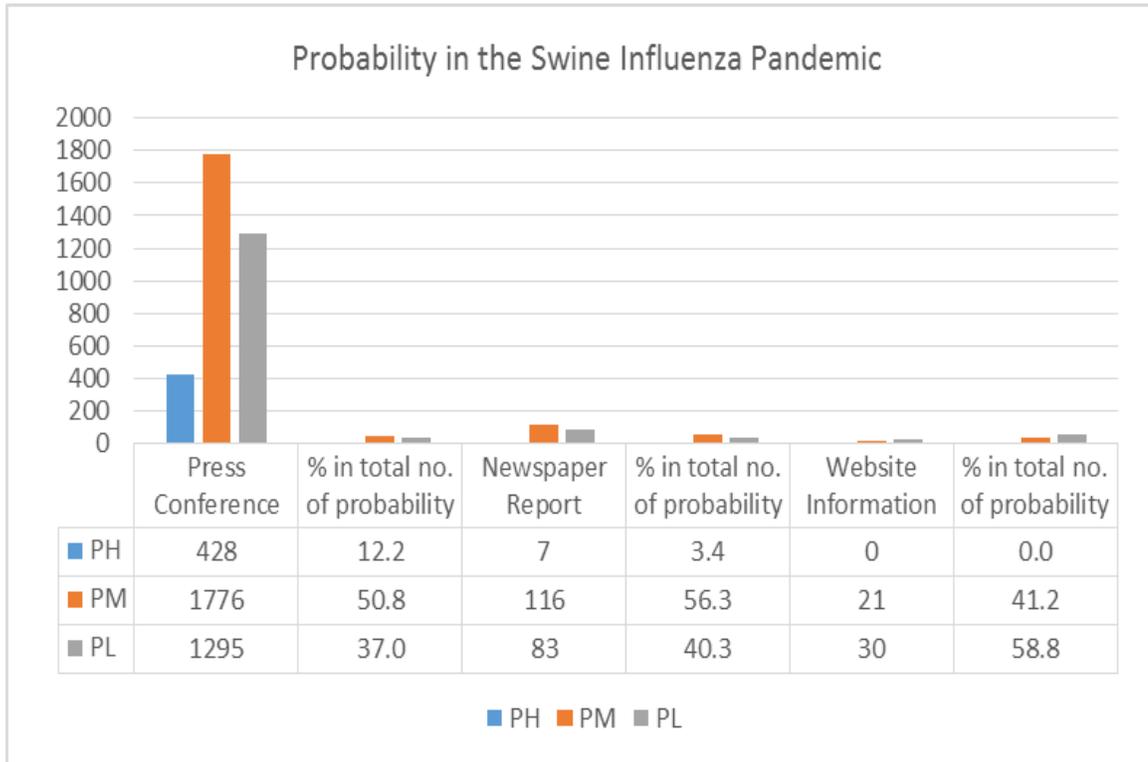


Figure 5-2 Values of Probability in the Swine Influenza Pandemic

Key: PH: probability-high; PM: probability-median; PL: probability-low

As indicated in Figure 5.2, probability-median (PM) is the highest frequency in Press Conferences and Newspaper Reports of swine influenza pandemic, accounting for 50.8%, and 56.3.3% of the occurrences respectively. Probability-low (PL) is the lowest frequency in the three data sets of Press Conferences, Newspaper Reports and Website Information, accounting for 12.2% and 3.4% respectively. There is no occurrence in the Website Information. In Website Information, probability-low (PL) is the highest, accounting for 58.8% of the occurrences.

5.4.2 Orientation and Manifestation

After showing the frequency of occurrences of *type of assessment* and *value* of modality presenting in the data sets of the swine influenza pandemic, this section turns to present the aspects of *orientation* and *manifestation* of modality. Table 5.9 shows the *orientation* and *manifestation* of modality presented in the three data sets.

Table 5-9 Orientation and Manifestation of Modality in the Swine Influenza Pandemic

	Subjective -Implicit	Subjective -Explicit	Objective- Implicit	Objective- Explicit	Not- Classified	Total
Press Conferences (n=4254)	2860 (67.3%)	706 (16.6%)	362 (8.5%)	142 (3.3%)	184 (4.3%)	4254 (100%)
Newspaper Reports (n=283)	265 (93.6%)	3 (1.1%)	4 (1.4%)	2 (0.7%)	9 (3.2%)	283 (100%)
Website information (n=77)	62 (80.5%)	0 (0%)	9 (11.7%)	1 (1.3%)	5 (6.5%)	77 (100%)
Total: (n=4614)	3187 (69.1%)	709 (15.4%)	375 (8.1%)	145 (3.1%)	198 (4.3%)	4614 (100%)

As shown in Table 5.9, is the highest frequency of *orientation* and *manifestation* of modality is *subjective-implicit*. Overall, 69.1% (3187 out of 4614) of *subjective-implicit* of the occurrences in total is presented. For individual data set of the swine influenza pandemic, 67.3% (2860 out of 4254) of *subjective-implicit* is presented in Press Conferences. In Newspaper Reports, *subjective-implicit* accounts for 93.6% (265 out of 283) of the occurrences. In Website Information, 80.5% (62 out of 77) of *subjective-implicit* is presented. The high frequency of occurrences of *subjective implicit* implies that the use of modal verbs to express modality is dominant in the three data sets of the swine influenza pandemic.

5.4.3 Frequency of Occurrences of Modal Verbs

Similar to the data sets presented in the SARS epidemic, the high frequency of occurrences of *subjective implicit* implies that the use of modal verbs to express modality is dominant in the discourses of the swine influenza pandemic selected for the study. Thus, this section presents the frequency of occurrences of modal verbs in the three data sets of the swine influenza pandemic.

Table 5-10 Frequency of Modal Verbs in the Swine Influenza Pandemic

Frequency of Occurrence of Modal Verbs in the Swine Influenza Pandemic						
Modal Verbs	Press Conferences	Relative Frequency (%)	Newspaper Reports	Relative Frequency (%)	Website Information	Relative Frequency (%)
may	175	6.0	23	8.9	12	19.4
might	124	4.2	11	4.3	0	0.0
can	594	20.3	17	6.6	17	27.4
could	293	10.0	27	10.5	0	0.0
will	993	33.9	56	21.7	16	25.8
would	505	17.2	66	25.6	1	1.6
must	23	0.8	11	4.3	3	4.8
should	213	7.3	46	17.8	13	21.0
shall	11	0.4	1	0.4	0	0.00
Total:	2931	100.00	258	100.00	62	100.00

As shown in Table 5.10, the highest frequency of occurrence of modal verb is *will* in Press Conferences, accounting for 33.9% (993 out of 2931) of the occurrences.

In Newspaper Reports, modal verb *would* is the highest frequency, accounting for 25.6% (66 out of 258) of the occurrence. In Website Information, modal verb *can* is the highest frequency, accounting for 27.4% (17 out of 62) of the occurrences.

5.5 Chapter Summary

The section presented the quantitative findings of the study. The general statistics including the total number of texts, words and clauses of the discourses of the SARS epidemic and the swine influenza pandemic selected for the study were presented. The chapter also presented the frequency of occurrences of modality in terms of *type of assessment*, *value*, *orientation* and *manifestation* in various data sets of the SARS epidemic and the swine influenza pandemic. As shown in the findings of modality in Section 5.3 and Section 5.4, *probability* was dominant in occurrences among the five types of modality presented in the data sets of Press Conferences, Press Updates, Newspaper Reports and Newspaper Reports of the two events selected for the study. Regarding the *value* of modality, probability-median was the highest frequency of occurrences in most data sets of the two events. *Subject-implicit* was the most overriding among the *orientation* and *manifestation* aspects of modality in the discourses of the two events selected for the study. This implies that modal verbs were the modal operators most frequently used by the speakers to express modality. Apart from modal verb *will*, which was the highest frequency in Press Updates and Newspaper Reports of the SARS

epidemic and in Press Conferences of the swine influenza pandemic, the presentation of other modal verbs in terms of frequency varies among the data sets of the two events. As mentioned in the findings of the previous two sections, *probability* was the major types of modality presented in the discourses of the SARS epidemic and the swine influenza pandemic selected for the study. This was also reflected in the examples of the extracts presented in the next two chapters.

The next chapter will introduce the qualitative findings of the study, that is how modality and its expressions are presented in public health communication during the SARS epidemic and the swine influenza pandemic.

Chapter 6 Modality in Public Health Communication

6.1 Chapter Overview

The quantitative findings of the study have been presented in the previous chapter. This chapter and Chapter 7 turn into a presentation and discussion of the qualitative findings of the study. As mentioned in Section 1.5, the primary objective of the study is to investigate how modality is used in public health and risk communication during the 2003 SARS epidemic and the 2009 swine influenza pandemic. Accordingly, this chapter first introduces the findings of modality presented in public health communication while the findings of modality expressed in risk communication will be presented in Chapter 7.

This chapter is divided into four subsections including this Chapter Overview. Section 6.2 introduces examples of modality expressed in public health communication. Different aspects of public health communication, such as expressing information about the signs and symptoms of the diseases, medium of disease transmission, prevention and treatment of the diseases and the role of health authorities in control of the disease spreads and in containment of the diseases, are illustrated with various extracts. These extracts are from the press conferences and press updates, newspaper reports and website information concerning the 2003

SARS epidemic and the 2009 swine influenza pandemic. The extracts are selected on the basis that they show examples of different types of modality with different modal operators (e.g. modal verbs, modal adjuncts, interpersonal metaphors and projecting clauses etc.) used by the speakers in public health communication. Section 6.3 presents the implications of the findings, which provides different inferences or suggestions both to the practice of public health communication and the theories of modality. Section 6.4 provides a summary of the chapter.

6.2 Expression of Modality in Public Health Communication

This section aims to present the qualitative findings of the study by introducing various extracts from the data sets to demonstrate the use of modality in public health communication.

As mentioned in Section 2.2, one of the major services of public health is to “inform, educate and empower people about health issues” (Schneider, 2011: 6). In case of infectious disease outbreak like SARS epidemic and influenza pandemic, a key role of public health services is to inform and educate people about the nature of the disease so as to make necessary actions to prevent the disease spread and contain the disease epidemics or pandemics (Schneider, 2011). The nature of a disease includes information about the aetiology, epidemiological feature such as

susceptible species, disease transmission and disease patterns, clinical signs and symptoms, pathology and diagnosis (Geering & Amanfu, 2002).

The findings of the following subsections will be organized according to the different aspects in public health communication. Accordingly, the sign and symptoms of the diseases (Section 6.2.1), medium of disease transmission (Section 6.2.2), treatment and prevention of diseases (Section 6.2.3) are selected as the main topics of public health communication in the study. Such information is more general but essential to the public during infectious disease epidemics and pandemic for containment and prevention of disease spread. Also, as mentioned in Chapter 2, public health communication usually takes place between governments or health authorities and the general public. Apart from delivery of information such as the nature of the disease, the health authorities also demonstrate their role in the management of disease outbreaks. Thus, the role of the health authorities is also selected as one of the main topics of public health communication (Section 6.2.4).

6.2.1 Expressing the Signs and Symptoms of Diseases

As mentioned in the previous section, it is important to inform and educate people about the nature of diseases in public health communication (Schneider, 2011). One

of the important aspects of the nature of a disease is its signs and symptoms (Geering & Amanfu, 2002). If people learn about the signs and symptoms of a disease, they can take necessary actions to prevent the disease spreading and contain the disease epidemics or pandemics. Accordingly, this section introduces how modality is used to present the signs and symptoms of the diseases in public health communication during the 2003 SARS epidemic and the 2009 swine influenza pandemic. There are three extracts to illustrate the use of modality to present the expressions of signs and symptoms of the diseases of SARS and swine influenza in public health communication.

Extract 6.1 demonstrates the use of modality to express the speaker's commitment to the truth of his/her proposition about the degree of usuality and degree of probability of the signs and symptoms of SARS, and the laboratory detection of the virus and its antibodies.

Extract 6.1: SARS: DH Website

Clause No. (CN)	Clause
1.1	Severe acute respiratory syndrome (SARS) is a viral respiratory infection caused by a coronavirus (SARS-CoV).
2.1	Symptoms <u>usually</u> appear within 2 - 7 days
2.2	after contracting the disease,
2.3	but the incubation period <u>can</u> be up to approximately 10 days.
3.1	The initial symptoms are influenza-like.
4.1	Patients with SARS <u>usually</u> begin with fever, which is <u>often</u> high (38°C or above)]],
4.2	and <u>sometimes</u> associated with chills, rigors, headache, malaise, muscle pain or even diarrhoea.
5.1	At the onset of illness, some patients <u>may</u> only have mild respiratory symptoms.
6.1	After a few days, symptoms of lower respiratory tract infection <u>may</u> follow, including cough without sputum and difficulty in breathing.
7.1	In around 10% of patients, the illness <u>may</u> rapidly progress to respiratory failure requiring intensive medical care.
8.1	Symptoms <u>can</u> be more variable among elderly patients.
9.1	Several laboratory tests <u>can</u> detect SARS-CoV, the virus that causes SARS.
10.1	Some tests <u>can</u> detect virus in clinical specimens, including respiratory secretions and stool.
11.1	Serological tests <u>can</u> detect antibodies to SARS-CoV which are produced from around 10 days after onset of the illness.

Extract 6.1 is taken from the website of the Department of Health (DH) of Hong Kong. The aim of the language activity is to deliver health information about the nature of SARS such as signs and symptoms of the disease. The speaker is a health official or representative of the Department of Health. The audience are the general public or other people who seek information from the website concerning SARS. The speaker used different modality operators such as degree of usuality e.g.

usually, sometimes, may and can etc. to present the information about SARS. Table 6.1 shows the modality operators of Extract 6.1.

Table 6-1 Modality Items of Extract 6.1

Clause No. (CN)	Modal Operators	Expressing	Modality Type	Value	Orientation/ Manifestation	Mood Type	Speech Function	Polarity
2.1	usually	frequency	usuality	med	Objective/ Implicit	declarative	statement	positive
2.3	can	potentiality	probability	low	Subjective/ Implicit	declarative	statement	positive
4.1	usually	frequency	usuality	med	Objective/ Implicit	declarative	statement	positive
4.1	often	frequency	usuality	med	Objective/ Implicit	declarative	statement	positive
4.2	sometimes	frequency	usuality	low	Objective/ Implicit	declarative	statement	positive
5.1	may	possibility	probability	low	Subjective/ Implicit	declarative	statement	positive
6.1	may	possibility	probability	low	Subjective/ Implicit	declarative	statement	positive
7.1	may	possibility	probability	low	Subjective/ Implicit	declarative	statement	positive
8.1	can	potentiality	probability	low	Subjective/ Implicit	declarative	statement	positive
9.1	can	potentiality	probability	low	Subjective/ Implicit	declarative	statement	positive
10.1	can	potentiality	probability	low	Subjective/ Implicit	declarative	statement	positive
11.1	can	potentiality	probability	low	Subjective/ Implicit	declarative	statement	positive

The discussion of Extract 6.1 first focuses on the following three clauses:

CN2.1: Symptoms usually appear within 2 - 7 days

CN4.1: Patients with SARS usually begin with fever, which is often high (38°C or above),

CN4.2: and sometimes associated with chills, rigors, headache, malaise, muscle pain or even diarrhoea.

As shown in Table 6.1, the modality in the above three clauses presents the degree of usuality. The interpretation of degree of usuality, which is often realized by modal adjuncts *usually*, *often* and *sometimes*, is generally straightforward as illustrated in Extract 6.1. CN2.1, CN 4.1 and CN4.2 in Extract 6.1 are clauses for exchange of information. The mood type is *declarative* and the speech function is *statement*. The modality type of the three clauses is *Modalization: usuality*, objective *orientation*, implicit *manifestation* as realized by modal adjuncts *usually* (median value), *often* (median value) and *sometimes* (low value). The function of the modal adjuncts *usually*, *often* and *sometimes* in Extract 6.1 is to express the speaker's opinion or commitment to the truth of his/her proposition (Davidse & Simon-Vandenberghe, 2008; Halliday, 1994; Huddleston & Pullman, 2002) about the degree of usuality of the signs and symptoms of SARS. Thus, when the speaker introduces the signs and symptoms of the SARS information on the DH website, e.g. the presence of fever, chills and rigor, the speaker present the signs and symptoms with modality operators to indicate the degree of usuality.

The second example of Extract 6.1 illustrates the use of modal verb *may* to express the speaker's propositions about the degree of probability of the signs of symptoms of SARS. The discussion of degree of probability of Extract 6.1 focuses on the following three clauses:

CN5.1: At the onset of illness, some patients may only have mild respiratory symptoms.

CN6.1: After a few days, symptoms of lower respiratory tract infection may follow, including cough without sputum and difficulty in breathing.

CN7.1: In around 10% of patients, the illness may rapidly progress to respiratory failure requiring intensive medical care.

As mentioned in Section 3.4, one of the uses of modal verb *may* is to express possibility (Carter et al, 2011). CN5.1, CN6.1 and CN7.1 in Extract 6.1 are clauses for exchange of information. The mood type is *declarative* and the speech function is *statement*. The modality type is *Modalization: probability, low value, subjective orientation* and implicit *manifestation* as realized by the use of modal verbs *may*. The use of modal verb *may* in these three clauses functions to express the speaker's opinion or commitment to the truth of his/her proposition (Davidse & Simon-Vandenberg, 2008; Halliday, 1994; Huddleston & Pullman, 2002) about the possibility of development of the signs and symptoms after contacting the SARS-coronavirus. As the development of respiratory symptoms is uncertain, there is indeterminacy between yes or no, the speaker use the strategy to state the uncertainty by using modality, the degree of probability to express the development of respiratory symptoms such as cough, difficulty in breathing etc.

The third example of Extract 6.1 illustrates the use of modal verb *can* to express the degree of probability. The five clauses are as follows:

- CN2.3:** but the incubation period can be up to approximately 10 days.
CN8.1: Symptoms can be more variable among elderly patients.
CN9.1: Several laboratory tests can detect SARS-CoV, the virus that causes SARS.
CN10.1: Some tests can detect virus in clinical specimens, including respiratory secretions and stool.
CN11.1: Serological tests can detect antibodies to SARS-CoV which are produced from around 10 days after onset of the illness.

As mentioned in Chapter 3, one of the uses of *can* is to express possibility (Carter et al, 2011). CN2.3, CN8.1, CN9.1, CN10.1 and CN11.1 in Extract 6.1 are clauses for exchange of information. The mood type is *declarative* and the speech function is *statement*. The modality type is *Modalization: probability, low value, subjective orientation* and implicit *manifestation* as realized by the use of modal verb *can*. The use of *can* in these four clauses functions to express the speaker's opinion or commitment to the truth of his/her proposition (Davidse & Simon-Vandenberg, 2008; Halliday, 1994; Huddleston & Pullman, 2002) about the possibility of the duration of the disease incubation (CN2.3), symptoms development among the elderly (CN8.1), detection of the virus and its antibodies by various laboratory tests (CN9.1, CN10.1 and CN11.1). The speaker uses modal verb *can* to express the uncertainty of information concerning the SARS. Instead of stating in a polar form '*Serological tests detect antibodies to SARS-CoV which are produced from around 10 days after onset of the illness*', the speaker expresses the information in a less determinate (Halliday, 1994) way by using a modal verb *can* to express the indeterminacy.

However, there is a variation in the interpretation of the usage of *can*, illustrated in Extract 6.1. In CN2.3, *can* is construed as *possibility* rather than *ability* because it is inappropriate to interpret the incubation period has the ability. This is also applied to the use of *can* in CN8.1, that is, the speaker made a proposition that symptoms have the possibility to become variable among the elderly. However, in CN9.1, “*several laboratory tests can detect SARS-CoV, the virus that causes SARS*”, the uses of *can* in CN9.1, CN10.1 and CN11.1 may also be interpreted as *ability* or *capacity*. In other words, the speaker wants to deliver the information about the ability or capacity of the laboratory test in detecting the SARS virus. However, it can also be interpreted as the possibility of the laboratory test in detecting the SARS virus. Thus, the interpretations of *can* in these three clauses are considered ambiguous. This point is further elaborated by the variant of the theory of modality. For *Modalization*, it is used for exchange of information and realized by the speech function *statement* or *question*. For *Modulation*, it is used for exchange of goods and services and realized by the speech function *offer* and *command*. However, for the degree of readiness: ability, it is less described in SFL theories and literature. Thus, if these three clauses are interpreted as *statement* for exchange of information, the use of *can* in the three clauses is interpreted as degree of probability rather than degree of readiness: ability. Also, it is also possible to interpret the use of *can* in the three clauses (CN9.1, CN10.1 and CN11.1) as expressing general truth about the

ability or capacity of the laboratory test. In other words, the speaker is expressing (CN11.1) '*I believe that several serological tests detect antibodies to SARS-CoV....*'. Then, it is still categorized as degree of probability as realized by using the interpersonal metaphor *I believe...*

The implication of this example from Extract 6.1 is that there are variations and ambiguities in making classification and categorization of modality. Accordingly, the use of modality itself is to express the indeterminacy between yes and no. However, without a clear classification and category, it is problematic both in the usage for the speaker and in interpretation for the general public to make judgement on the truth of proposition expressed or the actualization of that situation. (Huddleston & Pullman, 2012)

Extract 6.2 shows two examples of modality to express the speaker’s proposition about the degree of probability, and the degree of usuality of the signs and symptoms of swine influenza.

Extract 6.2: Swine Flu: NHS-Website

Clause No. (CN)	Clause
77.1	If you are pregnant
77.2	and you catch swine flu,
77.3	the symptoms are likely to be similar to those of normal flu.
78.1	You <u>will usually</u> have a fever (a high temperature of or above 38C/100.4F), plus two or more of the following symptoms: unusual tiredness, headache, runny nose, sore throat, shortness of breath or cough, loss of appetite, aching muscles, diarrhoea or vomiting.
79.1	Most pregnant women <u>will</u> have only mild symptoms
79.2	and recover within a week.

Extract 6.2 is taken from the website of the National Health Services (NHS), a public funded health services in of the United Kingdom (UK) (NHS, 2016). The aim of the language activity is to deliver health information about the signs and symptoms of swine influenza. The speaker is the health official or representative of the NHS. The audiences are the general public of the UK or other people who seek for information concerning the swine influenza on the website. Table 6.2 shows the modality items in Extract 6.2.

Table 6-2 Modality Items of Extract 6.2

Clause No. (CN)	Modal Operators	Expressing	Modality Type	Value	Orientation/ Manifestation	Mood Type	Speech Function	Polarity
78.1	will	prediction	probability	med	Subjective/ Implicit	declarative	statement	positive
78.1	usually	frequency	usuality	med	Objective/ Implicit	declarative	statement	positive
79.1	will	prediction	probability	med	Subjective/ Implicit	declarative	statement	positive

As shown in Table 6.2, three modality items are found in Extract 6.2. They are modal verb *will* in CN78.1 and CN79.1 and modal adjunct *usually* in CN78.1. According to Halliday (1994: 89), modality can be expressed in three ways: i) modal verbs (e.g. in CN79.1, most pregnant women *will* have mild symptoms); ii) modal adjuncts (e.g. most pregnant women *usually* have mild symptoms); iii) both (e.g. most pregnant women *will probably* have mild symptoms). In addition to these three ways, interpersonal metaphors such as *I think, I believe...*, and projecting clauses such as *It is possible that...* are other ways to express modality (Halliday & Matthiessen, 2014).

The examples shown in previous Extract 6.1 contain one modal operator in each individual clause. The assessment of the proposition is rather straightforward without any difficulties. However, when two modal operators with two modality types appeared in the same clause, there are variations with Halliday's interpretation.

Extract 6.2 first illustrates an example with one modal operator in one clause. Then, the second example shows two modal operators in one clause. CN79.1 presenting degree of probability is first discussed.

CN79.1: Most pregnant women will have only mild symptoms

In addition to the use of modal verbs *may* and *can* as illustrated in previous Extract 6.1, modal verb *will* is another way to express degree of probability. As mentioned in Section 3.4, one of the uses of *will* is to make prediction about the future (Carter et al, 2011). CN79.1 in Extract 6.2 is a clause for exchange of information. The mood type is *declarative* and the speech function is *statement*. The modality type is *Modalization: probability*, median *value*, subjective *orientation* and implicit *manifestation* as realized by the use of modal verb *will*. The use of *will* in CN79.1 functions to express a speaker's opinion or commitment to the truth of his/her proposition (Davidse & Simon-Vandenberg, 2008; Halliday, 1994; Huddleston & Pullman, 2002) about a prediction of mild symptoms presented in pregnant women concerning the swine influenza.

The example of degree of probability in CN79.1 of Extract 6.2 and the previous examples of degree of probability and degree of usually shown in Extract 6.1 are all presented in separate clauses and the modal operators are assessed individually.

However, when two modal operators with two modality types appeared in the same clause, the analysis shows variations in interpretation on the *orientation* aspect of modality. The following example demonstrates the use of two modality items with two types of modal operators in the same clause:

CN78.1: You *will usually* have a fever (a high temperature of or above 38C/100.4F), plus two or more of the following symptoms: unusual tiredness, headache, runny nose, sore throat, shortness of breath or cough, loss of appetite, aching muscles, diarrhoea or vomiting.

The presence of two modal operators in a clause is called *modal prosody* or *prosody of modalization* (Halliday 1994; Matthiessen, 1996; Halliday & Matthiessen 2014). Matthiessen (1996:480) comments that “the modalization is strung out like a prosodic pitch movement or like ‘double negation’”. Another terminology is called *concord* (Halliday, 1976 cited in Matthiessen, 1996), which is a combination of a modal verb with a modal adverb. However, the interpretation of *concord* can only take place if both modal operators are of the same kind of modality (Geurts & Huitink, 2006; Zaroukian, 2014; Zeijlstra, 2007) and with similar quantificational force (Zeijlstra, 2007). For example, the interpretation of ‘*most pregnant women will probably have mild symptom*’ is just like as if there is one single modal operator (Geurts & Huitink, 2006). The modal verb *will* and the modal adjunct *probably*, both are expressing degree of probability.

However, when modal verb *will* and modal adjunct *usually* in the same clause to express the degree of probability and degree of usuality respectively as illustrated in CN78.1 of Extract 6.2, there are ambiguities and variations with the SFL theory of modality. CN78.1 is a clause for exchange of information. The mood type is *declarative* and the speech function is *statement*. There are two modal operators in the clause:-

First, the use of modal verb *will* in CN78.1 indicates a modality type of *Modalization: probability, median value, subjective orientation* and implicit *manifestation*. As mentioned in Section 3.4, one of the uses of *will* is to ‘make prediction about the future’ (Carter et al, 2011). The use of *will* in CN78.1 functions to express the speaker’s opinion or commitment to the truth of his/her proposition (Davidse & Simon-Vandenberg, 2008; Halliday, 1994; Huddleston & Pullman, 2002) about a prediction of fever and other signs and symptoms of swine influenza.

Second, the use of modal adjunct *usually* in CN78.1 indicates a modality type of *Modalization: usuality, median value, objective orientation* and implicit *manifestation*. The use of *usually* in CN78.1 functions to express the speaker’s opinion or commitment to the truth of his/her proposition (Davidse & Simon-

Vandenbergen, 2008; Halliday, 1994; Huddleston & Pullman, 2002) about the frequency of fever and other signs and symptoms of swine influenza.

As mentioned in Section 3.3, in SFL theory, subjective *orientation* of modality is realized by modal verbs such as *will*, *can* etc. For the subjective type, the assessment is related to the speaker. On the other hand, *objective* orientation is realized by modal adjuncts such as *usually*, *probably* etc. For the objective type, there is minimal connection with the speaker (Butler, 2003). If a modal operator is used in an individual clause, the assessment of the orientation is rather direct like the first example, CN79.1, in Extract 6.2. However, the above two interpretations of the modal operators in CN78.1 of Extract 6.2 show that the modal verb *will* expresses the degree of probability and the modal adjunct *usually* expresses the degree of usuality. In other words, the clause is presenting two modality types. It is not considered as *modal concord* (Halliday 1994 cited in Matthiessen, 1996) or prosody of modalization (Halliday 1994; Matthiessen, 1996; Halliday & Matthiessen 2014) as previously mentioned.

As mentioned, Matthiessen (1996) comments that prosody of modalization is like a “double negation”. However, ‘double negation’ in language may have a resolved effect or as Tieken-Boon van Ostade (1982) states that two negatives forms an

affirmative. The interpretation of the aspect of *orientation* between modal verb (subjective) and modal adjuncts (objective) is different even when they are the same modality type. As such, it is not clear the way of interpretation of the aspect of *orientation* for two modal operators of the same modality type (prosody of modalization) or two modal operators of a different modality type as shown in CN78.1 of Extract 6.2.

The interpretation of the aspect of *orientation* is unclear when there are two modal operators with the same or different modality types presented in one clause. The implication is that *orientation* is concerned with whether proposition is related to (subjective) or with minimal connection (objective) to the speaker (Argamon et al, 2007). Subjective orientation is realized by the use of modal verbs while objective orientation is realized by the use of modal adjuncts (Halliday & Matthiessen, 2014). However, when a clause presents two modal operators of different modality types, as illustrated in CN78.1 of Extract 6.2, or even of the same modality type as prosody of modalization (Halliday 1994; Matthiessen, 1996; Halliday & Matthiessen 2014) or modal concord (Halliday, 1976 cited in Matthiessen, 1996), it is difficult to distinguish between subjective and objective *orientation* in modality assessment.

The previous examples in Extract 6.1 and Extract 6.2 demonstrate the uses of modality to express the degree of probability and degree of usuality of the signs and symptoms of SARS and swine influenza in public health communication. They are taken from the websites of the DH of Hong Kong and the NHS of the U.K. Here, Extract 6.3 is taken from another source of the data sets, a press conference (PC) held by the WHO concerning the swine influenza pandemic.

Extract 6.3: Swine Influenza: WHO Press Conferences (dated 29-04-2009)

Clause No. (CN)	Clause
40.1	The illness that we are seeing is generally consisting with seasonal influenza infection.
41.1	That is the kind of symptoms that the milder cases are experiencing and generally what are seen with other influenza viruses,
41.2	although there is some suggestions that <i>perhaps</i> cases are developing diarrhoea more <i>often</i> than is normal with seasonal influenza or seen with seasonal influenza.
42.1	So we <i>will</i> continue to follow this and see how the picture of clinical symptoms evolves.
43.1	The question that is really on many people's mind is what we <i>can</i> say about the severity of the illness at this point.
44.1	<i>I think</i>
44.2	that the information to date clearly points out
44.3	that this infection <i>can</i> result in anything from very mild illness, where people do not need to be hospitalized and generally recover without any complications after several days, to fatal illness.

The examples in Extract 6.3 also demonstrate the use of modality to express the speaker's commitment to the truth of his/her proposition (Davidse & Simon-Vandenberg, 2008; Halliday, 1994; Huddleston & Pullman, 2002) about the

degree of usuality and degree of probability of the signs and symptoms of swine influenza. The aim of the press conference was to let the Assistant Director-General of the WHO report the progress concerning the swine influenza virus and the progress of the pandemic. After the reporting by the representative of the WHO, it may be followed by questions from the reporters or journalists. Sometimes, there was only reporting by the WHO officials without questioning time from the media. The speaker is Dr. Keiji Fukuda, Assistant Director-General of the WHO. The audiences of the press conference are the reporters and journalists from different countries. The audiences of the press conference could also be the general public if the press conferences were broadcast on other media such as TV channels and the internet. There are interactions between the speaker and the audiences, the reporters and journalists on site. Table 6.3 shows the modality items of Extract 6.3.

Table 6-3 Modality Items of Extract 6.3

Clause No. (CN)	Modal Operators	Expressing	Modality Type	Value	Orientation/ Manifestation	Mood Type	Speech Function	Polarity
41.2	perhaps	possibility	probability	low	Objective/ Implicit	declarative	statement	positive
41.2	often	frequency	usuality	med	Objective/ Implicit	declarative	statement	positive
43.1	can	probability	probability	low	Subjective/ Implicit	declarative	statement	positive
44.1	I think	possibility	probability	med	Subjective/ Explicit	declarative	statement	positive
44.3	can	potentiality	probability	med	Subjective/ Implicit	declarative	statement	positive

As shown in Table 6.3, there are five modal operators: *perhaps*, *often*, *can* and *I think*. The speaker uses different modal operators, including modal adjunct *perhaps*, modal verb *can* and interpersonal metaphor *I think* to express propositions about the degree of probability of the signs and symptoms of the signs and symptoms of swine influenza. The speaker also uses modal adjunct *often* to express the degree of usuality concerning the signs and symptom of the disease. The discussion of this extract first focuses on the following clause:

CN41.2: ‘although there is some suggestion that perhaps cases are developing diarrhoea more often than is normal with seasonal influenza or seen with seasonal influenza’.

The problem of interpretation of the aspect of *orientation* for a clause with two modal operators of different modality types in Extract 6.2 has been discussed. Here, CN41.2 of Extract 6.3 shows an example of two modality types with modal operator of the same, modal adjunct, in the same clause. CN41.2 is a clause exchanging information. The mood type is *declarative* and the speech function is a *statement*. The modality type is *Modalization: usuality, median value, objective orientation* and implicit *manifestation* as realized by a modal adjunct *often*. The function of the modal adjuncts *often* is to express the speaker’s opinion or commitment to the truth of his/her proposition (Davidse & Simon-Vandenberg, 2008; Halliday, 1994; Huddleston & Pullman, 2002) about the frequency of developing diarrhoea in cases of swine influenza. However, another modal operator,

a modal adjunct *perhaps* is used to express the degree of probability in CN41.2. The two modal operators are within the modifier of ‘there is some suggestion[s] that...’ in which the noun group *suggestion* (nominalization of *suggest*) is also another modal operator to express possibility. The speaker of CN41.2 is making a comparison between swine influenza virus and other influenza virus in developing diarrhoea. Although there is no great problem of interpretation of different aspect of modality expressed in CN41.5, such practice of using multiple modal operators in a clause to convey a message makes it redundant and become very complex to interpret the speaker’s commitment to his/her proposition.

It is noted in CN42.1 of Extract 6.3, another type of modality: *inclination* is realized by use of modal verb *will* to express what the WHO is going to handle the uncertainty about the signs and symptoms of swine influenza. This example will be discussed in Section 6.2.4 of this chapter, which concerns the role of health authorities in public health communication.

The second example in Extract 6.3 demonstrates the use modality for expressing degree of probability. Two types of modal operators, interpersonal metaphor *I think* and modal verb *can* are used to express the degree of probability of the signs and symptoms of swine influenza.

CN44.1: *I think* **CN44.2** that the information to date clearly points out **CN44.3** that this infection can result in anything from very mild illness, where people do not need to be hospitalized and generally recover without any complications after several days, to fatal illness.

As mentioned in Section 3.3.3, when modal element is not coded congruently within the clause, but by means of a separate projecting clause, this is called metaphor of modality (Halliday, 1994, cited in Aritonang, 2014). In SFL approach to modality, *I think* is a kind of interpersonal metaphor (metaphor of modality). The modal meaning is realized or expressed explicitly outside the clause (Taverniers: 2003). This is an alternate approach to express modality which performs the function as presenting the proposition put forward by the speaker subjective implicitly.

CN44.1 and CN44.2 in Extract 6.3 shows examples of using interpersonal metaphors. The two clauses are exchanging information. The mood type is *declarative* and the speech function is a *statement*. The modality type is *Modalization: probability, median value, subjective orientation* and explicit *manifestation* as realized by interpersonal metaphor *I think* (Halliday & Matthiessen, 2014). The use of *I think* in CN44.1 of Extract 6.3 functions to express the speaker's opinion or commitment to the truth of his/her proposition (Davidse & Simon-Vandenberg, 2008; Halliday, 1994; Huddleston & Pullman,

2002) about the possibility of the information on the infection which can result in mild illness to fatal illness. The speaker shows his subjective point of view or opinion by utilizing the projecting clause *I think* toward the issue in the projected clause (Aritonang, 2014). However, the projected clause CN44.3 also includes a modal verb *can*. As mentioned in Section 3.4, one of the usages of *can* is to express possibility (Carter et al, 2011, Green, Yang & Li, 2009). CN44.3 is a clause for exchange of information. The mood type is *declarative* and the speech function is *statement*. The modality type is *Modalization: probability, low value, subjective orientation* and implicit *manifestation* as realized by the use of modal verb *can*. The use of *can* in CN44.3 is to express degree of probability of the signs and symptoms of swine influenza.

This section presents how modality is used to present the signs and symptoms of the diseases in public health communication during the 2003 SARS epidemic and the 2009 swine influenza pandemic. Various examples from three extracts are used to demonstrate how the speakers express propositions on the signs and symptoms of SARS and swine influenza. The next section presents examples from other extracts to illustrate the medium of disease transmission, another topic of the nature of disease in public health communication.

6.2.2 Expressing Medium of Disease Transmission

The medium of transmission is another important aspect in public health communication of the nature of disease (Geering & Amanfu, 2002). If people learn about the medium of transmission of a disease, they can make necessary actions e.g. frequent hand washing to prevent contacting the disease which is spread by droplets of sneezing or coughing (World Health Organization, 2010b) such as SARS and swine influenza. Accordingly, this section introduces how modality is used to present the medium of disease transmission in public health communication during the 2003 SARS epidemic and the 2009 swine influenza pandemic.

The first extract in this section is Extract 6.4, which demonstrates the use of modality to express a speaker's commitment to his/her proposition about the degree of probability of the medium of transmission of swine influenza virus.

Extract 6.4: Swine Influenza: WHO Website

Clause No. (CN)	Clause
15.1	Respiratory transmission occurs mainly by droplets disseminated by unprotected coughs and sneezes.
16.1	Short-distance airborne transmission of influenza viruses <i>may</i> occur, particularly in crowded enclosed spaces.
17.1	Hand contamination and direct inoculation of virus is another <i>possible</i> source of transmission.

Extract 6.4 is taken from the website of the WHO. The aim of the language activity is to deliver health information about the medium of transmission of the virus causing the swine influenza. The speaker is health officials or representatives of the WHO. The audiences are the general public or people who seek for information concerning the swine influenza on the website. Table 6.4 shows the modality items of Extract 6.4.

Table 6-4 Modality Items of Extract 6.4

Clause No. (CN)	Modal Operators	Expressing	Modality Type	Value	Orientation/ Manifestation	Mood Type	Speech Function	Polarity
16.1	may	possibility	probability	low	Subjective/ Implicit	declarative	statement	positive
17.1	possible	possibility	probability	median	?	declarative	statement	positive

As shown in Table 6.4, there are two modal items. The first example in Extract 6.4 demonstrates the use modal verb *may* to express propositions about the degree of probability concerning the medium of transmission of swine influenza virus.

CN16.1: Short-distance airborne transmission of influenza viruses *may* occur, particularly in crowded enclosed spaces.

As mentioned in Section 3.4, one of the uses of *may* is to express possibility (Carter et al, 2011). CN16.1 in Extract 6.4 is a clause for exchange of information. The mood type is *declarative* and the speech function is a *statement*. The modality type

is *Modalization: probability, low value, subjective orientation* and implicit *manifestation* as realized by the use of modal verbs of *may*. The modal verb *may* in CN16.1 functions to express a speaker's opinion or commitment to the truth of his/her proposition (Davidse & Simon-Vandenberg, 2008; Halliday, 1994; Huddleston & Pullman, 2002) about the possibility of occurrence of air-borne transmission of influenza viruses in short-distance.

Modal verb *may* is commonly used to express a weaker possibility (Carter et al, 2011), as indicated in CN16.1 of Extract 6.4. However, if modal verb *must* is used instead (e.g. *Short-distance airborne transmission must occur...*), it will demonstrate a stronger commitment to the proposition. Very often, it will be interpreted as making a conclusion of the truth of the proposition. Also, the text on the website information may also regard as a kind of scientific text or even as academic text. The words such as *may, possibly, perhaps* etc. is considered as 'speculative words' or belongs to 'meaning-making potential' (interpersonal function of language in SFL) (Ventola, 1997: 157), which are used in academic writing. Modal verb *may* is used in academic writing in which the speaker thinks the information he/she presenting is generally true (Carter et al, 2011). Thus, the use of modal verb *may* in CN16.1 can also be interpreted as a general of truth of the occurrence. Consequently, it is problematic for readers to make judgment about whether it is a general truth or a possibility of the short-distance transmission of the

virus. This may bring in different responses to the statement, over-react versus under-react. Such implication requires further research to study the reaction of the reader. For example, a survey is needed to investigate the response of readers after reading the information or message given by health authorities regarding epidemics or pandemic.

The second example in Extract 6.4 demonstrates the use of modal adjective *possible* to present degree of probability of the medium of transmission of swine influenza virus.

CN17.1: Hand contamination and direct inoculation of virus is another *possible* source of transmission.

As mentioned in Section 3.3, the aspects of *orientation* and *manifestation* of SFL model of modality are presented in four categories and realized by the uses of modal verbs (*subjective implicit*); modal adjuncts (*objective implicit*); interpersonal metaphors e.g. *I think* (*subjective explicit*); and projecting clauses e.g. *it is possible that...* (*objective implicit*) (Halliday & Matthiessen, 2014). However, when modal adjective is not presented as projecting clauses, it shows variations in the interpretation of *orientation* and *manifestation* aspect of modality.

CN17.1, Extract 6.4 is a clause exchanging information. The mood type is *declarative* and the speech function is a *statement*. The modality type is *Modalization: probability*, low *value* as realized by the use of modal adjective *possible*. The speaker uses modal adjective *possible* to evaluate the possibility of transmission of swine influenza by other medium such as hand contamination. However, the modal adjective *possible* in CN17.1 is not presented as projecting clause *it is possible...* When an adjective is added before a nominal group, it is called an *epithet* (Simon-Vandenberg, 1997) as illustrated in CN17.1 of Extract 6.4. According to Simon-Vandenberg (1997:346), epithets are added before a nominal group to express positive and negative evaluation. For example, ‘great future’, the adjective *great* implicitly expresses grading, meaning ‘very good’. Regarding the use modal adjectives such as *possible*, *certain* etc. presented as an epithet, it is not clearly described in SFL theory for the dimensions of *orientation* and *manifestation* of modality. The question is whether it is considered as *subjective* (‘expressed respective to the speaker’) or as *objective* (‘expressed irrespective of the speaker’) (Argamon et al, 2007). Except that CN17.1 is paraphrased and presented as projecting clause “*It is possible that hand contamination and direct inoculation of virus is another source of transmission*”, this will be interpreted as objective explicit. However, when a modal adjective added before a nominal group or an epithet, as illustrated in CN 17.1 of Extract 6.4, it is uncertain of the aspect of *orientation* and *manifestation* of modality. Thus, this example from Extract 6.4 brings in variant for categorization in assessment of

orientation in modality, which also affects the interpretation of the speaker's commitment of the proposition by the audiences because *subjective* is respective to the speaker while *objective* is irrespective to the speaker.

When a modal adjective is added before a nominal group or what we called an epithet (Simon-Vandenberg, 1997), it is uncertain of the interpretation of the aspects of *orientation* and *manifestation* of modality. The phenomenon in CN17.1 of Extract 6.4 brings forth two implications:-

First, in SFL theory, there are four major types of modality: degree of probability, usuality, obligation, inclination plus the fifth type, the degree of ability (Halliday & Matthiessen, 2014). As mentioned in Section 3.3, different types of modality are realized by different modal operators such as modal verbs and modal adjuncts. However, some aspects of modality are not well-defined in the literature. For example, there are different meanings or uses in one modal operator, in particular modal verbs. Subsequently, there may be different interpretations. Second, as mentioned in Section 3.3, different types of modality are realized by different modal operators such as modal verbs, modal adjuncts, interpersonal metaphors and projecting clause. (Halliday & Matthiessen, 2014). However, regarding the dimensions of *orientation* and *manifestation* of modality, the use modal adjectives

such as *possible* and *certain*, are not clearly described in SFL theory. The orientation of modality affects the interpretation of whether the proposition is *subjective* (‘expressed relative to the speaker’) or *objective* (‘expressed irrespective of the speaker’) (Argamon et al, 2007).

Extract 6.5 also demonstrates the use of modality to express degree of probability of the medium of transmission of swine influenza.

Extract 6.5: Swine Influenza: DH Website

Clause No. (CN)	Clause
7.1	A person <i>may</i> spread the virus to another person one day before symptoms start, and up to seven or more days after becoming sick.
8.1	This <i>can</i> be longer in some people, especially children and people with weakened immune system.
9.1	Therefore, people with HSI virus infection <i>should</i> be considered contagious
9.2	for as long as they show symptoms.
10.1	People <i>may</i> also become infected by touching objects soiled with flu viruses and then touching their mouth, nose or eyes.

Extract 6.5 is taken from the website of the Department of Health (DH) of Hong Kong. The aim of the language activity is to deliver health information about the medium of transmission of the virus causing the swine influenza. The speaker is health officials or representatives of the Department of Health. The audiences are

the general public or other people who seek information on the website concerning the swine influenza. Table 6.5 presents the modality items of Extract 6.5.

Table 6-5 Modality Items of Extract 6.5

Clause No. (CN)	Modal Operators	Expressing	Modality Type	Value	Orientation/ Manifestation	Mood Type	Speech Function	Polarity
7.1	may	possibility	probability	low	Subjective/ Implicit	declarative	statement	positive
8.1	can	possibility	probability	low	Subjective/ Implicit	declarative	statement	positive
9.1	should	deduction	probability	med	Subjective/ Implicit	declarative	statement	positive
10.1	may	possibility	probability	low	Subjective/ Implicit	declarative	statement	positive

As shown in Extract 6.5, the speaker used modal verbs *may*, *can* and *should* to express propositions about the degree of probability concerning the medium of transmission of swine influenza virus. The following four clauses are examples with modal verbs to present degree of probability.

CN7.1: A person *may* spread the virus to another person one day before symptoms start, and up to seven or more days after becoming sick.

CN8.1: This *can* be longer in some people, especially children and people with weakened immune system.

CN9.1: Therefore, people with HSI virus infection *should* be considered contagious CN9.2 for as long as they show symptoms.

CN10.1: People *may* also become infected by touching objects soiled with flu viruses and then touching their mouth, nose or eyes.

The above four examples in Extract 6.5 express the degree of probability by different modal verbs, *may*, *can* and *should*. They are clauses exchanging information. The mood type is *declarative* and the speech function is a *statement*. The modality type is *Modalization: probability*. The *orientation* is subjective and the *manifestation* is implicit. The modal verbs *may* and *can* is of low value while modal verb *should* is of median value. Modal verbs *may* and *can* are used to express possibility (Carter et al, 2011). The use of *may* and *can* in CN7.1, CN8.1 and CN10.1 functions to express the speaker's opinion or commitment to the truth of his/her proposition (Davidse & Simon-Vandenberg, 2008; Halliday, 1994; Huddleston & Pullman, 2002) about the possibility of the virus spread to other people and its route of transmission. Modal verb *should* is commonly used to construe degree of obligation, which is realized by a clause with speech function of *command* (Halliday & Matthiessen, 2014). However, the modal verb *should* is also used to express possibility or the speaker's deduction (Carter et al, 2011) as illustrated in CN9.1 of Extract 6.5. As the speech function of CN9.1 is a *statement*, the use of *should* in CN9.1 construes degree of probability of median value, a stronger commitment by the speaker of his/her proposition but not a command to express degree of obligation.

Different modal verbs have different uses, such as the modal verb *should*, *can* express command or possibility or deduction, as illustrated in CN9.1 of Extract 6.5.

The implication of Extract 6.5 is that it is important not to just focus on the modal operator presented in the clause. Rather, other aspects such as the context of situation or the speech function of the clause, as illustrated in the above example, are also considered essential.

The third extract in this section, Extract 6.6, illustrates the use of modal verbs *can* and *might*, and projecting clause *it is possible that...* to express degree of probability of the various medium of transmission of SARS in public health communication.

Extract 6.6: SARS: CDC website

Clause No. (CN)	Clause
18.1	The main way that SARS seems to spread is by close person-to-person contact.
19.1	The virus that causes SARS is thought to be transmitted most readily by respiratory droplets (droplet spread) produced
19.2	when an infected person coughs
19.3	or sneezes.
20.1	Droplet spread <u>can</u> happen
20.2	when droplets from the cough or sneeze of an infected person are propelled a short distance (generally up to 3 feet) through the air
20.3	and deposited on the mucous membranes of the mouth, nose, or eyes of persons who are nearby.
21.1	The virus also <u>can</u> spread
21.2	when a person touches a surface or object contaminated with infectious droplets
21.3	and then touches his or her mouth, nose, or eye(s).
22.1	In addition, <i>it is possible</i> that the SARS virus <i>might</i> spread more broadly through the air (airborne spread) or by other ways that are not now known.

Extract 6.6 is taken from the website of the Centers for Disease Control and Prevention (CDC) of the United States. The aim of the language activity is to deliver information about how SARS spreads. The speaker is health official or representative of the CDC. The audiences are the general public or people who seek information concerning the disease. Table 6.6 shows the modality items in Extract 6.6.

Table 6-6 Modality Items of Extract 6.6

Clause No. (CN)	Modal Operators	Expressing	Modality Type	Value	Orientation/Manifestation	Mood Type	Speech Function	Polarity
20.1	can	possibility	probability	low	Subjective/Implicit	declarative	statement	positive
21.1	can	possibility	probability	low	Subjective/Implicit	declarative	statement	positive
22.1	It is possible	possibility	probability	low	Objective/Explicit	declarative	statement	positive
22.1	might	possibility	probability	low	Subjective/Implicit	declarative	statement	positive

As shown in Table 6.6, four modal operators are present in Extract 6.6. The discussion of this extract first focuses on the following clauses:

CN20.1: Droplet spread can happen CN20.2 when droplets from the cough or sneeze of an infected person are propelled a short distance (generally up to 3 feet) through the air CN20.3 and deposited on the mucous membranes of the mouth, nose, or eyes of persons who are nearby.

CN21.1: The virus also can spread CN21.2 when a person touches a surface or object contaminated with infectious droplets

As mentioned in Section 3.4, one of the uses of *can* is to express possibility (Carter et al, 2011). The above examples in Extract 6.6 demonstrate the use of the modal

verb *can* to express propositions about the degree of probability of medium of transmission of swine influenza virus. CN20.1 and CN21.1 in Extract 6.6 are clauses for exchange of information. The mood type is *declarative* and the speech function is a *statement*. The modality type is *Modalization: probability, low value, subjective orientation* and implicit *manifestation* as realized by the use of modal verbs of *can*. The use of *can* in these two clauses functions to express the speaker's opinion or commitment to the truth of his/her proposition (Davidse & Simon-Vandenberghe, 2008; Halliday, 1994; Huddleston & Pullman, 2002) about the possibility of the virus spread by infectious droplets.

According to SFL theory (Halliday & Matthiessen, 2014), the four categories of *orientation* and *manifestation* of modality are realized by the uses of modal verbs (*subjective implicit*); modal adjuncts (*objective implicit*); interpersonal metaphors e.g. *I think* (*subjective explicit*); and projecting clauses e.g. *it is possible* that... (*objective implicit*). The second example of Extract 6.6 demonstrates the use of a projecting clause *it is possible* and a modal verb *might* to express propositions about the degree of probability of medium of transmission of the virus causing swine influenza.

CN22.1: In addition, *it is possible* that the SARS virus *might* spread more broadly through the air (airborne spread) or by other ways that are not now known.

CN22.1, Extract 6.6 is a clause exchanging information. The mood type is *declarative* and the speech function is a *statement*. The speaker made a proposition about the possibility of virus spread by infectious droplets by using two modal operators: a projecting clause *it is possible* that... and a modal verb *might*. First, the possibility of the virus spread through the air is realized by a projecting clause *it is possible*, a modality type is *Modalization: probability, low value, objective orientation* and explicit *manifestation*. The second modal operator used in the same clause is modal verb *might*, a modality type of *Modalization: probability, low value, subjective orientation* and implicit *manifestation*.

Similar to the example shown in Extract 6.2, there is an uncertain interpretation of the *orientation* of modality for two modality operators in the same clause as illustrated in CN22.1 of Extract 6.6. The implication is that when a modal operator is present in individual clause, it is more direct to assess the aspect of *orientation*. However, when two modal operators with two different types of orientation (*double orientation*) exist in the same clause, it is still possible to interpret the aspect of *orientation* according to individual modal operator. However, it is problematic to interpret whether it is related to the speaker (*subjective*) or it has only a minimal relation to the speaker (*objective*) (Butler, 2003) concerning his/her commitment to the proposition expressed. In other words, it creates confusion to readers.

The above example demonstrates the use of projecting clause *it is possible* to express degree of probability. The following extract shows examples of another modal operator, modal adjective *possible*, to express degree of probability.

Extract 6.7: SARS: WHO Press Updates (dated 25-03-2003)

Clause No. (CN)	Clause
16.1	Today's report of a <i>possible</i> transmission of SARS on board a flight is undergoing investigation.
17.1	As “close” contact is <i>possible</i> during a flight, in passengers sitting close to an infected person,
17.2	such transmission <i>cannot</i> be ruled out.

Extract 6.7 is taken from the press updates (PU) of the WHO concerning the SARS epidemic. The role of the language activity is to deliver information about the possibility of the transmission of SARS on flight. The speaker is health officials or public health representatives of the WHO. The readers are the general public or people who seek information concerning the SARS. Table 9.7 shows the modality items of Extract 6.7.

Table 6-7 Modality Items of Extract 6.7

Clause No. (CN)	Modal Operators	Expressing	Modality Type	Value	Orientation/ Manifestation	Mood Type	Speech Function	Polarity
16.1	possible	possibility	probability	low	?	declarative	statement	positive
17.1	possible	possibility	probability	low	?	declarative	statement	positive
17.2	can	possibility	probability	low	Subjective/ Implicit	declarative	statement	direct negative

As shown in Table 6.7, there are three modality operators, *possible* in CN16.1 and 17.1 and *can* in CN17.2. Modal adjective *possible* is often used to express the speaker's proposition about the degree of probability. As just discussed in Extract 6.6, modal adjective *possible* can be presented as a projecting clause *it is possible...* to express a degree of probability. The modal adjective *possible* also has other ways to express degree of probability. The first way is illustrated in the following clause Extract 6.7.

CN16.1: Today's report of a *possible* transmission of SARS on board a flight is undergoing investigation.

CN16.1, Extract 6.7 is a clause exchanging information. The mood type is *declarative* and the speech function is a *statement*. The speaker made a proposition about the possibility of transmission of the SARS on flight. The modality type is *Modalization: probability, low value* as realized by the use of a modal adjective

possible. However, the aspects of *orientation* and *manifestation* are indefinite. As discussed in Section 3.3.2, the aspects of *orientation* and *manifestation* are realized by the use of modal verbs (e.g. *may* and *can* etc.) as *subjective implicit*; modal adjuncts (e.g. *probably*, *certainly* etc.) as *objective implicit*; interpersonal metaphors (e.g. *I think*) as *subjective explicit*; and projecting clauses (e.g. *it is possible that...*) as *objective implicit* (Halliday & Matthiessen, 2014). However, in CN16.1, an adjective *possible*, which acts as an epithet (Simon-Vandenberg, 1997) added in a nominal group *transmission*, is a modal operator to present degree of probability. This presentation is not within the four categories of *orientation* and *manifestation* of modality in SFL approach. Except that the clause CN16.1 is paraphrased as ‘*it is possible for a transmission of SARS on board a flight*’, it will be interpreted as *objective orientation*. However, an epithet *possible* added in a noun group is indefinite in categorization of the aspect of *orientation*.

The practice of modal adjective *possible* in CN17.1, Extract 6.7 demonstrates another presentation of the degree of probability of the medium of transmission of swine influenza virus on flight.

CN17.1: As “close” contact is *possible* during a flight, in passengers sitting close to an infected person, **CN17.2** such transmission *cannot* be ruled out.

CN17.1, Extract 6.7 is a clause exchanging information. The speaker made a proposition about the possibility of close contact for transmission of SARS on flight. The mood type is *declarative* and the speech function is a *statement*. The modality type is *Modalization: probability, low value* as realized by the use of a modal adjective *possible*. Unlike CN16.1, *possible* in CN17.1 does not act as an *epithet* adding before a nominal group. Nevertheless, the modal adjective *possible* in CN16.1 also leads to ambiguity in the assessment of *orientation* and *manifestation* because it is not presented as the four SFL categories of *orientation* and *manifestation* of modality.

Another example in Extract 6.7 is a practice of negation of modal verb *can* to express degree of probability of disease transmission. CN17.2 is a clause exchanging information. The speaker made a proposition about the possibility of the medium of transmission just mentioned in CN17.1. The mood type of CN17.2 is *declarative* and the speech function is a *statement*. The modality type is *modalization: probability, low value, subjective orientation* and implicit *manifestation* as realized by the use of a modal verb *cannot*, a direct negative of the modal operator. As mentioned in Section 3.4, one of the uses of *can* is to express possibility (Carter et al, 2011). The function of *can* in negation is to express the commitment of the speaker that such transmission (*close contact during a flight*) is possible, presented by a negation of *can* plus lexical words ‘rule out’.

The implication of Extract 6.7 is that when modal adjective (e.g. *possible*) does not exist in projecting clauses (e.g. *it is possible...*) to present degree of probability, rather, as an epithet added in a nominal group like the one presented in CN16.1 or exist individually in a clause as in CN17.1, it is problematic to assess the *manifestation* aspect of modality because it is not classified in SFL theory.

Extract 6.8 shows an example of modal noun *possibility* to express degree of probability. Similar to the modal adjectives shown in Extract 6.7, modal nouns also encounter the same problem assessment of *orientation* aspect of modality.

Extract 6.8: SARS: WHO Press Updates (dated 07-04-2003)

Clause No. (CN)	Clause
21.1	Evidence that the causative agent is excreted in faeces has focused attention on the <i>possibility</i> of an oral-faecal route of transmission,
21.2	though no conclusions have been reached.

Extract 6.8 is also taken from the WHO press updates concerning SARS. The aim of the language activity is to deliver information about the possibility of the transmission of SARS through oral-faecal route. Table 6.8 shows modality items of Extract 6.8.

Table 6-8 Modality Items of Extract 6.8

Clause No. (CN)	Modal Operators	Expressing	Modality Type	Value	Orientation/ Manifestation	Mood Type	Speech Function	Polarity
21.1	possibility	possibility	probability	low	?	declarative	statement	positive

As shown in Extract 6.8, the speaker uses a modal noun *possibility* to express propositions about the degree of probability concerning the possibility of the transmission of SARS through oral-faecal route. The discussion focuses on the following clause:

CN21.1: Evidence that the causative agent is excreted in faeces has focused attention on the *possibility* of an oral-faecal route of transmission, (CN21.2) though no conclusions have been reached.

The above clause is exchanging information. The mood type is *declarative* and the speech function is a *statement*. The modality type is *Modalization*: probability, low *value* as realized by the use of modal noun *possibility*. The speaker made a proposition about the possibility of the disease transmission through oral-faecal route. Similar to modal adjectives presented in Extract 6.7, the use modal nouns such as *possibility* to express degree of probability leads to ambiguity in the assessment of *orientation* and *manifestation* as illustrated in CN21.1 of Extract 6.8.

The implication of Extract 6.8 is that when modal nouns (e.g. *possibility*, *uncertainty*) are used to present the degree of probability, it is also problematic or indefinite to assess the *manifestation* aspect of modality. Modal nouns are not included in the four SFL categories of *orientation* and *manifestation* of modality. There is also a lack of literature on the practice of modal nouns in presenting modality.

In SFL approach to modality, *I think*, *I believe*, *I guess* is a kind of interpersonal metaphor (metaphor of modality). The modal meaning is realized or expressed explicitly outside the clause (Taverniers: 2003). This is an alternate approach to express modality which performs the function as presenting the proposition put forward by the speaker subjective implicitly. The following extract shows examples of the use of interpersonal metaphors such as *we think*, *we believe* to express degree of probability in public health communication.

Extract 6.9: Swine Flu: WHO Press Conferences (dated 29-04-2009)

Clause No. (CN)	Clause
141.1	At this point, I want to make it very clear that <i>we do not believe</i> that the infections occurring in people are associated with getting infected from exposure to pigs.
142.1	This is a different situation from what we saw with avian influenza – the bird flu – in which people got clearly infected by birds.
143.1	In this situation, even though the virus originated in pigs,
143.2	<i>we do not believe</i>
143.3	that people are getting infected by pigs.
144.1	This is really a virus that is being transmitted from person-to-person.
145.1	Therefore, <i>we think</i>
145.2	that with food-handling practices, the eating of pork meat does not pose a danger to people.

Extract 6.9 is taken from the WHO press conferences concerning the swine influenza pandemic. The language event is a press conference held by the WHO concerning the 2009 swine influenza pandemic. The aim of the press conferences was to let the Assistant Director-General of the WHO report the progress concerning the swine influenza virus and the progress of the pandemic. After the reporting by the representative of the WHO, it may be followed by questions from the reporters or journalists. The speaker is Dr. Keiji Fukuda, Assistant Director-General of the WHO. The audiences are the reporters and journalists from different countries. The audiences of the press conference could also be the general public

when the press conferences were broadcast on other media such as TV channels and internet. Table 6.9 shows the modality items of Extract 6.9.

Table 6-9 Modality Items of Extract 6.9

Clause No. (CN)	Modal Operators	Expressing	Modality Type	Value	Orientation/ Manifestation	Mood Type	Speech Function	Polarity
141.1	we believe	possibility	probability	med	Subjective/ Explicit	declarative	statement	direct negative
143.2	we believe	possibility	probability	med	Subjective/ Explicit	declarative	statement	direct negative
145.1	we think	possibility	probability	med	Subjective/ Explicit	declarative	statement	positive

As shown in Extract 6.9, the speaker uses interpersonal metaphors *we believe...*, *we think...* to express propositions about the degree of probability concerning the possibility of the transmission of SARS through contact or exposure to pigs. The discussion focuses on the following three clauses:

CN141.2: At this point, I want to make it very clear that *we do not believe* that the infections occurring in people are associated with getting infected from exposure to pigs

CN143.1: In this situation, even though the virus originated in pigs, **CN143.2** *we do not believe* CN143.3 that people are getting infected by pigs.

CN145.1: Therefore, *we think* CN145.2 that with food-handling practices, the eating of pork meat does not pose a danger to people.

The above clauses in Extract 6.9 are expressed as an exchange of information. The mood type is *declarative* and the speech function is a *statement*. The modality type

is *Modalization: probability*, *median value*, *subjective orientation* and *explicit manifestation*, negative polarity as realized by the use of interpersonal metaphors *we do not believe* in CN141.2 and CN143.2, and the use of *we think* in CN145.1. The speaker made a proposition about the possibility of the disease transmission through exposure to pigs.

The modal meaning, which is realized by interpersonal metaphor (e.g. *I think*, *I believe*, *I guess*) to indicate the proposition put forward by the speaker, is categorized as *subjective orientation* and *explicit manifestation*. However, when the speaker is representing the institution where he/she works for, the subjective meaning is expressed as *we think* or *we believe* etc. as illustrated in the above examples in Extract 6.9. As the speaker is representing the WHO, a first-person pronoun WE is used to express the subjective point of view or opinion by utilizing the interpersonal metaphor presented by a projecting clause *we think* towards the issue in the projected clause. (Aritonang, 2014)

This section presents how modality is used to present the medium of disease transmission in public health communication during the 2003 SARS epidemic and the 2009 swine influenza pandemic. Various examples from six extracts concerning SARS and swine influenza are used to demonstrate how the speakers express

proposition on the medium of transmission of the diseases. In next section, examples from other extracts will be presented to illustrate the expression of prevention and treatment of the diseases, another topic of the nature of disease in public health communication.

6.2.3 Expressing Prevention and Treatment of Diseases

The prevention and treatment of diseases, in particular infectious diseases, are important aspects of public health communication on the nature of disease (Geering & Amanfu, 2002). If people learn about the prevention and treatment of a disease, they can take necessary action e.g. frequent hand washing to prevent SARS and swine influenza. Accordingly, this section introduces how modality is used to present the prevention and treatment of diseases in public health communication during the 2003 SARS epidemic and the 2009 swine influenza pandemic.

The first extract in this section demonstrates the use of modality to express proposition about the degree of probability and the speaker's proposal on the degree of obligation regarding the prevention and treatment of SARS.

Extract 6.10: SARS: NHS website

Clause No. (CN)	Clause
Treatment for SARS	
29.1	There is currently no cure for SARS,
29.2	but research to find a vaccine is ongoing.
30.1	A person suspected of having SARS <i>should</i> be admitted to hospital immediately
30.2	and kept in isolation under close observation.
31.1	Treatment is mainly supportive
31.2	and <i>may</i> include: assisting with breathing using a ventilator to deliver oxygen; antibiotics to treat bacteria that cause pneumonia; antiviral medications; high doses of steroids to reduce swelling in the lungs.
32.1	There is little in the way of scientific evidence to show
32.2	that these treatments are very effective.
33.1	The antiviral medication, ribavirin, is known to be ineffective at treating SARS.
Prevention advice	
34.1	You <i>should</i> avoid travelling to areas of the world where there is an uncontrolled SARS outbreak.
35.1	To reduce your risk of becoming infected,
35.2	avoid direct contact with people with SARS (until at least 10 days after their symptoms have gone).
36.1	To avoid spreading the infection, it is important to follow the prevention advice outlined below:
37.1	wash your hands thoroughly using an alcohol-based hand detergent
38.1	cover your mouth and nose when you sneeze or cough
39.1	avoid sharing food, drink and utensils
40.1	regularly clean surfaces with disinfectant
41.1	In some situations, it <i>may</i> be appropriate to wear gloves, masks and goggles to help prevent the spread of SARS.

Extract 6.10 is taken from the website of the National Health Service (NHS). The aim of the language activity is to deliver health information about prevention and

treatment of SARS. The speaker is health officials or representatives of the NHS, a public funded health services in the United Kingdom (UK) (National Health Service, 2016). The audience are the UK general public or other people who access information on the website. Table 6.10 shows the modality items of Extract 6.10.

Table 6-10 Modality Items of Extract 6.10

Clause No. (CN)	Modal Operators	Expressing	Modality Type	Value	Orientation/ Manifestation	Mood Type	Speech Function	Polarity
30.1	should	suggestion	obligation	med	Subjective/ Implicit	declarative	command	positive
31.2	may	possibility	probability	low	Subjective/ Implicit	declarative	statement	positive
34.1	should	suggestion	obligation	med	Subjective/ Implicit	declarative	command	positive
41.1	may	possibility	probability	low	Subjective/ Implicit	declarative	statement	positive

As shown in Table 6.10, modal verbs *should* and *may* are used by the speaker. The first example discussed in this extract focuses on the following two clauses, in which modal verb *should* to express a proposal of the degree of obligation concerning the prevention and management of SARS.

CN30.1: A person suspected of having SARS *should* be admitted to hospital immediately...

CN34.1: You *should* avoid travelling to areas of the world where there is an uncontrolled SARS outbreak.

As mentioned in Section 3.4, one of the usages modal verbs *should* is to give advice and suggestions (Carter et al, 2011). CN30.1 and CN34.1, Extract 6.10 are clauses exchanging goods and services. The mood type is *declarative* and the speech function is a *command*. The modality type is *Modulation: obligation, median value, subjective orientation* and implicit *manifestation* as realized by modal verb *should*. The function of *should* in CN30.1 and CN34.1 is to express a suggestion or advice to the general public concerning the management and prevention of SARS. For example, in CN30.1, the function of the modal verb *should* aims to express the speaker's proposal suggesting people should be admitted to hospital if they are suspected of having SARS.

The following example in Extract 6.10 demonstrates the use of modal verb *may* to express the speaker's proposition about the degree of probability concerning the prevention and management of SARS.

CN31.1: Treatment is mainly supportive **CN31.2** and *may* include: assisting with breathing using a ventilator to deliver oxygen; antibiotics to treat bacteria that cause pneumonia; antiviral medications; high doses of steroids to reduce swelling in the lungs.

CN31.2, Extract 6.10 is a clause exchanging information. The mood type is *declarative* and the speech function is a *statement*. The modality type is *Modalization: probability, low value, subjective orientation* and implicit

manifestation as realized by the use of modal verb *may*. The modal verb *may* in CN31.2 functions to express a speaker's opinion or commitment to the truth of his/her proposition (Davidse & Simon-Vandenberg, 2008; Halliday, 1994; Huddleston & Pullman, 2002) on the possibility of treatment of SARS by antibiotics and antiviral medication. Thus, it is less determinate (Halliday, 1994) e.g. '(Treatment) *may include...antibiotics to treat bacteria that cause pneumonia*' than presenting in a polar form such as '(Treatment) *includes...antibiotics to treat bacteria that cause pneumonia*'.

The following clause also demonstrates the use of modal verb *may* to present the degree of probability of appropriate measures to help prevention of the spread of SARS.

CN41.1: In some situations, it *may* be appropriate to wear gloves, masks and goggles to help prevent the spread of SARS.

The above example in Extract 6.10 is a clause exchanging information. The mood type is *declarative* and the speech function is a *statement*. The modality type *Modalization: probability, low value, subjective orientation* and implicit *manifestation* as realized by modal verbs *may*. As mentioned in Section 3.4, one of the uses of *may* is to express prediction (Carter et al, 2011). The use of *may* in

CN41.1 functions as a prediction that wearing gloves, masks and goggles helps to prevent the spreading of SARS.

The first example in Extract 6.10 presents the use of modal verb *should* to express degree of obligation. However, modal verb *should* is also used to express possibility (Carter et al, 2011). Thus, Extract 6.11 demonstrates an example of using a modal verb *should* to express the speaker’s proposition about the degree of probability of the prevention and treatment of swine influenza.

Extract 6.11: Swine influenza: NHS Website

Clause No. (CN)	Clause
104.1	Relenza <i>should</i> not affect your pregnancy or your growing baby.
105.1	However, Tamiflu <i>should</i> be offered instead of Relenza
105.2	if you: have a condition such as asthma or chronic obstructive pulmonary disease
105.3	have difficulty taking an inhaled antiviral
105.4	develop a severe or complicated disease due to influenza where you <i>will probably</i> be treated in hospital.

Extract 6.11 is also taken from the website of the NHS. The aim of the language activity is to deliver health information about the prevention and treatment of swine influenza. Table 6.11 shows the modality items of Extract 6.11.

Table 6-11 Modality Items of Extract 6.11

Clause No. (CN)	Modal Operators	Expressing	Modality Type	Value	Orientation/ Manifestation	Mood Type	Speech Function	Polarity
104.1	should	prediction	probability	med	Subjective/ Implicit	declarative	statement	direct negative
105.1	should	conditional possibility	probability	med	Subjective/ Implicit	declarative	statement	positive
105.4	will	conditional possibility	probability	med	Subjective/ Implicit	declarative	statement	positive
105.4	probably	possibility	probability	med	Objective/ Implicit	declarative	statement	positive

As shown in Table 6.11, the speaker used modal verbs *should* and *will* and modal adjunct *probably* to express degree of probability. The discussion of this extract first focuses on the following clause.

CN104.1: *Relenza should not affect your pregnancy or your growing baby.*

CN104.1, Extract 6.11 is a clause exchanging information. The mood type is *declarative* and the speech function is a *statement*. The modality type is *Modalization: probability*, median *value*, subjective *orientation* and implicit *manifestation* as realized by modal verb *should* in negation. As mentioned in Section 3.4, one of the uses of *should* is to express ‘what is likely to happen’ (Carter et al, 2011: 479). In other words, the function of *should* in CN104.1 is to express a prediction. The speaker made a proposition on the degree of probability of the treatment of influenza Relenza in affecting your (women’s) and your (women’s) growing baby by the use of *should* in negation.

The following examples in Extract 6.11 also demonstrate the use of the modal verb *should*, and the modal verb *will* and the modal adjunct *probably* in the same clause to present the degree of probability of the treatment of swine influenza.

CN105.1: However, Tamiflu *should be offered instead of Relenza* CN105.2 if you: have a condition such as asthma or chronic obstructive pulmonary disease CN105.3 have difficulty taking an inhaled antiviral **CN105.4** develop a severe or complicated disease due to influenza where you *will probably* be treated in hospital.

CN105.1 of Extract 6.11 is a clause exchanging information. The mood type is *declarative* and the speech function is a *statement*. The modality type is *Modalization: probability, median value, subjective orientation* and implicit *manifestation* as realized by modal verb *should*. The function of modal verb *should* in CN105.1 is to express “a hypothetical conditional clause with *if* to express possibility” (Carter et al, 2011: 480). As stated in CN105.2, the speaker made a proposition about the degree of probability on the use of Tamiflu instead of Relenza under the condition of some chronic illness.

Similar to the example shown in Extract 6.2, Section 6.2.1, CN105.4 also includes two modal operators in the same clause. However, the two operators in CN105.4, Extract 6.11 are the same modality type. CN105.4 is a clause exchanging information. The mood type is *declarative* and the speech function is a *statement*.

The speaker uses modal verb *will* and modal adjunct *probably* to express the management of swine influenza. In other words, there are two modal operators in the same clause. First, modal verb *will* indicates modality type of *Modalization: probability*, median *value*, subjective *orientation* and implicit *manifestation*. The function of *will* in CN105.4 is to express a conditional possibility (Carter et al, 2011) of the treatment of Tamiflu in hospital in case of development of severe or complicated disease. Second, modal adjunct *probably* indicates modality type of *Modalization: probability*, median *value*, objective *orientation* and implicit *manifestation*. The two modal operators indicate the same modality types of probability; however, there is uncertainty over the assessment and interpretation in a clause with two modal operators with two different orientations, subjective (*will*) and objective (*probably*), as in CN105.4, Extract 6.11. This issue has been discussed in Extract 6.2 and Extract 6.6.

The following extract shows an example of modality to express a degree of obligation.

Extract 6.12: Swine Influenza: WHO Website

Clause No. (CN)	Clause
33.1	Ill persons <i>should</i> be encouraged to practise cough etiquette
33.2	maintain distance,
33.3	cover coughs
33.4	and sneezes with disposable tissues or clothing, wash hands.

Extract 6.12 is taken from the website of the WHO. The aim of the language activity is to deliver health information about the prevention of swine influenza. The speaker is a health official or representative of the WHO. The audience are the general public or other health care providers who seek information concerning swine influenza. Table 6.12 shows modality items of Extract 6.12

Table 6-12 Modality Items of Extract 6.12

Clause No. (CN)	Modal Operators	Expressing	Modality Type	Value	Orientation/ Manifestation	Mood Type	Speech Function	Polarity
33.1	should	suggestion	obligation	med	Subjective/ Implicit	declarative	command	positive

As shown in Table 6.12, the speaker uses modal verb *should* to express a proposal of the degree of obligation concerning prevention of swine influenza. The discussion focuses on the following clauses:

CN33.1: Ill persons *should* be encouraged to practise cough etiquette
CN33.2 maintain distance, **CN33.3** cover coughs **CN33.4** and sneezes with disposable tissues or clothing, wash hands.

One of the uses of *should* is to express advice and suggestion (Carter et al, 2011). CN33.1 in Extract 6.12 is a clause exchanging information. The mood type is *declarative* and the speech function is a *command*. The modality type is *Modulation: obligation, median value, subjective orientation* and implicit

manifestation as realized by modal verb *should*. The function of the modal verb *should* in CN33.1 is to express the speaker’s proposal of the degree of obligation of prevention of swine influenza. The speaker is giving advice and suggestions to the audience to practise measures that control of swine influenza.

Extract 6.13 demonstrates the use of modality to express a speaker’s commitment to the truth of his/her proposition about the degree of probability and proposal of the degree of obligation concerning the prevention and treatment of the swine influenza.

Extract 6.13: Swine Influenza: DH Website

Clause No. (CN)	Clause
13.1	People who develop flu symptoms <i>should</i> put on a mask
13.2	and consult a doctor as soon as <i>possible</i> .
14.1	Those who have been to affected places or been exposed to sick persons <i>should</i> tell the doctor the travel and contact history.
15.1	Antiviral agents <i>can</i> reduce the severity and duration of illness
15.2	but <i>must</i> be used under doctor's prescription.
16.1	It is important for people not to self-medicate.

Extract 6.13 is taken from the website of the DH of Hong Kong. The aim of the language activity is to deliver health information concerning the prevention and treatment of swine influenza. The speaker is health officials or representatives of the DH. The audience are the general public or people who seek information concerning swine influenza. Table 6.13 shown the modality items of Extract 6.13

Table 6-13 Modality Items of Extract 6.13

Clause No. (CN)	Modal Operators	Expressing	Modality Type	Value	Orientation/ Manifestation	Mood Type	Speech Function	Polarity
13.1	should	suggestion	obligation	med	Subjective/ Implicit	declarative	command	positive
14.1	should	suggestion	obligation	med	Subjective/ Implicit	declarative	command	positive
15.1	can	potentiality	probability	low	Subjective/ Implicit	declarative	statement	positive
15.2	must	suggestion	obligation	high	Subjective/ Implicit	declarative	command	positive

As shown in Table 6.13, modal verbs *should*, *must* and *can* are used by the speaker. The first example in this extract discusses the use of modal verb *should* to express proposals of the degree of obligation concerning the prevention and management of swine influenza.

CN13.1: People who develop flu symptoms *should* put on a mask **CN13.2** and (should) consult a doctor as soon as possible.

CN14.1: Those who have been to affected places or been exposed to sick persons *should* tell the doctor the travel and contact history.

The above two clauses, CN13.1 and CN14.1, Extract 6.13 are used for an exchange of goods and services. The mood type is *declarative* and the speech function is *command*. The modality type is *Modulation: obligation*, median *value*, subjective *orientation* and implicit *manifestation* as realized by the use of modal verbs of *should*. As mentioned in Section 3.4, one of the uses of *should* is to express advice

and suggestion (Carter et al, 2011). The function of *should* in CN13.1 and CN14.1 functions to express the speaker's proposal of the degree of obligation of the prevention of swine influenza. The speaker is giving advice and suggestions to the audience to put on a mask and consult a doctor as soon as possible when the symptoms develop (CN13.1) and to tell the doctor in the travel and contact history (CN14.1).

The second example in this extract demonstrates the use of another modal verb *must* to express the degree of obligation of the treatment of swine influenza.

CN15.1: Antiviral agents can reduce the severity and duration of illness
CN15.2 but must be used under doctor's prescription.

As shown in CN15.2, this is a clause exchanging goods and services. The mood type is *declarative* and the speech function is a *command*. The modality type is *Modulation: obligation, high value, subjective orientation and implicit manifestation* as realized by the use of modal verb of *must*. As mentioned in Section 3.4, one of the uses of *must* is to express obligation and necessity (Carter et al, 2011). The use of *must* in CN15.2 is to express the speaker's proposal on the degree of obligation. As the mood type is *command*, in other words, the speaker is 'demanding something from the listener' or 'requiring something of the listener' (Halliday and Matthiessen, 2014: 135), and the response of the listener receiving

the command is undertaken, either he/she obey or refuse the command (Halliday and Matthiessen, 2014: 137). Accordingly, the speaker is making a suggestion to the audience that antiviral agents *must be used under doctor's prescription*.

Another example of CN15.1, Extract 6.13 demonstrates the use of modal verb *can* to express the degree of probability of the treatment of swine influenza.

CN15.1: Antiviral agents *can* reduce the severity and duration of illness
CN15.2 but *must* be used under doctor's prescription.

As shown in CN15.1, Extract 6.13, it is a clause exchanging information. The mood type is *declarative* and the speech function is a *statement*. The modality type is *Modalization: probability, low value, subjective orientation* and implicit *manifestation* as realized by the use of modal verb *can*. As one of the uses of *can* is to express possibility (Carter et al, 2011), the speaker expresses commitment to his/her proposition about the degree of probability of the antiviral agents in reducing the severity and duration of illness.

Extract 6.14 demonstrates the use of modality to express the speaker's commitment to the truth of his/her proposition about the degree of usuality and proposal of the degree of obligation concerning the prevention and treatment of SARS.

Extract 6.14: SARS: DH website

Clause No. (CN)	Clause
31.1	<i>Always</i> carry a handkerchief or tissue paper.
32.1	Cover the nose and mouth with it when sneezing or coughing.
33.1	Remember to wash hands immediately with liquid soap afterwards.
34.1	People with symptoms of respiratory tract infection or fever <i>should</i> wear a mask
34.2	and consult a doctor promptly.

Extract 6.14 is taken from the website of the DH of Hong Kong. The aim of the language activity is to deliver health information about the prevention of SARS.

Table 6.14 shows the modality items of Extract 6.14.

Table 6-14 Modality Items of Extract 6.14

Clause No. (CN)	Modal Operators	Expressing	Modality Type	Value	Orientation/ Manifestation	Mood Type	Speech Function	Polarity
31.1	always	frequency	usually	med	Objective/ Implicit	imperative	command	positive
34.1	should	suggestion	obligation	med	Subjective/ Implicit	declarative	Command	positive

As shown in Table 6.14, there are two modal operators in Extract 6.14, modal adjuncts *always* and modal verb *should*. The discussion of this extract first focuses on the following clause, in which the speaker uses modal adjunct *always* to express

a proposition on the degree of usuality concerning the prevention and management of SARS.

CN31.1: *Always* carry a handkerchief or tissue paper.

As shown in CN31.1, Extract 6.14, it is a clause exchanging information. The mood type is *imperative* and the speech function is a *command*. The modality type is *Modalization: usuality, high value, objective orientation* and implicit *manifestation* as realized by modal adjunct *always*. The function of the modal adjunct *always* is to express a speaker's opinion or commitment to the truth of his/her proposition or opinion (Davidse & Simon-Vandenberghe, 2008; Halliday, 1994; Huddleston & Pullman, 2002) on the frequency of carrying a handkerchief or tissue paper for prevention the spread of SARS.

The second example in this extract demonstrates the use of modal verb *should* to express proposal of degree of obligation concerning the prevention and management of SARS.

CN34.1: People with symptoms of respiratory tract infection or fever *should* wear a mask **CN34.2** and consult a doctor promptly.

As shown in CN34.1, Extract 6.14, it is a clause exchanging goods and services. The mood type is *declarative* and the speech function is a *command*. The modality type is *Modulation: obligation*, *median value*, *subjective orientation* and *implicit manifestation* as realized by a modal verb *should*. The function of the modal verb *should* in CN34.1 is to express the speaker's proposal to express the degree of obligation of people to admit to hospital if suspected of having SARS. One of the uses of *should* is to express advice and suggestion (Carter et al, 2011). The speaker is giving an advice and suggestion to the audiences to wear a mask when having symptoms of respiratory tract infect (CN34.1) and consult a doctor promptly (CN34.2).

This section presents how modality is used to present the speaker's commitment to his/her propositions or propose the prevention and treatment of the diseases in public health communication during the 2003 SARS epidemic and the 2009 swine influenza pandemic. Various examples from five extracts concerning SARS and swine influenza are used to illustrate how the speakers express propositions and proposal of the prevention and treatment of SARS and swine influenza. The next section presents examples from other extracts to illustrate the expression of the role of health authorities in the control and containment of the diseases in public health communication.

6.2.4 Expressing the Role of Health Authorities

The previous three sections mainly discuss how modality is used to express the nature of diseases in public health communication such as the signs and symptoms, medium of transmission, and prevention and treatment of SARS and swine influenza. During the SARS epidemic and the swine influenza pandemic, apart from delivering the information about the nature of diseases, public health authorities also play an important role to control the spread of diseases and ultimately contain the diseases. Accordingly, the aim of this section is to introduce examples from four extracts to illustrate how modality is used to present the role of health authorities in public health communication during the 2003 SARS epidemic and the 2009 swine influenza pandemic.

The first extract in this section introduces examples of modality to express the speaker's proposal of the degree of obligation of health authorities concerning the control of disease spread of SARS.

Extract 6.15: SARS: SCMP (dated 12-02-2003)

Clause No. (CN)	Clause
19.1	The officials said
19.2	there were no effective drugs to treat the disease, which has the symptoms of a flu and lung infection.
20.1	The two important things we <i>must</i> do are control the spread of the disease
20.2	and step up publicity to allay people's fears,
20.3	health department chief Huang Qingtao said.

Extract 6.15 is taken from *South China Morning Post*, a newspaper in Hong Kong. The role of the language activity is to report health official's promise or offer about the role or action to be taken by health authorities during the SARS epidemic. The speaker is the reporter or journalist of the newspaper, *South China Morning post* (SCMP), and the audience are people who read the newspaper. Table 6.15 shows the modality items of Extract 6.15.

Table 6-15 Modality Items of Extract 6.15

Clause No. (CN)	Modal Operators	Expressing	Modality Type	Value	Orientation/ Manifestation	Mood Type	Speech Function	Polarity
20.1	must	necessity	obligation	high	Subjective/ Implicit	declarative	offer	positive

As shown in Table 6.15, modal verb *must* is used by the speaker in CN20.1. The speaker uses modal verb *must* to express the degree of obligation concerning the role of health authorities in control the spread of the disease. The discussion focuses on the following clauses:

CN20.1: The two important things we *must* do are control the spread of the disease CN20.2: and step up publicity to allay people's fears, CN20.3: health department chief Huang Qingtao said.

The first clause, CN20.1, Extract 6.15 is a clause exchanging goods and services. The mood type is *declarative* and the speech function is an *offer*. The modality type is *Modulation: obligation, high value, subjective orientation* and implicit *manifestation* as realized by modal verb *must*. However, the speaker of the two clauses, CN20.1 and CN20.2, is the health department chief Huang Qingtao. He made a proposal to express the degree of obligation that “*the two important things we must do are control the spread of the disease and step up publicity to allay people's fears*”. The mood type is *declarative*. One of the uses of *must* is to express obligation and necessity (Carter et al, 2011). Although modal verb *must* is used, the speech function is not a *command*. Rather, it is an *offer* because the first-person pronoun *we* is used. It implies that the speaker is speaking for himself and on behalf of the health department. Thus, a command is not applicable because a *command* is the speaker who ‘demands something from the listener’ or ‘requires something of the listener’ (Halliday & Matthiessen, 2014: 135), and the response of

the listener of the command is undertaken, either obeying or refusing the command (Halliday & Matthiessen, 2014: 137). However, apart from expressing obligation, *must* is also used to express necessity. There are overlaps between the expression of necessity and obligation. A catenative verb *have to* is an alternate word for modal verb *must* in expressing necessity (Kosur, 2012). Thus, this is an example that a modal operator *must* is used to express degree of obligation but the speech function is an *offer*.

Extract 6.16 demonstrates example of modality in reported speech.

Extract 6.16: SARS: SCMP: (dated 17-03-2003b)

Clause No. (CN)	Clause
12.1	Lau Kong-wah, legislator with the Democratic Alliance for Betterment of Hong Kong, agreed
12.2	that in the absence of any concrete information linking the spread of the illness to an act of bio-terrorism, drawing such an inference was only speculation.
13.1	He said
13.2	government officials in Hong Kong and the mainland <i>should</i> , however, act swiftly to establish the source of the outbreak.

Extract 6.16 is also taken from *South China Morning Post*, the major English newspaper in Hong Kong. It demonstrates the use of modality to express the speaker's proposal of the degree of obligation of the health authorities in the containment of SARS.

Table 6-16 Modality Items of Extract 6.16

Clause No. (CN)	Modal Operators	Expressing	Modality Type	Value	Orientation/ Manifestation	Mood Type	Speech Function	Polarity
13.2	should	? suggestion	? obligation	med	Subjective/ Implicit	declarative	? command	positive

As shown in Table 6.16, modal verb *should* is used in Extract 6.16. The speaker uses modal verb *should* to express the degree of obligation concerning the role of health authorities in the management of the source of the SARS outbreak. This is also an example of modality in reported speech.

CN13.1He said **CN13.2.** government officials in Hong Kong and the mainland *should*, however, act swiftly to establish the source of the outbreak.

CN13.2, Extract 6.16 is a clause exchanging of information. The mood type is *declarative* and the speech function is a *statement*. The modality is subjective *orientation* and implicit *manifestation*, median *value* as realized by modal verb *should*. However, the modality type is ambiguous. It seems that CN13.2 is a clause exchanging goods and services and the speech function is a *command*. However, a command involves a commander or addresser and an addressee to do the action of the command (Halliday and Matthiessen, 2014). If CN13.2 is assessed individually without connection with CN13.1 ‘*He said*’, it is a command to express a degree of

obligation of government officials of Hong Kong and the mainland. However, when referring to the context of situation in Extract 6.16, the writer is a reporter or journalist of the newspaper *SCMP* and the audience are the people who read the newspaper article. The reporter is not giving a command to the audience. It is the legislator who gave the command and the addressee is the government. Thus, the speaker (the reporter) reported the legislator's suggestion or advice '*the government officials in Hong Kong and the mainland should act swiftly to establish the source of the outbreak*'. In other words, CN13.2 is probably not a clause for exchange of goods and services and the speech function is not a command. Rather, it is a clause for exchange of information. However, it is ambiguous to interpret the uses of *should* in CN13.2 as expressing degree of probability. The reason is that modal verb *should* has five common uses: i) "what is ideal or desired" (Carter et al, 2011: 479); ii) "advice and suggestions" (Carter et al, 2011: 479); iii) "what is likely to happen" (Carter et al, 2011: 480) ; iv) "conditional sentences" (Carter et al, 2011: 480); v) "surprise and regret" (Carter et al, 2011: 480). As the speech function of CN13.2 is not a *command*, the modal verb *should* in CN13.2 would not be expressing "what is ideal or desired" (Carter et al, 2011: 479) or 'advice or suggestions'. However, it is also not expressing "what is likely to happen" (Carter et al, 2011: 480), 'conditional sentences', or 'surprise and regret'. Accordingly, it is difficult to interpret the modal verb *should* in CN13.2 as expressing a degree of probability if the clause is an exchange of information. The possible interpretation of the modal verb *should* in CN13.2 is to express the degree of obligation in a

reported speech. However, when modality, such as expression of a command, is presented in reported speech, it shows problems in the interpretation of the modal assessment as illustrated in the above example. The implications of Extract 6.16 demonstrate a different interpretation from the SFL theory regarding the degree of obligation in modality. As mentioned previously, a command is the speaker is ‘demanding something from the listener’ or ‘requiring something of the listener’ (Halliday and Matthiessen, 2014: 135), and the response of the listener of the command is undertaken, either obeying or refusing the command (Halliday and Matthiessen, 2014: 137). However, when a command or the degree of obligation is expressed in a reported speech like the example in Extract 6.16, there is difference in the interpretation.

Extract 6.17 also demonstrates the use of modality to express the role of health authorities in control and management of SARS.

Extract 6.17: SARS: WHO Press Updates (dated 03-04-2003)

Clause No. (CN)	Clause
14.1	In Beijing, the government of China is now gearing up to fight SARS on a priority basis.
15.1	Reports in today's media referred to a State Council executive meeting on SARS
15.2	and described three key decisions:-
16.1	A special task force, headed by Minister of Health Dr Zhang Wenkang, <u>will</u> take charge of the fight against SARS.
17.1	A vice secretary-general of the State Council <u>will</u> coordinate actions by relevant ministries.
18.1	The task force <u>will</u> provide updates on SARS to WHO.
19.1	A nationwide mechanism for outbreak alert and response <u>will</u> be set up shortly to ensure rapid detection and reporting of outbreaks.
20.1	Dr Zhang appeared on Chinese national TV to address SARS-related issues

Extract 6.17 is taken from the WHO press updates concerning the SARS epidemic.

The aim of the language activity is to deliver health information concerning the SARS epidemic. The speaker is health officials or representatives from the WHO.

The audience is the general public or people who seek information concerning the SARS epidemic. Table 6.17 shows modality items of Extract 6.17.

Table 6-17 Modality Items of Extract 6.17

Clause No. (CN)	Modal Operators	Expressing	Modality Type	Value	Orientation/Manifestation	Mood Type	Speech Function	Polarity
16.1	will	decision	probability	med	Subjective/Implicit	declarative	statement	positive
17.1	will	decision	probability	med	Subjective/Implicit	declarative	statement	positive
18.1	will	decision	probability	med	Subjective/Implicit	declarative	statement	positive
19.1	will	decision	probability	med	Subjective/Implicit	declarative	statement	positive

As shown in Table 6.17, modal verb *will* is used by the speaker in CN16.1, CN17.1, CN18.1 and CN19.1. The speaker used modal verb *will* to express the role of health authorities in management of SARS.

CN16.1: A special task force, headed by Minister of Health Dr Zhang Wenkang, will take charge of the fight against SARS.

CN17.1: A vice secretary-general of the State Council will coordinate actions by relevant ministries.

CN18.1: The task force will provide updates on SARS to WHO.

CN19.1: A nationwide mechanism for outbreak alert and response will be set up shortly to ensure rapid detection and reporting of outbreaks.

Modal verb *will* is included in the above four clauses in Extract 6.18. However, there are two interpretations on the modality types of the modal verb *will* used in the extract.

First, CN16.1, CN17.1, CN18.1 and CN19.1, Extract 6.17 are clauses exchanging information. The mood type is *declarative* and the speech function is a *statement*.

The modality type is *Modalization: probability, median value, subjective orientation* and implicit *manifestation* as realized by modal verb *will*. As mentioned in Section 3.4, one of the uses of modal verb *will* is to express intentions, decisions and plans about the future (Carter et al, 2011: 586). The above four clauses are under CN15.1-2 “*Reports in today’s media referred to a State Council executive meeting on SARS CN15.2 and described three key decisions*”. Thus, the use of modal verb *will* in the four clauses is expressing something happened in the future or decisions of the State Council of Ministry of Health of China. The speaker of the text is health official or representative of the WHO. The speaker is expressing the degree of probability about what the health authority of China will do (their decisions of futurity).

Second, the above four clauses may be interpreted as exchanging goods and services. The mood function is an *offer*. The modality type is *Modulation: inclination*. The offers of the clauses were made by the State Council (CN15.1) to the general public. However, such an interpretation differs from the SFL theory that an *offer* is between the speaker who gives goods and services and the audience who either accepts or refuses goods and services (Halliday & Matthiessen, 2014). The speaker of Extract 6.19 is a health official or representative of the WHO. Accordingly, the speaker is giving information of the State Council’s decision on the management of the disease in the future with a modal verb *will* indicates the

speaker's commitment to the truth of his/her proposition on the degree of probability of the health authorities' decision on the control and management of SARS.

When the speaker of a text is reporting others' offers or commands, he or she is still exchanging information rather than exchanging goods and services as illustrated in the above example. Accordingly, the implication from Extract 6.17 is that it is important to relate to the context in analysis or interpretation of the type of modality of a language activity.

Extract 6.18 demonstrates an example of modality to express the speaker's proposal about the degree of inclination of the role health authority in the swine influenza pandemic.

Extract 6.18: Swine Influenza: WHO Press Conferences (dated 29-04-2009)

Clause No. (CN)	Clause
42.1	So we <i>will</i> continue to follow this and see how the picture of clinical symptoms evolves.

Extract 6.18 is taken from the press conferences of the WHO. The aim of the press conference was to let the Director-General or Assistant Director-General or other health official of the WHO reports the progress of the swine influenza pandemic.

After the reporting by the representative of the WHO, it may be followed by questions from the reporters or journalists. Sometimes, there was only reporting by the WHO officials without questioning time from the media. The speaker is a health official from the WHO. The audience are the reporters and journalists from different countries. The audiences of the press conference could also be the general public when the press conferences were broadcast on other media such as TV channels and internet. Table 6.18 shows the modality items of Extract 6.18.

Table 6-18 Modality Items of Extract 6.18

Clause No. (CN)	Modal Operators	Expressing	Modality Type	Value	Orientation/ Manifestation	Mood Type	Speech Function	Polarity
42.1	will	offer	inclination	med	Subjective/ Implicit	declarative	offer	positive

As shown in Table 6.18, modal verb *will* is used by the speaker. The discussion focuses on the following clause.

CN42.1: So we *will* continue to follow this and see how the picture of clinical symptoms evolves.

In CN42.1, the speaker uses modal verb *will* to express proposal of the degree of inclination concerning the role of health authority in the swine influenza pandemic. It is a clause exchanging goods and services. The mood type is *declarative* and the speech function is an *offer*. The modality type is *Modulation: inclination*, median

value, subjective *orientation* and implicit *manifestation* as realized by modal verb *will*. One of the uses of *will* is used to express “someone’s willingness to do something or to make offers. It is often used with *I* in this context” (Carter et al, 2011: 384). As the speaker of the text is representing the WHO, thus, the first-person pronoun *we* is used in CN42.1. The function of the modal verb *will* is used to express the inclination or the willingness of the WHO to continue follow the pictures of the symptoms evolves. In public health communication, the health authorities also play an important role to calm down the general public. To let the general public to know that they are going to do something is one of the strategies to calm people down. Thus, the modal verb *will* is used in this aspect.

This section presents how modality is used to present the role of health authorities in public health communication during the 2003 SARS epidemic and the 2009 swine influenza pandemic. Various examples from four extracts concerning SARS and swine influenza are used to demonstrate how the speakers express proposition or proposal of the role of health authorities in control and containment of the diseases. The next section introduces the implications that emerge arise from the study of modality in public health communication presented in this chapter.

6.3 Implications of the Study Findings

Various implications have been presented in the previous subsections. The aim of this section is to consolidate the implications in relation to public health communication. The study findings presented in this chapter have far-reaching implications both to the speakers and the audiences of the language activities.

Modality is usually realized through modal verbs (e.g. *should, would*), modal adjuncts (e.g. *probably*) or interpersonal metaphors presented by projecting clauses (e.g. *I think (that)...* or *it is likely (that)....*) (Halliday, 2014). However, there are variations and ambiguities in making classification and categorization of modality. Modal operators, in particular modal verbs, do not carry only one meaning. For example, in Extract 6.1, the use of modal verb *can* may be interpreted as degree of probability or ability. Likewise, the use of *may* in CN16.1 in Extract 6.4 can be interpreted as expressing either *possibility* or *a general truth* of the proposition (Carter et al, 2011) of “*Short-distance airborne transmission of influenza viruses may occur, particularly in crowded enclosed spaces*”. Although both interpretations are classified as a degree of probability in the SFL approach to modality, it is difficult to construe the meaning and even influence the audience to take appropriate action regarding the speaker’s proposition. The use of modality itself is to express indeterminacy between yes and no (Halliday, 1994). However, without a clear classification and category, it is problematic both in the usage for

the speaker and in interpretation for the audiences. It is even harder for the audience to make judgement on the truth of proposition expressed or the actualization of that situation (Huddleston & Pullman, 2012). Thus, it is suggested to consider further research to investigate response of the general public towards the messages with modality concerning the two events.

As mentioned in Section 3.3.2, each modality expression has four aspects including type of assessment (modalization: probability, usuality; modulation: obligation, readiness-inclination, ability), value (median; outer: high or low), orientation (subjective or objective) and manifestation (implicit or explicit). For the aspects of orientation and manifestation, *orientation* is concerned with whether proposition is related to (subjective) or with minimal connection (objective) to the speaker (Argamon et al, 2007). Subjective orientation is realized by the use of modal verbs while objective orientation is realized by the use of modal adjunct. However, when a clause presents with two modal operators of different types of modality or even of the same type of modality (prosody of modalization or modal concord), such as examples shown in Extracts 6.2 and 6.6 , there will be problems for the audience to distinguish whether the proposition is related to the speaker (*subjective*) or irrespective of the speaker (*objective*) (Argamon et al, 2007).

Also, the *manifestation* aspect of modality for the use of modal adjectives not presenting as projecting clauses or the use of modal nouns is not clearly described in SFL theory. When modal adjective (e.g. *possible*) does not exist in projecting clauses (e.g. *it is possible...*) to present the degree of probability, rather, as an epithet added in a nominal group as presented in CN16.1, Extract 6.4, it is problematic to assess the *manifestation* aspect of modality. Similarly, when modal noun (e.g. *possibility, uncertainty*) is used to present the degree of probability such as the example shown in Extract 6.8, it is also unclear to assess the *manifestation* aspect of modality. The orientation of modality affects the interpretation of whether the proposition is *subjective* ('expressed respective to the speaker') or *objective* ('expressed irrespective of the speaker') (Argamon et al, 2007).

When modality is used in reported speech, there is also variation in the assessment of types of modality. For example, the degree of obligation presented in Extract 6.16, a command where the speaker is 'demanding something from the listener' or 'requiring something of the listener' (Halliday & Matthiessen, 2014: 135), and the response of the listener of the command is undertaking, either obey or refuse the command (Halliday & Matthiessen, 2014: 137). However, when a command or the degree of obligation is expressed in reported speech, see Extract 6.16, there are differences in the interpretation of the type of modality.

6.4 Chapter Summary

This chapter presented the qualitative findings of how modality is used in public health communication. Various examples in eighteen extracts from the data set including press conferences, press updates, newspaper reports and website information concerning the 2003 SARS epidemic and the 2009 swine influenza pandemic were used to demonstrate how modality were expressed in information concerning the signs and symptoms of the diseases, medium of disease transmission, prevention and treatment of the diseases and the role of health authorities in control and containment of the diseases. Different modal operators (e.g. modal verbs, modal adjuncts, interpersonal metaphors and projecting clauses etc.) were used by the speakers to express their propositions or proposal in public health communication of SARS and swine influenza. However, the findings also presented problems and ambiguities in categorization and interpretation of modality type and its *orientation* aspect of modality, which were introduced in the implications of the findings and provided different inferences or suggestions both to the practice of public health communication and the theories of modality.

In the next chapter, the findings of modality in risk communication during the SARS epidemic in 2003 and the swine influenza pandemic in 2009 will be presented.

Chapter 7 Modality in Risk Communication

7.1 Chapter Overview

As mentioned in Section 1.5, the primary objective of the study is to investigate how modality is presented in public health and risk communication during the 2003 SARS epidemic and the 2009 swine influenza pandemic. The findings of modality presented in public health communication have been introduced in Chapter 6. This chapter turns to introduce the findings of modality presented in risk communication of the epidemic and pandemic.

This chapter is divided into four sections including this Chapter Overview. Section 7.2 introduces examples of modality expressed in risk communication. Various extracts from the press conferences and press updates, newspaper reports and website information concerning the 2003 SARS epidemic and the 2009 pandemic are used to demonstrate the speakers' choices of modal operators to express different aspects of risk communication such as expressing risk and uncertainty of diseases and vaccines for prevention of contacting diseases and the consequences of the disease epidemics and pandemics. Similar to the findings presented in the previous chapter, the extracts are selected on the basis that they show examples of different types of modality with different modal operators (e.g. modal verbs, modal

adjuncts, interpersonal metaphors and projecting clauses etc.) used by the speakers in risk communication. Section 7.3 presents the implications of the findings, which provide differences in inferences and suggestions both to the practice of risk communication and the theories of modality. Section 7.4 provides a summary of the chapter.

7.2 Expression of Modality in Risk Communication

As mentioned in Section 2.3, risk communication is critical because its goal is to assist the general public to understand the matters of concern and make informed choices and risk-based decision or judgment related to risk (Berry, 2003; Aven and Renn, 2010). Also, one important issue is that risk is concerned with the future, which is indispensable with the concepts of probability and uncertainty (Jaeger et al, 2001; Garland, 2003; Arnoldi, 2009; Jaeger et al, 2001). This implies that it is hard to get everything certain in reality in risk communication. Also, the features of risk and uncertainty are inherent features of disease outbreaks (World Health Organization, 2005c: 1) in public health crisis such as the SARS epidemic and the swine flu pandemic. Such contexts pose a challenge of risk communication to public health authorities and public health experts. As this study underlines the important issues of probability and uncertainty from a linguistic perspective, this section presents qualitative findings of the study by introducing various extracts from the data set to demonstrate the use of modality to express the features of

probability and uncertainty in risk communication during the SARS epidemic in 2003 and the swine influenza pandemic in 2009.

As it is impossible to cover all the topics related to risk communication, the findings of modality in risk communication will be organized into three subsections according to some important and significant topics during the SARS epidemic and the swine influenza such as risk and uncertainty of diseases, risk and uncertainty of vaccines, and consequences of epidemics and pandemics. Accordingly, Section 7.2.1 first presents the findings of modality in expressing risk and uncertainty of SARS and swine influenza. As mentioned in Section 1.3, vaccine was regarded as one of the most effective ways to protect people against the viruses or pathogens during influenza epidemic or pandemic (French & Raymond, 2009). Nonetheless, the uptake of swine influenza vaccine from the public in 2009 was unsatisfactory or even disappointing in many regions, for example in the U.S., Canada and Hong Kong (CDC, 2010; Henrich & Holmes, 2011; Lee, 2010). Lee (2010) argues that poor government organization and poor public communication accounted for the low public response to the swine flu vaccination programme in Hong Kong. However, if people believe that the vaccine will for protect their health, one may suppose that they will make judgments about the risks and benefits of such action. Of course, this judgment will rely on the information of risk and the benefits provided, and how such information is being presented. Accordingly, Section 7.2.2

introduces how modality is used to present the information about the vaccine, in particular the risk and uncertainty about the vaccine for the prevention of swine influenza. Also, as mentioned in Section 1.3.3, the 2003 SARS epidemic and the 2009 swine influenza pandemic created a significant impact on public health and other socio-economic consequences (Bandara, 2003; Heymann & Rodier, 2004; Lau et al., 2009; Smith, 2006; World Health Organization, 2003c). Thus, Section 7.2.3, presents how modality is expressed in risk communication of the consequences of the SARS epidemic and the swine influenza pandemic.

7.2.1 Expressing Risk and Uncertainty of Diseases

As stated in Section 1.5, the first objective of the study is to explore how the features of risk and uncertainty are communicated and presented during the 2003 SARS epidemic and the 2009 swine influenza pandemic. In case of disease epidemics or pandemic, public health authorities play an important role in informing the general public about the risk and uncertainty of the disease in order to assist the general public to understand risk and its associated matters and make judgement related to the risk (Berry, 2003; Aven and Renn, 2010) such as SARS and swine influenza. Accordingly, this section introduces how modality is used to communicate the risk and uncertainty of SARS and swine influenza.

The first extract, Extract 7.1, in this section demonstrates the use of modality to express the risk of swine influenza virus.

Extract 7.1: Swine Influenza: WHO Press Conferences (dated 26-04-2009)

Clause No. (CN)	Clause
12.1	When we see such a new virus,
12.2	if it has the ability to infect people to move from person to person in a way that it is able to cause community outbreaks, large outbreaks of infection,
12.3	then we <u>certainly</u> have the potential for the virus to spread from one country or one location to another.

Extract 7.1 is taken from the transcript of a press conference held by the WHO in 2009 concerning the swine influenza pandemic. The aim of the press conference was to let the Assistant Director-General of the WHO report the progress concerning the swine influenza virus and the progress of the pandemic. After the reporting by the representative of the WHO, it was followed by questions from the reporters or journalists. The speaker is Dr. Keiji Fukuda, Assistant Director-General of the WHO. The audience of the press conference is the reporters and journalists from different countries. The audience of the press conference could also be the general public if the press conferences were broadcast on other media such as TV channels and the internet. Table 7.1 shows the modality items of Extract 7.1.

Table 7-1 Modality Items of Extract 7.1

Clause No. (CN)	Modal Operators	Expressing	Modality Type	Value	Orientation/ Manifestation	Mood Type	Speech Function	Polarity
12.3	certainly	possibility	probability	high	Objective/ Implicit	declarative	statement	positive

As shown in Table 7.1, the use of modal adjunct *certainly* to express proposition about the degree of probability concerning the risk of swine influenza virus spread.

The discussion focuses on the following clauses:

CN12.2 *if* it has the ability to infect people to move from person to person in a way that it is able to cause community outbreaks, large outbreaks of infection,

CN12.3: then we *certainly* have the potential for the virus to spread from one country or one location to another.

CN12.3 is a clause exchanging information. The mood type is *declarative* and the speech function is a *statement*. The modality type is *Modalization: usuality*, high *value*, objective *orientation* and implicit *manifestation* as realized by a modal adjunct *certainly*. According to Bolinger (1972 cited in Hoyer, 1997: 161), modal adjuncts such as *certainly*, *surely*, *definitely* etc. involves the affirmation of truth. Thus, the speaker put his proposition by employing mood adjunct *certainly* to express a high value of probability or certainty of the risk of the virus spreading from one country or location to another. However, the interpretation of the example shown in Extract 7.1 is not straightforward and there are two predicaments:

conditional or *if-clause* shown in CN12.2 and the *orientation* aspect of modality in CN12.3.

First, according to Carter et al (2011), conditionals are used to “expressed imagined or uncertain situation and the possible results of the situation” (Carter et al, 2011: 140). Figure 7.2 shows the three types of conditionals and their associated forms.

Figure 7-1 Types of Conditionals

Types of Conditional	Conditional clause	Main clause
First conditional	<i>if</i> + present simple	Modal verb with future meaning (shall/should/will/would/can/could/may/might)
Second conditional	<i>if</i> + past simple	Modal verb with future-in-the-past meaning (should/would/might/could)
Third conditional	<i>if</i> + past perfect	Modal verb with future meaning (should/would/might/could) + have + -ed form

(Modified from Carter, R., McCarthy, M., Mark, G., & O’Keeffe, A., 2011:141-143)

The first conditional is used to present “the result of an imagined future situation, when we believe the imagined situation is quite likely” (Carter et al, 2011: 142). Thus, CN12.2 and CN12.3 are clauses of the first conditional. The first clause, CN12.2, of the example is the conditional clause (imagined future situation) and

the second clause, CN12.3, is the main clause (future result). However, the main clause, CN12.3, is not presented with a modal verb to indicate meaning of futurity. Instead, a mood adjunct *certainly* + finite *have* are used. The modality value of the mood adjunct *certainly* is high while the futurity of *will* or *shall*, is a median value modality operator. Very often, conditionals are used to present conditions that are possible, likely, unlikely and impossible and the main clause are presented with future meaning as realized by modal verbs (Carter et al, 2011) of low or median value. The implication of Extract 7.1 is that the use of modal adjunct *certainly*, which is a modal operator of high value, creates an unclear interpretation when it is used in conditionals, as in CN12.2 and CN12.3.

The second predicament is about the assessment of the aspects of *orientation* and *manifestation* of modality. Regarding the aspect of *orientation*, there are subjective and objective types, as mentioned in Section 3.3.2. Modality expressed in subjective *orientation* is relative to the speaker while in objective *orientation*, it is irrespective of the speaker (Argamon et al, 2007). Halliday & Matthiessen (2014: 181) also states that *subjective* orientation is presented either implicitly by modal verbs (e.g. *can*, *will* etc.) or explicitly by an interpersonal metaphor presented by a projecting clause or what Halliday (1994) calls it metaphor of modality, such as *I think... or I'm certain that ...* For *objective* orientation, it is presented either

implicitly by modal adjuncts (e.g. *certainly* or *possibly* etc) or explicitly by projecting clause such as *it is certain that*

As mentioned previously, the modality type CN12.3, Extract 7.1 is *Modalization: usuality*, high *value*, objective *orientation* and implicit *manifestation* as realized by a modal adjunct *certainly*. However, it is noted that the speaker used first person pronoun ‘we’ in CN12.1 and CN 12.3. In other words, the speaker also included the addressees or audiences of the press conference, that is, the reporters or journalists from different countries, to put forward the proposition or a make judgement about the proposition. The use of first person pronoun ‘we’ implies that it is a subjective *orientation*. However, if this is the case, such interpretation is different from the SFL theory. Halliday & Matthiessen (2014) comment that “the adverbial form *certainly* is a way of objectifying the speaker’s evaluation, the verbal form *must* carries a subjective loading” (Halliday & Matthiessen, 2014: 181). It is shown in the difference between modal adjuncts e.g. *certainly* and modal verbs e.g. *must* in the tag. For subjective orientation, the speaker evaluates the situation by his/her subjective assessment and also asks for the audiences’ subjective assessment by putting the modal verb *must* in the tag. For example, *He must have done the homework, mustn’t he?* However, for objective *orientation*, the audience is not involved in the subjective assessment and the modal operator *certainly* is not put in a tag (Halliday & Matthiessen, 2014). For example, *He certainly did the homework,*

didn't he? As Halliday & Matthiessen (2014) point out “with the subjective orientation, the modality is queried, but not with the objective orientation” (Halliday & Matthiessen, 2014: 181). The use of modal adjunct certainly is an objective orientation. For example, in

CN12.3 we certainly have the potential for the virus to spread from one country or one location to another’

The speaker does not put in the tag *don't we?* However, the speaker used ‘we’, which is a subjective sense, implying that the speaker is referring himself and other addressees, either the reporters/journalists attending the conferences or audiences who may watch the conference broadcasted on TV or other media, as in CN12.3, Extract 7.1.

Extract 7.2 in this section is also taken from a press conference held by the WHO in 2009 concerning the swine influenza pandemic.

Extract 7.2.: Swine Influenza: WHO Press Conferences (dated 26-04-2009)

Clause No. (CN)	Clause
114.1	So when viruses evolve,
114.2	clearly they <u>can</u> become more dangerous for people,
114.3	that is, to cause more serious disease,
114.4	or they are also able to mutate
114.5	so they cause less serious disease
114.6	and that is very difficult to predict.

Extract 7.2 demonstrates the use of modality to express the speaker's proposition about the degree of possibility of the risk of swine influenza virus. The aim of the press conference was to let the Assistant Director-General of the WHO report the progress concerning the swine influenza virus and the progress of the pandemic. After the reporting by the representative of the WHO, it was followed by questions from the reporters or journalists. The speaker is Dr. Keiji Fukuda, Assistant Director-General of the WHO. The audience of the press conference is the reporters and journalists from different countries. The audience of the press conference could also be the general public if the press conferences were broadcast on other media such as TV channels and the internet. Table 7.2 shows the modality items of Extract 7.2.

Table 7-2 Modality Items of Extract 7.2

Clause No. (CN)	Modal Operators	Expressing	Modality Type	Value	Orientation/ Manifestation	Mood Type	Speech Function	Polarity
114.2	can	possibility	probability	low	Subjective/ Implicit	declarative	statement	positive

As shown in Table 7.2, CN114.1 of Extract 7.2, the speaker used modal verb *can* to express proposition about the degree of probability of the risk of swine influenza virus. The discussion focuses on the following clause:

CN114.1 So when viruses evolve, **CN114.2**: clearly they can become more dangerous for people...

CN114.1 is a clause exchanging information. The mood type is *declarative* and the speech function is a *statement*. The modality type is *Modalization: probability*, low *value*, subjective *orientation* and implicit *manifestation* as realized by the use of modal verbs *can*. One of the uses of *can* is to express potentiality or possibility (Carter et al, 2011). The use of modal verb *can* in CN114.1 functions to express a speaker’s opinion about the possibility of whether the viruses become dangerous to people when they evolve. However, as noted in CN114.4 ‘*or they are also able to mutate*’, the words *are able to* are used, meaning that the viruses have the ability to mutate. This implies that the modal verb *can* may be interpreted as expressing degree of ability. However, it is also noted that in CN114.6 ‘*and that is very*

difficult to predict', the lexical word *predict* is used, meaning that the modal verb *can* in CN114.1 may also be interpreted as expressing degree of probability.

Modality is usually expressed by various modal operators such as modal verbs, modal adjuncts, interpersonal metaphors presented in projecting clauses (Halliday & Matthiessen, 2014). When modal verbs are used to express modality, there may be problems in interpretation of modality types, as illustrated in the above example in Extract 7.2. The implication is that the modal verb *can* in CN114.1 may be interpreted as possibility or ability or other uses as mentioned in Section 3.4. Thus, it is important not to just focus on one single clause in analysis and interpretation.

The above two extracts demonstrate examples of modality appearing in one clause. Extract 7.3 presents examples of multiple modal operators in one clause that reflects complexity in interpretation of the speaker's propositions.

Extract 7.3.: Swine Influenza: WHO Press Conferences (dated 29-04-2009)

Clause No. (CN)	Clause
50.1	Is it theoretically <i>possible</i> that this epidemic <i>could certainly</i> stop for unknown reasons,
50.2	although this is <i>probably unlikely</i> at this point.
51.1	<i>It is also possible</i> that we <i>could</i> continue on with spread of relatively mild illness in most countries
51.2	recognizing that death and serious illnesses <i>will</i> occur <i>sometimes</i> .
52.1	And <i>it is</i> also <i>possible</i> , that as we go into the future,
52.2	we <i>will</i> see more serious cases.
53.1	These options are all <i>possible</i> .
54.1	<i>We do not quite know</i> how this is going to evolve
54.2	but we <i>will</i> , << >>, monitor the situation very carefully.
54.3	<<as we mentioned over the last few days>>,

Extract 7.3 is taken from a press conference of the WHO concerning the swine influenza pandemic. The aim of the press conference was to let the Assistant Director-General of the WHO report the progress concerning the swine influenza virus and the progress of the pandemic. After the reporting by the representative of the WHO, it was followed by questions from the reporters or journalists. The speaker is Dr. Keiji Fukuda, Assistant Director-General of the WHO. The audience of the press conference is the reporters and journalists from different countries. The audience of the press conference could also be the general public if the press

conferences were broadcast on other media such as TV channels and the internet.

Table 7.3 shows the modality items of Extract 7.3.

Table 7-3 Modality Items of Extract 7.3

Clause No. (CN)	Modal Operators	Expressing	Modality Type	Value	Orientation/ Manifestation	Mood Type	Speech Function	Polarity
50.1	it is possible	possibility	probability	low	Objective/ Explicit	Yes/No interrogative	question	positive
50.1	could	possibility	probability	low	Subjective/ Implicit	Yes/No interrogative	question	positive
50.1	certainly	possibility	probability	high	Objective/ Implicit	Yes/No interrogative	question	positive
50.2	probably	prediction	probability	med	Objective/ Implicit	declarative	statement	positive
50.2	unlikely	prediction	probability	low	Objective/ Implicit	declarative	statement	direct negative
51.1	It is possible	possibility	probability	low	Objective/ Explicit	declarative	statement	positive
51.1	could	prediction	probability	low	Subjective/ Implicit	declarative	statement	positive
51.2	will	prediction	probability	med	Subjective/ Implicit	declarative	statement	positive
51.2	sometimes	frequency	usuality	med	Objective/ Implicit	declarative	statement	positive
52.1	it is possible	possibility	probability	low	Objective/ Explicit	declarative	statement	positive
52.2	will	prediction	probability	med	Subjective/ Implicit	declarative	statement	positive
53.1	possible	possibility	probability	low	?	declarative	statement	positive
54.1	we know	possibility	probability	high	Subjective/ Explicit	declarative	statement	direct negative
54.2	will	offer	inclination	med	Subjective/ Implicit	declarative	offer	positive

As shown in Table 7.3, the speaker uses various modal operators to express the speaker's proposition about the degree of probability of the risk and uncertainty of swine influenza. The discussion of this extract first focuses on the following clause:

CN50.1 Is it theoretically possible that this epidemic could certainly stop for unknown reasons,

CN50.1 is a clause exchanging information. The mood type of CN50.1 is *yes/no interrogative* and the speech function is a *question*. Although the speaker is expressing something that is uncertain by using a speech function of *question*, he (Dr. Fukuda) also gives answers to his question in the subsequent clauses from CN51.1 to CN53.2. The modality type is *Modalization: probability*. As there are three modal operators in the clause to express degree of probability of stopping the epidemic, the analysis is presented individually. First, the degree of probability is expressed by a projecting clause *it is possible that*, which is expressed in interrogative form. The modality type is low *value*, objective *orientation* and explicit *manifestation*. Second, a modal verb *could*, which is low *value*, subjective *orientation* and implicit *manifestation*, also expressed degree of probability. Third, a modal adjunct *certainly*, which is high *value*, objective *orientation* and implicit *manifestation*, also expressed degree of probability.

When modal operators in the same clause are assessed individually, there is no great problem in terms of the different aspects of modality. However, there are inconsistencies in the values of modality used to express the uncertainty or degree of probability, as in CN50.1, Extract 7.3. First of all, as discussed in the example

shown in Extract 7.1, modal adjuncts such as *certainly*, *surely*, *definitely* etc. involves the affirmation of truth (Bolinger, 1972 cited in Hoye, 1997: 161). Thus, the speaker puts his proposition by employing mood adjunct *certainly* to express a high value of probability in CN50.1. Conversely, a modal verb *could* and a projecting clause *it is possible*, which express low value of probability are also used in the same clause.

Secondly, regarding the aspects of *orientation* and *manifestation*, projecting clause *it is possible* is objective *orientation* and explicit *manifestation*; modal verb *could* is subjective *orientation* and implicit *manifestation*; modal adjunct *certainly*, is objective *orientation* and implicit *manifestation*. The *orientation* is assessed on whether the modality is expressed in relation to the speaker (subjective) or irrespective of the speaker (objective) (Argamon et al, 2007). The implication of the above example is that it would be quite confusing when the audience received a message with multiple uses of modal operators of different values and orientations in only one single clause, as in CN50.1 of Extract 7.3.

The following clause in Extract 7.3 also shows examples of using more than one modal operator in one clause.

CN50.2 although this is *probably unlikely* at this point.

The above example, CN50.2, is a clause exchanging information. The mood type is *declarative* and the speech function is a *statement*. The modality type of *Modalization: probability*, *median value*, *objective orientation* and *implicit manifestation*. The speaker uses two modal adjuncts *probably* and *unlikely* to express the uncertainty of the pandemic. As mentioned in the example shown in Extract 6.2 in Chapter 6, the presence of two modal operators in a clause is called *modal prosody* or *prosody of modalization* (Halliday 1994; Matthiessen, 1996; Halliday & Matthiessen 2014) or *concord* (Halliday, 1976 cited in Matthiessen, 1996). The interpretation of *concord* can only take place if both modal operators are of the same kind of modality (Geurts & Huitink, 2006; Zaroukian, 2014; Zeijlstra, 2007) and with similar quantificational force (Zeijlstra, 2007). However, the modal adjunct *unlikely* is the negation of *likely*, which is also a median value of modality. It seems that the speaker is expressing his proposition as *unlikely*. However, another modal adjunct *probably* with opposite meaning is included in the clause. Instead of just saying ‘*although this is unlikely at this point*’, the speaker adds a modal operator *probably*, which acts a modifier (Halliday, 1994; Halliday & Matthiessen, 2014) of modal adjunct *unlikely*. This reflects that the speaker is expressing uncertainty of the pandemic.

The following clause in Extract 7.3 also shows examples of using more than one modal operator in one clause.

CN51.1 *It is* also *possible* that we *could* continue on with spread of relatively mild illness in most countries

CN51.1 clause is exchanging information. The mood type is *declarative* and the speech function is a *statement*. The speaker also made a proposition about the uncertainty of virus spread by using two modal operators: a projecting clause *it is possible* that... and a modal verb *could*. First, the possibility of the virus spread into mild illness is realized by a projecting clause *it is possible*, a modality type is *Modalization: probability, low value, objective orientation* and explicit *manifestation*. The second modal operator used in the same clause is modal verb *could*, a modality type of *Modalization: probability, low value, subjective orientation* and implicit *manifestation*.

Similar to the example shown in CN50.1 and CN50.2 in Extract 7.3, there is an uncertain interpretation of the *orientation* of modality when more than one modality operator is used in the same clause as illustrated in CN51.1 of Extract 7.3. The implication is that when modal operator is present in individual clause, it is more direct to assess the aspect of *orientation*. However, when two modal operators with two different types of orientation (*double orientation*) exist in the same clause, it is still possible to interpret the aspect of *orientation* according to individual modal operator. However, it is problematic to interpret whether it is

related to the speaker (*subjective*) or it has only a minimal relation to the speaker (*objective*) (Butler, 2003; Argamon et al, 2007) concerning his/her commitment to the proposition expressed.

The following example in Extract 7.3 demonstrates the use of modality to express the speaker's proposition about degree of probability and degree of usuality of the risk of the swine influenza.

CN51.2 recognizing that death and serious illnesses will occur sometimes.

CN51.2 is a clause exchanging information. The mood type is *declarative* and the speech function is a *statement*. There are two modal operators in the clause:-

First, the use of modal verb *will* in CN51.2 indicates a modality type of *Modalization: probability, median value, subjective orientation* and implicit *manifestation*. One of the uses of *will* is to 'make prediction about the future' (Carter et al, 2011). The use of *will* in CN51.2 functions to express the speaker's opinion about a prediction of the risk of death and serious illnesses due to the spread of swine influenza of virus.

Second, the use of modal adjunct *sometimes* in CN51.2 indicates a modality type of *Modalization: usuality, median value, objective orientation* and implicit

manifestation. The use of *sometimes* in CN51.2 functions to express the speaker's proposition about the frequency of the risk of death and serious illnesses due to the spread of swine influenza of virus.

In SFL theory, subjective *orientation* of modality is realized by modal verbs such as *will* and *can*. For subjective type, the assessment is related to speaker (Argamon et al, 2007). *Objective* orientation is realized by modal adjuncts such as *usually* and *probably*. For objective type, there is minimal connection with the speaker (Argamon et al, 2007; Butler, 2003). However, the above two interpretations of the modal operators in CN51.2 of Extract 7.3 show that the modal verb *will* expresses the degree of probability and the modal adjunct *sometimes* expresses the degree of usuality. The clause is presenting two modality types. It is not considered as *modal concord* (Halliday 1994 cited in Matthiessen, 1996) or prosody of modalization (Halliday 1994; Matthiessen, 1996; Halliday & Matthiessen 2014) as previously mentioned. Thus, two modal operators presenting modality of different types cannot be interpreted as just like one single modal operator. It is difficult to distinguish between subjective and objective *orientation* in modality assessment when there are two modal operators of different modality types as illustrated in CN51.2 of Extract 7.3.

The following two clauses in Extract 7.3 also show examples of using more than one modal operator in one clause. The speaker also made a proposition about the risk and uncertainty of the virus spreading and the occurrence of serious cases by using two modal operators: a projecting clause *it is possible* that... and a modal verb *will*.

CN52.1 And *it is* also *possible* that as we go into the future, we *will* see more serious cases.

The analysis and interpretation of the modal operators of the above clause is similar to the example shown in CN51.2, Extract 7.3 and will not be repeated here.

The following two clauses in Extract 7.3 demonstrate the use of modal adjective *possible* and interpersonal metaphor *we do not know* to express the uncertainty of swine influenza virus.

CN53.1 These options are all *possible*.

CN54.1 *We do not quite know* how this is going to evolve

The discussion first focuses on CN53.1, which is clause exchanging information. The speaker made a proposition that the degree of probability or the possibility of the options he just mentioned in the previous clauses. The mood type is *declarative* and the speech function is a *statement*. The modality type is *Modalization: probability*, low *value* as realized by the use of modal adjective *possible*. The

modal adjunct *possible* in CN53.1 is not presented as a projecting clause *it is possible that*, as in CN50.1, CN51.1 and CN52.1. Thus, it leads to ambiguity in the assessment of *orientation* and *manifestation* because modal adjectives such as *possible* and *certain* are not presented as the four SFL categories of *orientation* and *manifestation* of modality.

As shown in CN54.1 of Extract 7.3 above, the speaker uses interpersonal metaphor *we know* in negation to express the uncertainty of the severity of swine influenza virus.

CN54.1 *We do not quite know* how this is going to evolve...

When a speaker said *I do not know*, it implies that he or she does not have information or is ignorant about the matter of concern. However, when an adverb *quite* is also used in the expression, it implies the indeterminacy of the information he or she is giving. Accordingly, the expression *we do not quite know*, as in CN54.1, is considered as modality rather than as in negative pole. CN54.1 is a clause exchanging information. The mood type is *declarative* and the speech function is a *statement*. The modality type is *Modalization: probability, high value*, subjective *orientation* and explicit *manifestation*, negative polarity as realized by the use of *we do not know*.

When modal meaning, which is realized by interpersonal metaphor (e.g. *I think, I believe, I guess*) to indicate the proposition put forward by the speaker, they are categorized as *subjective* orientation and *explicit* manifestation. However, when the speaker is representing the institution where he/she works for, the subjective meaning is expressed as *we know, we think* or *we believe* etc. as illustrated in the above example in Extract 7.3. As the speaker is representing the WHO, a first-person pronoun WE is used to express the subjective point of view or opinion by utilizing the projecting clause *we know, we think* or *we believe* towards the issue in the projected clause (Aritonang, 2014).

The lengthy discussion of Extract 7.3 is mainly due to a practice of multiple uses of modal operators. There are ten clauses (or five sentences or clause complexes) in Extract 7.3. However, it is noted that altogether there are fourteen modal operators including modal verbs, modal adjuncts, modal adjectives, interpersonal metaphors and projecting clauses, to present the speaker's propositions about the express the risk and uncertainty of swine influenza and its severity of illnesses related. As mentioned in Chapter 1, the risk and uncertainty of the diseases poses great challenges for public health officials delivered such information to the general public. Thus, it is difficult to make a subjective judgment about the appropriateness of such practice. Further research is needed to investigate the audience's

interpretation and understanding of the message with multiple modality operators, as illustrated in Extract 7.3. Although there are many modality items in such as short text in the Extract, they are not common in the data sets in the current study. Further investigation is suggested to study the multiple use of modality in the texts presented in other discourses.

Extract 7.4 turns to discuss the use of modality to express proposition about the degree of probability of an outbreak of the atypical pneumonia (SARS) in the community of Hong Kong.

Extract 7.4.: SARS: SCMP (dated 17-03-2003)

Clause No. (CN)	Clause
11.1	Secretary for Health, Welfare and Food Yeoh Eng-kiong said yesterday there <i>might</i> be infections of atypical pneumonia in the community directly related to the outbreaks involving mostly medical workers from
11.2	four public hospitals and one Mongkok clinic.

Extract 7.4 is taken from a major English newspaper in Hong Kong, the *South China Morning Post* (SCMP). The role of the language activity is to report news concerning SARS. The writer is the reporter or journalist of the *South China Morning post* (SCMP), and the audiences are people who read the newspaper. Table 7.4 shows the modality items of Extract 7.4.

Table 7-4 Modality Items of Extract 7.4

Clause No. (CN)	Modal Operators	Expressing	Modality Type	Value	Orientation/ Manifestation	Mood Type	Speech Function	Polarity
11.2	might	possibility	probability	low	Subjective/ Implicit	declarative	statement	positive

As shown in Table 7.4, the modal verb *might* is used in Extract 7.4. The speaker (reporter of SCMP) reported the health official’s proposition about the degree of probability of the relation between the outbreaks in the hospitals and clinic and infections of atypical pneumonia (SARS) in the community.

CN11.2: there *might* be infections of atypical pneumonia in the community directly related to the outbreaks involving mostly medical workers from four public hospitals and one Mongkok clinic.

CN11.2 is a declarative clause exchanging information. The mood type is *declarative* and the speech function is a *statement*. The modality type is *Modalization: probability, low value subjective orientation* and implicit *manifestation* as realized by modal verb *might*. As one of the uses of modal verb *might* is to express possibility (Carter et al 2011), the use of modal verb *might* in CN11.2 is to express the degree of probability of the relation between the outbreaks in hospitals and clinic and infections of atypical pneumonia in the community. Although the use of modal verb *might* is considered as subjective *orientation*, when referring to the context of situation of Extract 7.4, the situation is that the speaker (the reporter of the SCMP) is reporting the health official’s (Dr. Yeoh’s)

proposition concerning the uncertainty of SARS. In other words, the modal verb *might* is used in reported speech, in which a discrepancy occurs in interpretation of the aspect of *orientation* of modality. Subjective *orientation* is related to the speaker's assessment of the proposition while objective *orientation* is irrespective to the judgment of the speaker (Argamon et al, 2007). The implication of Extract 7.4 is that there is variation for interpretation on the aspect of *orientation* of modality in direct speech and in indirect reported speech. There is inadequate literature discussed on this aspect. Further research is needed to investigate the modality used in reported speech in other discourses so as to make the SFL framework of modality more comprehensive in interpretation different aspects of lexicogrammar.

Extract 7.5 demonstrates the use of modality to express the speaker's proposition about the uncertainty of swine influenza.

Extract 7.5: Swine Influenza: WHO-Press Conferences (dated 11-05-2009)

Clause No. (CN)	Clause
13.1	Right now as you know,
13.2	we are at this so-called Phase 5, and in sort of dry terms,
13.3	what this reflects is that <i>we believe</i> there is sustained community transmission, from person-to-person, occurring in two countries in one region, which is North America –which is one of the WHO Regions.
14.1	We have not gone up to 6,
14.2	and as we have gone on over and over again,
14.3	<i>I think</i> with these press briefings,
14.4	we have said,
14.5	you know,
14.6	we <i>cannot</i> predict the future,
14.7	so <i>it is possible</i> that we <i>will</i> go up to Phase 6,
14.8	we <i>could</i> go up there quickly,
14.9	we <i>could</i> go up there after a long period of time,
14.10	<i>it is possible</i> for us to go up,
14.11	but <i>it is also possible</i> for the current situation to stabilize where it is now,
14.12	and then <i>it is possible</i> that we <i>will</i> go back, down to Phase 4 in the future.

Extract 7.5 is taken from a press conference held by the WHO in 2009 concerning the swine influenza pandemic. The aim of the press conference was to let the Assistant Director-General of the WHO report the progress concerning the swine influenza virus and the progress of the pandemic. After the reporting by the representative of the WHO, it was followed by questions from the reporters or journalists. The speaker is Dr. Keiji Fukuda, Assistant Director-General of the

WHO. The audience of the press conference is the reporters and journalists from different countries. The audience of the press conference could also be the general public if the press conferences were broadcast on other media such as TV channels and the internet. Table 7.5 shows the modality items of Extract 7.5.

Table 7-5 Modality Items of Extract 7.5

Clause No. (CN)	Modal Operators	Expressing	Modality Type	Value	Orientation/ Manifestation	Mood Type	Speech Function	Polarity
13.3	we believe	opinion	probability	med	Subjective/ Explicit	declarative	statement	positive
14.3	I think	opinion	probability	med	Subjective/ Explicit	declarative	statement	positive
14.6	can	ability	ability	low	Subjective/ Implicit	declarative	statement	direct negative
14.7	It is possible	possibility	probability	low	Objective/ Explicit	declarative	statement	positive
14.7	will	prediction	probability	med	Subjective/ Implicit	declarative	statement	positive
14.8	could	possibility	probability	low	Subjective/ Implicit	declarative	statement	positive
14.9	could	possibility	probability	low	Subjective/ Implicit	declarative	statement	positive
14.10	It is possible	possibility	probability	low	Objective/ Explicit	declarative	statement	positive
14.11	It is possible	possibility	probability	low	Objective/ Explicit	declarative	statement	positive
14.12	It is possible	possibility	probability	low	Objective/ Explicit	declarative	statement	positive
14.12	will	prediction	probability	med	Subjective/ Implicit	declarative	statement	positive

As shown in Table 7.5, the speaker used different modal operators including modal verb *can*, *could*, *will* and interpersonal metaphors *we believe*, *I think* and projecting clauses *it is possible* to express the risk and uncertainty of swine influenza.

The discussion of this extract first focuses on the following clause:

CN13.3 what this reflects is that *we believe* there is sustained community transmission, from person-to-person, occurring in two countries in one region, which is North America –which is one of the WHO Regions.

The above clause in Extract 7.5 is used for an exchange of information. The mood type is *declarative* and the speech function is a *statement*. As discussed in Extract 6.9 in Chapter 6, modal meaning, which is realized by an interpersonal metaphor (e.g. *I think, I believe, I guess*) to indicate the proposition put forward by the speaker, is categorized as *subjective* orientation and *explicit* manifestation. However, when the speaker is representing the institution where he/she works, the subjective meaning is expressed as *we think* or *we believe* etc. As the speaker is representing the WHO, a first-person pronoun WE is used to express the subjective point of view or opinion by utilizing the projecting clause *we think* towards the issue in the projected clause (Aritonang, 2014). The modality type is *Modalization: probability, median value, subjective orientation* and *explicit manifestation*, as realized by the use of interpersonal metaphor *we believe*. The speaker made a proposition about the possibility of the risk of sustained community transmission of swine influenza.

The discussion of the second example of Extract 7.5 focuses on the following clauses:

- CN14.3 *I think* with these press briefings,
- CN14.6 we *cannot* predict the future,
- CN14.7 so *it is possible* that we *will* go up to Phase 6,
- CN14.8 we *could* go up there quickly,
- CN14.9 we *could* go up there after a long period of time,
- CN14.10 *it is possible* for us to go up,
- CN14.11 but *it is* also *possible* for the current situation to stabilize where it is now,
- CN14.12 and then *it is possible* that we *will* go back, down to Phase 4 in the future.

The speaker expresses the risk and uncertainty of swine influenza and the disease pandemic by employing many modal operators in one clause complex. The above clauses are used for an exchange of information. The mood type is *declarative* and the speech function is a *statement*. All the modal operators in the above clauses indicate modality type of *Modalization: probability*, except CN14.6 in which modal verb *can* in negation indicates degree of ability. As different modal operators indicate different *value*, *orientation* and *manifestation*, they will be interpreted individually. First, the use of interpersonal metaphor presented by projecting clause *I think* in CN14.3 indicates median *value*, subjective *orientation* and explicit *manifestation*. Second, the use of modal verb *can* in negation in CN14.6 indicates low *value*, subjective *orientation* and implicit *manifestation*. Third, the use of projecting clauses *it is possible* in CN14.7, CN14.10, CN14.11 and CN14.12 indicates low *value*, objective *orientation* and explicit *manifestation*. Fourth, the use of modal verb *will* in CN14.7 and CN14.12 indicates low *value*, subjective

orientation and implicit *manifestation*. Fifth, the use of modal verb *could* in CN14.8 and CN14.9 indicates low *value*, subjective *orientation* and implicit *manifestation*.

Again, as discussed in the examples shown in other extracts (e.g. Extract 6.2, Extract 6.3 and Extract 7.3), when modal operators are assessed individually, there are no problems of interpretation in the *orientation* aspect of modality. In other words, the question is whether the proposition is relative or irrespective to the speaker (Argamon et al, 2007). For example, the projecting clause *it is possible* in CN14.7 and CN14.12 of Extract 7.5 indicates low *value* and objective *orientation*. In contrast, another modal verb *will*, which indicates median *value* and subjective *orientation*, also exists in CN14.7 and CN14.12. Thus, it creates an unclear interpretation in the speaker's proposition about the information of the swine influenza pandemic.

The above example in Extract 7.5 presents a practice of multiple uses of modal operators with different values and orientations of modality to express degree of probability of the uncertainty of swine influenza pandemic. Such practice may be indispensable as uncertainty is an inherent feature in risk communication (WHO, 2005) as mentioned in Chapter 1. Nevertheless, further research to investigate the

response and the understanding of the audience is needed. The implication of the above example has been discussed in examples which show two modal operators in one clause such as Extract 7.3, Extract 6.2 and Extract 7.3.

The following extract, Extract 7.6, has been introduced in Section 1.4 to discuss the role of linguistics can play in epidemics or pandemics. Here, the examples shown in the extract will be interpreted in more detail.

Extract 7.6: Swine Influenza: WHO Press Conferences (dated 26-04-2009)

Clause No. (CN)	Clause
110.1	So currently cases we are mild
110.2	and we see cases which appear to be quite severe,
110.3	although again <i>we don't know</i> the exact relationship of this specific swine 'flu viruses to the serious cases,
110.4	you know
110.5	<i>we don't know</i> how <u>often</u> it causes serious disease as opposed to mild disease.

Extract 7.6 demonstrates the use of modality to express the risk, uncertainty and even ignorance of swine influenza. It is taken from a press conference held by the WHO in 2009 concerning the swine influenza pandemic. The aim of the press conference was to let the Assistant Director-General of the WHO report the progress concerning the swine influenza virus and the progress of the pandemic. After the reporting by the representative of the WHO, it was followed by questions from the reporters or journalists. The speaker is Dr. Keiji Fukuda, Assistant

Director-General of the WHO. The audience of the press conference are the reporters and journalists from different countries. The audience of the press conference could also be the general public if the press conferences were broadcast on other media such as TV channels and the internet. Table 7.6 shows the modality items of Extract 7.6

Table 7-6 Modality Items of Extract 7.6

Clause No. (CN)	Modal Operators	Expressing	Modality Type	Value	Orientation/ Manifestation	Mood Type	Speech Function	Polarity
110.3	we know	ignorance	probability	high	Subjective/ Explicit	declarative	statement	direct negative
110.5	we know	ignorance	probability	high	Subjective/ Explicit	declarative	statement	direct negative
110.5	often	frequency	usuality	med	Objective/ Implicit	declarative	statement	positive

As shown in Table 7.6, the speaker used modal operator *you know* in CN110.3 and 110.5 and *often* in 110.5 in Extract 7.6. The discussion focuses on the following clauses:

- CN110.1** So currently cases we are mild
- CN110.2** and we see cases which appear to be quite severe,
- CN110.3** although again we don't know the exact relationship of this specific swine 'flu viruses to the serious cases,
- CN110.5** we don't know how often it causes serious disease as opposed to mild disease.

The above clauses are exchanging information. The mood type is *declarative* and the speech function is a *statement*. The modality type of CN110.3 and CN110.5 is *Modalization: probability, high value, subjective orientation* and explicit *manifestation* as realized by the use of interpersonal metaphor *we know* in negation. The speaker expresses proposition about the ignorance (*'we don't know'*) of the relationship between swine influenza viruses and the severity of disease. Also, the speaker uses, 'appears to be' to express uncertainty of the severity of disease. In Section 1.4, the role of linguistics can take during disease outbreak is discussed. When uncertainties exist in the initial periods of a pandemic, lack of commitment to the proposition becomes the major strategy rather than making strong commitment so as to avoid unnecessary anxiety to the public.

Extract 7.7 also demonstrates the use of modality to express the uncertainty of SARS.

Extract 7.7: SARS: SCMP: (dated 18-03-2003c)

Clause No. (CN)	Clause
12.1	Dr Yeoh said
12.2	the infectious agent had still not been identified.
13.1	He criticised the WHO for sending out a travel advisory on Saturday which he said cast the definition of severe acute respiratory syndrome (SARS) too wide.
14.1	You really need to be sensible about this and not to have a whole global panic about this infection
14.2	because <u>we do not know</u> about its origin,
14.3	<u>we do not know</u> about its extent,
14.4	he said.

Extract 7.7 is taken from the *South China Morning Post (SCMP)*, the major English newspaper in Hong Kong. The role of the language activity is to report health official's proposition about the origin and extent of SARS. The speaker is the reporter or journalist of the newspaper, *South China Morning post (SCMP)*, and the audiences are people who read the newspaper. Table 7.7 shows the modality items of Extract 7.7.

Table 7-7 Modality Items of Extract 7.7

Clause No. (CN)	Modal Operators	Expressing	Modality Type	Value	Orientation/ Manifestation	Mood Type	Speech Function	Polarity
14.2	we know	ignorance	probability	high	Subjective/ Explicit	declarative	statement	direct negative
14.3	we know	ignorance	probability	high	Subjective/ Explicit	declarative	statement	direct negative

As shown in Table 7.7, modal operator *we know* is used. The discussion focuses on the following clauses:

CN14.1 You really need to be sensible about this and not to have a whole global panic about this infection

CN14.2 because *we do not know* about its origin,

CN14.3 *we do not know* about its extent,

CN20.1 he said.

The above clauses are exchanging information. The mood type is *declarative* and the speech function is a *statement*. The modality type of CN14.2 and CN14.3 is *Modalization: probability, high value, subjective orientation* and explicit *manifestation* as realized by the use of interpersonal metaphor *we know* in negation. The two clauses express proposition about the ignorance (*'we don't know'*) of the origin and extent of SARS. However, when referring to the context of situation of Extract 7.7, there is a difference between the interpretation of the aspect *orientation* of *'we do not know'* in CN14.2 and CN14.3 and the examples in Extract 7.6. The speaker of Extract 7.7 is the reporter of the newspaper and he or she is reporting the official's proposition about the ignorance of information concerning the SARS. In contrast, the speaker of the clauses, CN110.3 and CN110.5, in Extract 7.6, (the WHO health official), made the proposition about the ignorance (*'we don't know'*) of the relationship between swine influenza viruses and the severity of disease. In other words, although the same interpersonal metaphor *'we don't know'* or *'we*

know' in negation is used, there is a difference in the interpretation of the *orientation* aspect of modality, which concerns whether the statement is respective or irrespective to the speaker (Argamon et al 2007).

Again, this is less discussed in SFL theory regarding the aspect of *orientation* of modality when modal operators are used in reported speech, as in Extract 7.7. Further research should investigate the modality use in reported speech.

This section presents how modality is expressed in risk communication during the 2003 SARS epidemic and the 2009 swine influenza pandemic. Various examples from seven extracts are used to demonstrate how the speakers express propositions about the risk and uncertainty of SARS and swine influenza. The next section presents findings from other extracts to illustrate how modality is used to communicate risk and uncertainty of the swine influenza vaccine.

7.2.2 Expressing Risk and Uncertainty of Vaccines

As mentioned in Section 1.3, vaccines have been regarded as one of the most effective ways to protect people against the viruses or pathogens of during influenza epidemics or pandemics (French & Raymond, 2009). Nonetheless, the uptake of swine influenza vaccine from the public in 2009 was unsatisfactory or even disappointing in many regions, for example in the U.S., Canada and Hong Kong (CDC, 2010; Henrich & Holmes, 2011; Lee, 2010). Lee (2010) argues that poor government organization and poor public communication accounted for the low public response to the swine flu vaccination programme in Hong Kong. However, if people believe that the vaccine is for the protection of their health, they will make a judgment about the risks and benefits of such actions. Of course, this judgment will highly rely on the information of risk and the benefits provided, and how such information is being presented. Accordingly, this section introduces how modality is used to present the information, in particular the risk and uncertainty about the vaccine for the prevention of swine influenza. As there were no vaccines for the prevention of SARS (Jiang, Lu, & Du, 2012; World Health Organization, 2003a), the extracts introduced in this section are mainly taken from the data sets of swine influenza pandemic.

Extract 7.8 is the first extract discussed on the topic of risk and uncertainty of vaccines.

Extract 7.8: Swine Influenza: WHO Press Conferences (dated 13-07-2009)

Clause No. (CN)	Clause
85.1	The vaccines which are produced now are much better purified than the way they were in 1976,
85.2	so <u>we really do not think</u>
85.3	that <u>it is likely that we will</u> have these side effects again,
85.4	but to be <u>absolutely</u> honest,
85.5	of course it is only when you have a large scale distribution of vaccines that you know with <u>certainty</u> the safety profile of the vaccine.

Extract 7.8 is taken from a press conference of the WHO concerning the swine influenza pandemic. The aim of the press conference was to let the health officials of the WHO report the progress concerning the swine influenza virus and the progress of the pandemic. After the reporting by the representative of the WHO, it was followed by questions from the reporters or journalists. The speaker is Dr. Marie-Paule Kieny, the Director of the Initiative for Vaccine Research of the WHO. The audience of the press conference are the reporters and journalists from different countries. The audience of the press conference could also be the general public if the press conferences were broadcast on other media such as TV channels and the internet. Table 7.8 shows the modality items of Extract 7.8.

Table 7-8 Modality Items of Extract 7.8

Clause No. (CN)	Modal Operators	Expressing	Modality Type	Value	Orientation/ Manifestation	Mood Type	Speech Function	Polarity
85.1	we think	possibility	probability	med	Subjective/ Explicit	declarative	statement	direct negative
85.2	it is likely	possibility	probability	med	Objective/ Explicit	declarative	statement	positive
85.3	will	prediction	probability	med	Subjective/ Implicit	declarative	statement	positive
85.4	absolutely	possibility	probability	high	Objective/ Implicit	declarative	statement	positive
85.5	certainty	possibility	probability	high	?	declarative	statement	positive

As shown in Table 7.8, modal operators interpersonal metaphors *we think*, *it is likely*, modal verb *will* and modal adjuncts *absolutely* and *certainty* were used to express the uncertainty of the safety of the swine influenza vaccine in Extract 7.8.

The discussion focuses on the following clauses:

CN85.1 The vaccines which are produced now are much better purified than the way they were in 1976,

CN85.2 so *we really do not think* that

CN85.3 *it is likely that* we *will* have these side effects again,

CN85.4 but to be *absolutely* honest,

CN85.5 of course it is only when you have a large scale distribution of vaccines that you know with *certainty* the safety profile of the vaccine.

The above examples have been mentioned in Section 1.4 to discuss the role linguistics can take during disease outbreaks, but they have not been analysed in detailed in Chapter 1. The speaker expresses the risk and uncertainty of the safety and side effects of swine influenza vaccine by employing five modal operators in

one clause complex, which consists of five clauses. The above clauses are exchanging information. The mood type is *declarative* and the speech function is a *statement*. All the modal operators in the above clauses indicate modality type of *Modalization: probability*. As different modal operators indicate different *value*, *orientation* and *manifestation*, they will be interpreted individually. First, the use of interpersonal metaphor presented by projecting clause *we think* in negation in CN85.2 indicates median *value*, subjective *orientation* and explicit *manifestation*. Second, projecting clause *it is likely* in CN 85.3 indicates median *value*, objective *orientation* and explicit *manifestation*. Third, the use of the modal verb *will* in CN85.3 indicates a median *value*, subjective *orientation* and implicit *manifestation*. Fourth, the use of modal noun *absolutely* in CN85.4 indicates high *value*, objective *orientation* and implicit *manifestation*. Fifth, the use of modal noun *certainty* in CN85.5 indicates high *value* of modality. For the aspects of *orientation* and *manifestation*, modal nouns are less discussed in SFL theory of modality. It is suggested to investigate modal nouns in modality in the aspects of *orientation* and *manifestation* so as to provide more examples to establish a more comprehensive framework to analyze modality.

Again, as discussed in the examples shown in other extracts (e.g. Extract 6.2 and Extract 6.3 in Section 7.2.1 of this chapter), when modal operators are assessed individually, there are no problems of interpretation in the *orientation* aspect of

modality. In other words, the question is whether the proposition is relative or irrespective to the speaker (Argamon et al, 2007). For example, the projecting clause *it is likely* in CN85.3 indicates objective *orientation*. In contrast, the modal verb *will*, also in CN85.3, indicates a subjective *orientation*. Thus, it creates an unclear interpretation in the speaker's proposition about the information of the swine influenza vaccine.

Also, in CN85.2 '*we really do not think*' is used to indicate a negative polarity. Here, 'we' together with an adverb 'really' indicates a subjective emphasis of situation (Paradis, 2003). However, Paradis (2003) argues that there is no direct relationship between the evidence of truth of the propositional content and the subjective emphasis put by the speaker. Then, the statement is followed by a projecting clause 'it is likely that'..., which indicates a median value of probability with an objective *orientation* and explicit *manifestation*. The whole statement, here, constitutes a negative polarity and two different level of modality to indicate the degree of probability. It is quite problematic to interpret the exact commitment of the speaker concerning the safety and side effects of swine influenza vaccine.

As mentioned in Chapter 1, uncertainty is an inherent feature in risk communication. The practice of the multiple uses of modal operators to express a

degree of probability constitutes the attribute of uncertainty about the swine flu vaccine as illustrated by the examples shown in Extract 7.8. Nevertheless, whether such practice is indispensable requires further research to investigate the response and understanding of the audiences.

Extract 7.9 demonstrates the use of modality to express the speaker's proposition about the dose of the vaccine for the prevention of swine influenza.

Extract 7.9: Swine Influenza: WHO-Press Conferences (dated 06-05-2009)

Clause No. (CN)	Clause
15.1	For H5N1 – avian influenza vaccine – it has been shown
15.2	that you need two doses.
16.1	For this new vaccine, nobody knows.
17.1	It <u>may</u> be the case that the population has already some experience, some "priming"
17.2	as we say,
17.3	and has already encountered the H1N1 (unintelligible) – not the new one – but the human H1N1 seasonal strain,
17.4	and because of that there is already some background level of immunity.
18.1	If this is the case,
18.2	it <u>may</u> be that one dose <u>will</u> be sufficient.
19.1	But this still needs to be demonstrated,
19.2	and it is only in clinical trials in humans with the first doses of vaccine available,
19.3	that this <u>will</u> be completely clear.
20.1	Therefore, we <u>will</u> still need a few months to know whether we <u>will</u> need one or two doses.

Extract 7.9 is taken from a press conference of the WHO concerning the swine influenza pandemic. The aim of the press conference was to let the health officials of the WHO report the progress concerning the swine influenza virus and the progress of the pandemic. After the reporting by the representative of the WHO, it was followed by questions from the reporters or journalists. The speaker is Dr Marie-Paule Kieny, the Director of the Initiative for Vaccine Research of the WHO. The audience of the press conference are the reporters and journalists from different countries. The audience of the press conference could also be the general public if the press conferences were broadcast on other media such as TV channels and the internet. Table 7.9 shows the modality items used in Extract 7.9.

Table 7-9 Modality Items of Extract 7.9

Clause No. (CN)	Modal Operators	Expressing	Modality Type	Value	Orientation/ Manifestation	Mood Type	Speech Function	Polarity
17.1	may	possibility	probability	low	Subjective/ Implicit	declarative	statement	positive
18.2	may	possibility	probability	low	Subjective/ Implicit	declarative	statement	positive
18.2	will	possibility	probability	med	Subjective/ Implicit	declarative	statement	positive
19.3	will	prediction	probability	med	Subjective/ Implicit	declarative	statement	positive
20.1	will	prediction	probability	med	Subjective/ Implicit	declarative	statement	positive
20.1	will	prediction	probability	med	Subjective/ Implicit	declarative	statement	positive

As shown in Table 7.9, modal verbs may and will were used by the speaker. The first discussion focuses on the following clauses:

CN17.1 It may be the case that the population has already some experience, some "priming".
CN18.1 If this is the case,
CN18.2 it may be that one dose will be sufficient.

The first example in Extract 7.9 demonstrates the use of modal verb *may* to express the speaker's proposition about the dose of swine influenza vaccine. CN17.1 and CN18.2 in Extract 7.9 are clauses exchanging information. The mood type of the two clauses is *declarative* and the speech function is a *statement*. The modality type is *Modalization: probability*, subjective *orientation* and implicit *manifestation* as realized by the use of modal verb *may*. As one of the uses of modal verb *may* is to express possibility (Carter et al, 2011), the modal verb *may* in CN17.1 functions to express the speaker's proposition about the population has already got some 'priming' or experience. The modal verb *may*, expressed in CN17.1, is straightforward and related to the interpretation of the different aspects of modality.

However, the modal verb *may* in CN18.2 functions as an expression of the future results in the main clause of a type of first conditional as *if* is indicated in the conditional clause of CN18.1. Also, the speaker uses another modal verb *will* in the main clause of the conditional to indicate the future result - '*one dose will be sufficient*'. As mentioned in Section 3.4, one of the uses of *will* is to indicate a possible situation in the future in main clause in conditionals (Carter et al, 2011).

The modality value of modal verb *may* is low while modal verb *will* is median. In other words, when two modal operators of different values are present in the main clause of conditionals, it is expected to indicate different degree of probability of future result. It leads to discrepancy in interpretation of the proposition in terms of value of modality.

In conditionals, modal verbs are used in the main clause to indicate possible situations or results in the future. The implication of the above example is that when two modal verbs of different values are used in the main clause of a conditional clause as illustrated in the examples in CN18.1 and CN18.2, Extract 7.9, there is a discrepancy of interpretation of the proposition in terms of value of modality. More importantly, there is a lack in the literature and discussion in SFL regarding the presentation of modality in conditionals.

The following example demonstrates the use of modality to express the speaker's proposition about the dose of the vaccine for the prevention of swine influenza.

CN20.1 Therefore, we will still need a few months to know whether we will need one or two doses.

One of the uses of modal verb *will* is to make a prediction about the future (Carter et al, 2011). CN20.1 in Extract 7.10 is a clause exchanging information. The mood

type is *declarative* and the speech function is a *statement*. The modality type is *Modalization: probability, median value, subjective orientation* and implicit *manifestation* as realized by the use of modal verb *will*. The use of *will* in CN20.1 functions to express the speaker's proposition about a prediction of the doses of swine influenza vaccine.

This section presents how modality is used to communicate risk and uncertainty concerning the vaccine of swine influenza. Various examples from two extracts are used to demonstrate how the speakers express propositions on the risk and uncertainty concerning the safety and doses of swine influenza vaccine. The next section presents findings from other extracts to illustrate how modality is used to express the consequences of the diseases during the 2003 SARS epidemic and the 2009 swine influenza pandemic.

7.2.3 Expressing Consequences of Diseases

The previous two sections mainly present the risk and uncertainty of SARS and swine influenza and the vaccine of swine influenza. As mentioned in Section 1.3.3, the 2003 SARS epidemic and the 2009 swine influenza pandemic have created significant impacts on public health and other socio-economic consequences. For example, the massive implication of the SARS epidemic was a significant global

socio-economic disruption occurred in the affected countries and regions (e.g. in Hong Kong, China and Singapore), mainly due to the travel and tourism affected (Bandara, 2003; Heymann & Rodier, 2004; Lau et al., 2009; Smith, 2006; World Health Organization, 2003c). Accordingly, this section turns to illustrate how modality is expressed in risk communication of the consequences of SARS and swine influenza.

Extract 7.10 is the first extract in this section which introduces examples of modality to express the speaker's proposition about the risk and consequences of SARS.

Extract 7.10: SARS: SCMP (dated 19-03-2003)

Clause No. (CN)	Clause
11.1	However, some parents have taken to issuing individual alerts, with one anonymous circular signed by a very concerned parent warning of the potential for an epidemic.
12.1	Up to now the infection seems to have been limited to the hospital staff and their families,
12.2	the statement said.
13.1	If the second outburst took place in one of the schools,
14.1	the consequences <i>could</i> be very disastrous.
15.1	Then Hong Kong <i>will</i> be in the grip of a gigantic plague, like the one which killed tens of thousands of people in 1894.
16.1	The statement slammed the complacency of the Education and Manpower Bureau (EMB) in issuing cautionary guidelines to school authorities.

Extract 7.10 is taken from *South China Morning Post (SCMP)*, a major English newspaper in Hong Kong. The role of the language activity is to report the news the risk and consequences of the SARS epidemic. The writer is the reporter or journalist of SCMP, and the audiences are people who read the newspaper. Table 7.10 shows the modality items of Extract 7.10.

Table 7-10 Modality Items of Extract 7.10

Clause No. (CN)	Modal Operators	Expressing	Modality Type	Value	Orientation/ Manifestation	Mood Type	Speech Function	Polarity
14.1	could	possibility	probability	low	Subjective/ Implicit	declarative	statement	positive
15.1	will	prediction	probability	med	Subjective/ Implicit	declarative	statement	positive

As shown in Table 7.10, modal verbs *could* and *will* are used. There are two examples of modality in this extract. The discussion of this extract first focuses on the following two clauses:

CN13.1 If the second outburst took place in one of the schools,
CN13.2 the consequences *could* be very disastrous.

CN13.2, Extract 7.10 is a clause exchanging information. The mood type is *declarative* and the speech function is a *statement*. The modality is subjective *orientation* and implicit *manifestation*, low *value* as realized by modal verb *could*. One of the uses of modal verb *could* is “to express possibility in the past and the

future” (Carter et al, 2011: 161). The functions of modal verb *could* in CN13.2 is to express the speaker’s proposition about the risk of the consequences of SARS. However, the involvement of *if* in CN13.1 indicates the two clauses are conditional. As indicated in Figure 7.1, the above two clauses are forms of second conditional, in which the imagined present or future situation is expressed in the conditional clause or *if-clause* and the possible result is expressed in the main clause. The second conditional is usually expressed in a past form to indicate a detachment from reality. It is not to indicate past time in the conditional clause (Carter et al, 2011). The conditional clause is expressed with *if* + past simple in conditional clause, as in CN13.1 and the main clause is expressed with modal verbs (e.g. *should, would, might* and *could*) to express future-in-the-past meaning (Carter et al, 2011), as in CN13.2. In other words, the modal verb *could* in the above example functions to express the possible result or consequence of an imagined condition or situation as in CN13.1 of Extract 7.10.

The second example of Extract 7.10 demonstrates the use of modal verb *will* to express the consequences of SARS.

CN15.1 Then Hong Kong *will* be in the grip of a gigantic plague, like the one which killed tens of thousands of people in 1894.

In addition to the use of modal verb *could* presented in conditional as illustrated in the previous example, modal verb *will* is another way to express degree of probability. As mentioned in Section 3.4, one of the uses of *will* is to make prediction about the future (Carter et al, 2011). CN15.1, Extract 7.10 is a clause exchanging information. The mood type is *declarative* and the speech function is *statement*. The modality type is *Modalization: probability, median value, subjective orientation* and implicit *manifestation* as realized by the use of modal verb *will*. The speaker expresses his/her opinion about a prediction of the consequence and the risk of SARS because a modal verb *will* is used in CN15.1.

Extract 7.11 introduces examples of modality to express the speaker's proposition about the redundancies of workers in Hong Kong, one of the consequences of SARS.

Extract 7.11: SARS: SCMP (dated 29-03-03b)

Clause No. (CN)	Clause
1.1	Hong Kong workers <i>may</i> face another round of redundancies
1.2	if the community fails to contain the spread of atypical pneumonia, triggering the collapse of consumer confidence.

Extract 7.11 is also taken from *South China Morning Post*. The role of the language activity is to report news concerning SARS. The writer is the reporter or journalist

of the *South China Morning post*, and the audiences are people who read the newspaper. Table 7.11 shows the modality items of Extract 7.11.

Table 7-11 Modality Items of Extract 7.11

Clause No. (CN)	Modal Operators	Expressing	Modality Type	Value	Orientation/ Manifestation	Mood Type	Speech Function	Polarity
1.1	may	possibility	probability	low	Subjective/ Implicit	declarative	statement	positive

As shown in Table 7.11, modal verb *may* is used in Extract 7.11. The discussion focuses on the following clauses:

- CN1.1:** Hong Kong workers *may* face another round of redundancies
- CN1.2:** if the community fails to contain the spread of atypical pneumonia, triggering the collapse of consumer confidence.

The above example in Extract 7.11 demonstrates the use of modal verb *may* to express propositions about the degree of probability concerning the risk and consequences of SARS. CN1.1 in Extract 7.11 is a clause exchanging information. The mood type is *declarative* and the speech function is *statement*. The modality type is *Modalization: probability*, low *value*, subjective *orientation* and implicit *manifestation* as realized by the use of modal verbs of *may*. One of the uses of *may* is to express possibility (Carter et al, 2011). The use of modal verb *may* in CN1.1 functions to express the speaker’s opinion about the possibility of redundancies of

workers in Hong Kong under the condition that *if* the spread of atypical pneumonia (SARS) fails to contain. The use of *if* in CN1.2 indicates the clause is conditional. CN1.2 is the conditional clause with *if* + present simple to indicate an imagined situation and CN1.1 is the main clause presented with modal verb *may* to indicate a future result. Thus, the above two clauses are examples of first conditional in which the speaker “believe the imagined situation is quite likely” (Carter et al, 2011: 142).

Apart from using modal verbs to express degree of probability, the involvements of *if* in conditionals are also ways to present situations that are possible, likely, unlikely or impossible (Carter et al, 2011). For first conditionals, the present simple form in the conditional clause indicates that speaker believes “the imagined situation is quite likely” (Carter et al, 2011: 142). For second conditional, the past simple form in conditional clause indicates ‘a distance from reality’. For third conditional, the past perfect form in conditional clause indicates “when we imagine a different past, where something did or did not happen, and we imagine a different result” (Carter et al, 2011: 143). In other words, different conditionals present different degree of probability. The implication is that when modal verbs are presented in the main clause of conditionals, as illustrated in the first example shown in Extract 7.10 and the above example in Extract 7.11, the interpretation also involved the information presented in conditional clause or *if-clause*.

Extract 7.12 introduces examples of modality to express the speaker's proposition about the consequences of SARS.

Extract 7.12: SARS: SCMP: Editorial (dated 030403b)

Clause No. (CN)	Clause
29.1	<u>Certainly</u> , the disease <u>will</u> take an economic toll, coming on the heels of worries about the Iraq war and a jittery world economy.

Extract 7.12 is also taken from *South China Morning Post*. The role of the language activity is to report news concerning SARS. The writer is the reporter or journalist of the *South China Morning post*, and the audiences are people who read the newspaper.

Table 7-12 Modality Items of Extract 7.12

Clause No. (CN)	Modal Operators	Expressing	Modality Type	Value	Orientation/Manifestation	Mood Type	Speech Function	Polarity
29.1	certainly	possibility	probability	high	Objective/Implicit	declarative	statement	positive
29.1	will	prediction	probability	med	Subjective/Implicit	declarative	statement	positive

As shown in Table 7.12, modal adjunct *certainly* and modal verb *will* are used in Extract 7.12. The discussion focuses on the following clause:

CN29.1 Certainly, the disease will take an economic toll, coming on the heels of worries about the Iraq war and a jittery world economy.

The above example in Extract 7.12 demonstrates the use modal adjuncts *certainly* and modal verb *will* to express the speaker's propositions about the degree of probability concerning the risk and consequences of SARS. CN29.1 is a clause exchanging information. The mood type is *declarative* and the speech function is a *statement*. There are two modal operators in one clause. First, the use of modal adjunct *certainly* in CN29.1 indicates a modality type of *Modalization: probability*, high *value*, objective *orientation* and implicit *manifestation*. According to Bolinger (1972 cited in Hoyer, 1997: 161), modal adjuncts such as *certainly*, *surely* and *definitely* involve the affirmation of truth. Thus, the speaker offers his proposition by employing a mood adjunct *certainly* to express a high value of probability or certainty of the risk and consequence of SARS on world economy.

However, a second modal operator, a modal verb *will*, is also used by the speaker to express a degree of probability. The use of modal verb *will* in CN29.1 indicates a modality type of *Modalization: probability*, median *value*, subjective *orientation* and implicit *manifestation*. The use of *will* in CN78.1 functions to express the speaker's proposition about a prediction of the risk and consequence of SARS on world economy because one of the uses of *will* is to 'make a prediction about the future' (Carter et al, 2011).

The use of two modal operators of the same modality types in one clause is considered as concord (Halliday 1994 cited in Matthiessen, 1996) or prosody of modality (Halliday 1994; Matthiessen, 1996; Halliday & Matthiessen 2014). The two modal operators shown in CN29.1 of Extract 7.12 are of the same type of degree of probability. In other words, there are no contradictions in the assessment of the modality type. However, the aspects of *value* and the *orientation* of modality are different. The modal adjunct *certainly* in CN29.1 indicates a high value and objective *orientation*. In contrast, the modal verb *will* indicates a median *value* and subjective *orientation*. Thus, this creates unclear interpretation in the speaker's proposition about the risk and consequence of SARS on the world economy. The implications of the above example have been discussed in the examples in Extract 7.3 and Extract 6.2 in Chapter 6, which also shows two modal operators in one clause. In other words, further research is needed to investigate the use of two modal operators of the same modality types in one clause

This section presents how modality is used to express the consequences of the diseases during the 2003 SARS epidemic and the 2009 swine influenza pandemic. Various examples from three extracts are used to demonstrate how the speakers express propositions about the consequences of the diseases. The next section introduces the implications that arise from the study findings of modality in risk communication presented in this chapter.

7.3 Implications of the Study Findings

Various implications have been presented in the previous subsections in this chapter and this section aims at consolidating these implications in relation to risk communication. The study findings presented in this chapter have far reaching implications both for the speakers and the audience of the language activities.

As mentioned in Section 2.4.3, disease epidemics or pandemics have caused vast apprehension in the world because of the characteristics of high degree of uncertainty especially the mortality and transmissibility of the virus (Jones and Slather, 2009). Thus, it is common to recognize the language of risk and uncertainty over the messages conveyed from the media, government and health authorities worldwide. For example, as illustrated by some extracts in this chapter such as Extract 7.3, Extract 7.5 and Extract 7.8, it is noted that the speakers employ a practice of using different modal operators with different values to present degree of probability of the risk and uncertainty of the diseases and vaccines. For example, in Extract 7.3, there are ten clauses with fourteen modal operators including modal verbs, modal adjuncts, modal adjectives, and interpersonal metaphors to present the speaker's propositions about the risk and uncertainty of the swine influenza and severity of the illnesses. As discussed in Chapter 1, uncertainty is an inherent feature in risk communication, as illustrated by multiple uses of modal operators

with high frequency of occurrences in examples shown in Extract 7.3, Extract 7.5 and Extract 7.8. Such a high frequency of modality may reflect the risk and uncertainty of the diseases. On the one hand, this poses great challenges for public health officials who delivered such information to the general public. On the other hand, this may also create confusion for the audience when they received a message with multiple modal operators of different values and orientations in only one single clause, such as examples in CN50.1, Extract 7.3. Covello, Peters, Wojtecki, and Hyde (2001) state that communication to the public about nature of risk is crucial, in particular for making decisions about any action associated with the risk. The WHO (2005c) also mentioned that “(Disease) outbreaks are frequently marked by uncertainty, confusion and a sense of urgency” (World Health Organization, 2005c: 1). In other words, the language of uncertainty is common and inherent in risk communication. One way to study uncertainty is by means of modality. As the major focus of the study is to investigate how modality is presented in the discourses of the SARS epidemic and the swine influenza pandemic, it is difficult to make a subjective judgment on the appropriateness of the practice of multiple uses of modality in a message. If such practice is indispensable, it would be worth conducting further research to investigate the audience’s interpretation and their corresponding actions associated with the risk and uncertainty with multiple modality operators as illustrated in the examples Extract 7.3, Extract 7.5 and Extract 7.8.

Another issue being discussed in the findings of this chapter is the use of modality in conditionals as presented by examples in Extract 7.1, Extract 7.10 and Extract 7.11. Very often, conditionals are used to present conditions that are possible, likely, unlikely and impossible and the main clause are usually presented with future meaning as realized by modal verbs (Carter et al, 2011) of low or median value such as *could*, *can*, *will* and *would*. However, if a modal adjunct *certainly*, which is a modal operator of high value, is used as illustrated in CN12.3, Extract 7.1., it may create an unclear interpretation when modal adjuncts are used in the main clause of conditionals.

Also, in conditionals, modal verbs are present in the main clause to indicate a possible situation or results in the future (Carter et al 2011). When two modal operators of different values are present in the main clause of conditionals as illustrated in the example in CN18.1 and CN18.2 of Extract 7.9, it is expected that they indicate a different degree of probability for the future results. There are discrepancies in the interpretation of the proposition in terms of the value of the modality. More importantly, there is a lack of literature and discussion in SFL regarding the presentation of modality in conditionals. It is suggested that more studies on modality used in conditionals in other discourses should be considered.

As discussed previously, modality is usually expressed by various modal operators such as modal verbs, modal adjuncts and interpersonal metaphors (Halliday & Matthiessen, 2014). Sometimes there may be problems in the interpretation of modality types, in particular when modal verbs are used, as illustrated by the example of the modal verb *can* in CN114.1, Extract 7.2. The modal verb *can* may be interpreted as a possibility or ability or other uses as mentioned in Section 3.4. Nevertheless, there may be confusion for the audiences to interpret whether the modal verb *can* is expressing possibility or ability or other meanings. The implication is that it is important not to just focus on one single clause in the analysis and interpretation of the *types*, *value*, *orientation* and *manifestation* aspects of modality.

When modal operators are assessed individually, there are no great problems in the interpretation of the aspect of their orientation. The *orientation* is assessed on whether the modality is expressed in relation to the speaker (subjective) or irrespective of the speaker (objective) (Argamon et al, 2007). However, when two modal operators with two different types of orientation (*double orientation*) exist in the same clause as illustrated in examples in Extract 7.1 and Extract 7.3, it is uncertain in the interpretation of the aspect of *orientation* of modality. Also, there are inconsistencies in the values of modality used to express the uncertainty or

degree of probability as discussed in the example shown in Extract 7.3. The speaker puts his proposition forward by employing a mood adjunct *certainly* to express a high value of probability because modal adjuncts such as *certainly*, *surely* and *definitely* involve the affirmation of truth (Bolinger, 1972 cited in Hoye, 1997: 161). However, a modal verb *could* and a projecting clause *it is possible* are also used to express low value of probability. Such practice may create confusion for the audience to make judgment on the proposition of the speaker such as a message with the multiple uses of modal operators of different values and orientations in only one single clause, as in CN50.1, Extract 7.3.

7.4 Chapter Summary

This chapter presented the qualitative findings of how modality was used in risk communication. Various examples in twelve extracts from the data sets including press conferences, press updates, newspaper reports and website information concerning the 2003 SARS epidemic and the 2009 swine influenza pandemic were used to demonstrate how modality was expressed in information concerning the risk and uncertainty of diseases and vaccines, and the consequences of the diseases.

Different modal operators (e.g. modal verbs, modal adjuncts, interpersonal metaphors and projecting clauses etc.) were used by the speakers to express their

propositions or proposal in the risk communication of SARS and swine influenza. However, there were practices of using multiple modal operators in communicating risk and uncertainty as illustrated in the examples shown in this chapter, in particular those taken from the press conferences of the WHO concerning the swine influenza pandemic. Further research is needed to investigate the audiences' interpretation and their corresponding actions associated with the risk and uncertainty with multiple modality operators as illustrated in the examples in this chapter.

Regarding the use of modality in conditionals, there is a lack of literature and discussion in SFL theory, as illustrated by the examples shown in Extract 7.1, Extract 7.10 and Extract 7.11. Further studies are needed to investigate modality used in conditionals in other discourses so as to provide a more comprehensive framework of modality in interpretation presented by various lexicogrammar.

Similar to the findings of modality in public health communication in Chapter 6, this Chapter also demonstrated the use of two or more than two modal operators in one clause. Thus, there were also problems and ambiguities in the categorization and interpretation of modality type and its *orientation* aspect. Such problems and ambiguities have been discussed in the implications of the findings and different

inferences or suggestions both related to the practice of risk communication and the theories of modality have been provided.

In the next chapter, the conclusion of the study, including a summary of how the study achieves its objectives, the contributions of the study, the limitations of the study and recommendations for future research are presented.

Chapter 8 Conclusion

8.1 Chapter Overview

The primary objective of the study is to investigate how modality and its expressions are used to construe risk and uncertainty in public health and risk communication in the discourses of the 2003 SARS epidemic and the 2009 swine influenza pandemic. This final chapter aims at concluding the thesis by summarizing the key findings and contributions of this study, and discussing the limitations and challenges of the study that lead to suggestions for future research. Section 8.2 first discusses how the study has achieved the research objectives by highlighting some key findings detailed in the previous chapters. It is followed by Section 8.3, a discussion of the contributions of this study to the theories and practice of public health and risk communication and also to the current debates on the conception of modality. Section 8.4 presents the limitations, challenges and recommendations for future research. Section 8.5 is a summary of the chapter.

8.2 How the Study Has Achieved the Research Objectives

Before discussing how the study has achieved the research objectives, it is important to revisit the major issues that this study aims to address.

As mentioned in Section 1.3, the WHO in its publication *WHO, Outbreak Communication Guidelines* (World Health Organization, 2005c) highlights some of the rationale for this study. The WHO first mentions that diseases outbreaks are inevitable and unpredictable and the outbreaks are public health issues. Uncertainty, confusion and urgency are inherent features in disease outbreaks and communication is another feature of disease outbreaks. The WHO also states that communication failure is a factor that has delayed the outbreak control and other social, economic and political implications (World Health Organization, 2005c). All these issues sketch out the problems of public health and risk communication in disease outbreaks. Secondly, the WHO also points out that the media is an important means of public health communication (World Health Organization, 2005c). This explains that the data source of the study comes from the media, including the press conferences and press updates, newspaper reports and website information concerning SARS and swine influenza. Thirdly, laboratory analysis of the disease and epidemiological training are important. However, the WHO acknowledges that communication expertise also plays an essential role in the control of a disease outbreak (World Health Organization, 2005c). Thus, the WHO asks a question “what are the best practices for communicating with the public, often through the media, during an outbreak?” (World Health Organization, 2005c). It is not easy to make judgments about what kind of practice is the best. Nevertheless, it is possible to explore how the communication with the public during an outbreak is being practised.

With these concerns, this study attempts to contribute by adopting a linguistic approach. The major focus of this study is to enhance the understanding of public health and risk communication through linguistic investigations of the use of modality to express risk and uncertainty in the discourses of the 2003 SARS epidemic and the 2009 swine influenza pandemic. There are four research objectives of the study as stated in Section 1.5.

- (i) To explore how modality and its expressions are used to present the features of risk and uncertainty in public health and risk communication during the 2003 SARS epidemic and the 2009 swine influenza pandemic;
- (ii) To examine the functions of modality in public health and risk communication;
- (iii) To contribute to existing theories of modality: integrate and explicate theories and analytical models of modality; and
- (iv) To enrich the body of knowledge on public health and risk communication through linguistic analysis.

With respect to the four research objectives, the major findings are highlighted to discuss how the study has achieved the research objectives. The discussion here first focuses on Objective (i) and Objective (ii).

As mentioned previously, modality is a linguistic resource which enables a speaker/writer to convey a different degree of certainty, and to express their stance or opinion or commitment to the truth of his/her proposition (Davidse & Simon-Vandenberg, 2008; Halliday, 1994; Huddleston & Pullman, 2002). Objective (i) and Objective (ii) are achieved by investigating the discourses of the 2003 SARS epidemic and the 2009 swine influenza pandemic with detailed analysis and interpretation of modality and its expressions. The data sets consist of approximately 217, 000 words from a variety sources including press updates and press conferences held by the WHO, newspaper reports and websites information concerning the two events.

As presented in the findings in Chapter 5, *probability* is the major types of modality presented in the discourse of the SARS epidemic and the swine influenza pandemic selected for the study. For example, overall there is 84.6% of *probability* type of the occurrences in total in the data sets of the SARS epidemic and 81.4% of *probability* type of the occurrences in total is presented in the data sets of the swine influenza pandemic. This means that the *probability* type of modality is overriding in all the data sets of the two events. The discourses of the SARS epidemic and the swine influenza pandemic involved the features of risk and uncertainty. This is reflected in the language uses in the discourses as risk and uncertainty, very often

express probability. This can be related to the issue of register and context of the discourses of SARS epidemic and the swine influenza pandemic. Halliday (cited in R. H. Jones, 2012) states that in different situations, we use language to communicate different topic with different people through different channel e.g. newspaper, health information and press conferences on delivering information of pandemic as the data source of the present study. This is called register or the context of the language use. For example, in case of press conference, the health officials need to deliver the information of the diseases to the general public. However, during the initial period of disease outbreaks, in particular the newly identified diseases like SARS and swine influenza, there are many uncertainties regarding the nature, diagnosis and treatment of the diseases. Thus, how the health authorities express such contexts is realized by different lexicogrammatical choices to construe the meanings in the texts. This accounts for the significant use of modality, in particular degree of probability in the discourse of the two events. This is also reflected in the examples of the extracts presented in Chapter 6 and Chapter 7.

Also, as mentioned in Chapter 4, the data sets of the study include the Press Conferences, Press Updates, Newspaper Reports and Website Information concerning the two events. For example, the findings shown in Chapter 5 present significant uses of degree of probability in press conferences of the swine influenza.

The number of occurrences in Press Conferences is 28.4% (3,499 occurrences in 12,206 number of clauses in total). However, the occurrences of probability in Newspaper Report and Website Information are 14% (206 in 1473) and 17.3% (51 in 295) respectively. The number of degree of probability presented in Press Conferences may be related to the register and context of the press conferences. The speaker of the WHO press conferences have to report all the information concerning the swine influenza pandemic, including the nature and the progress of the diseases. Apart from the inherent uncertainty in the message concerning a newly and emerging disease of swine influenza, the speaker also needs to answer questions from the audience in the press conference that the public health experts may not be certain of the answers. In contrast, the newspaper reports only present the extract of what has been said by the public health experts in the press conference; and the website information of the diseases presents the general information of the diseases. As the language choices are related to the register or context in which the text is situated, this explains why the presentation of modality in Press Conferences, in particular degree of probability is more significant than other data sets.

As illustrated in the examples in Chapter 6, the speakers use various expressions of modality, in particular the degree of probability to express a proposition in public health communication of the nature of the diseases including signs and symptoms,

medium of transmission, prevention and treatment of SARS and swine influenza, and the role of health authorities during the epidemic and pandemic. In Chapter 7, the findings also illustrate how modality and its expression are used in risk communication to express the risk and uncertainty of SARS and swine influenza and the swine influenza vaccine and the consequences of the diseases. For example, the following extract has been discussed in Chapter 7, which is taken from the press conferences of the WHO concerning the swine influenza pandemic.

Extract 7.3.: Swine Influenza: WHO Press Conferences (dated 29-04-2009)

Clause No. (CN)	Clause
50.1	Is it theoretically <i>possible</i> that this epidemic <i>could certainly</i> stop for unknown reasons,
50.2	although this is <i>probably unlikely</i> at this point.
51.1	<i>It is also possible</i> that we <i>could</i> continue on with spread of relatively mild illness in most countries
51.2	recognizing that death and serious illnesses <i>will</i> occur <i>sometimes</i> .
52.1	And <i>it is</i> also <i>possible</i> , that as we go into the future,
52.2	we <i>will</i> see more serious cases.
53.1	These options are all <i>possible</i> .
54.1	<i>We do not quite know</i> how this is going to evolve
54.2	but we <i>will</i> , << >>, monitor the situation very carefully.
54.3	<<as we mentioned over the last few days>>,

Modality items of Extract 7.3

Clause No. (CN)	Modal Operators	Expressing	Modality Type	Value	Orientation/ Manifestation	Mood Type	Speech Function	Polarity
50.1	it is possible	possibility	probability	low	Objective/ Explicit	Yes/No interrogative	question	positive
50.1	could	possibility	probability	low	Subjective/ Implicit	Yes/No interrogative	question	positive
50.1	certainly	possibility	probability	high	Objective/ Implicit	Yes/No interrogative	question	positive
50.2	probably	prediction	probability	med	Objective/ Implicit	declarative	statement	positive
50.2	unlikely	prediction	probability	low	Objective/ Implicit	declarative	statement	direct negative
51.1	It is possible	possibility	probability	low	Objective/ Explicit	declarative	statement	positive
51.1	could	prediction	probability	low	Subjective/ Implicit	declarative	statement	positive
51.2	will	prediction	probability	med	Subjective/ Implicit	declarative	statement	positive
51.2	sometimes	frequency	usuality	med	Objective/ Implicit	declarative	statement	positive
52.1	it is possible	possibility	probability	low	Objective/ Explicit	declarative	statement	positive
52.2	will	prediction	probability	med	Subjective/ Implicit	declarative	statement	positive
53.1	possible	possibility	probability	low	?	declarative	statement	positive
54.1	we know	possibility	probability	high	Subjective/ Explicit	declarative	statement	direct negative
54.2	will	offer	inclination	med	Subjective/ Implicit	declarative	offer	positive

The texts are analyzed at the clause level, referring to the analytical framework of the SFL approach to modality and its expressions or modal operators such as modal adjuncts, finite modals, and interpersonal metaphors in terms of *types of assessment*, *value*, *manifestation* and *orientation* (Argamon et al., 2007; Halliday & Matthiessen, 2014). The mood type and speech function provide supplementary information about the *type of assessment* of modality. For example, *Modalization* is

realized by an exchange of information of *declarative* mood type and the speech function is a *statement* (Halliday & Matthiessen, 2014).

The following clause in Extract 7.3 shows how modality is used to present the speaker's proposition about the uncertainty of the swine influenza and also the function of the modal operators: projecting clause *It is possible that...* and modal verb *could* in the proposition.

CN51.1 *It is* also *possible* that we *could* continue on with spread of relatively mild illness in most countries

CN51.1 clause is exchanging information. The mood type is *declarative* and the speech function is a *statement*. The speaker made a proposition about the uncertainty of the virus spreading by using two modal operators: a projecting clause *it is possible that...* and a modal verb *could*. First, the possibility of the virus spreading into a mild illness is realized by a projecting clause *it is possible*, a modality type is *Modalization: probability, low value, objective orientation* and explicit *manifestation*. The second modal operator used in the same clause is a modal verb *could*, a modality type of *Modalization: probability, low value, subjective orientation* and implicit *manifestation*. Both modal operators function to express a degree of probability, the possibility of a spread of mild illness caused by

the virus. Thus, it is less determinate (Halliday, 1994), as illustrated in CN51.1, than presenting in a polar form such as ‘*we continue on with spread of....*’

For Objective (iii), i.e. *to contribute to existing theories of modality: integrate and explicate theories and analytical models of modality*. As reflected from the findings of modality in public health and risk communication presented in Chapter 6 and Chapter 7, the study has explored issues contributing to the existing theories of modality. These issues include an *orientation* of modality in modal adjectives and modal nouns; the *orientation* of modality in reported speech; modality in conditionals; and meanings of modal verbs.

As mentioned in Section 3.3.2, each modality expression has four aspects including *type of assessment* (modalization: probability, usuality; modulation: obligation, readiness-inclination, ability), *value* (median; outer: high or low), *orientation* (subjective or objective) and *manifestation* (implicit or explicit). The aspect of *orientation* affects the interpretation of whether the proposition is *subjective* (‘expressed respective to the speaker’) or *objective* (‘expressed irrespective of the speaker’) (Argamon et al, 2007). According to SFL theory, the four categories of *orientation* and *manifestation* of modality are realized by the use of modal verbs (*subjective implicit*); modal adjuncts (*objective implicit*); interpersonal metaphors

e.g. *I think (subjective explicit)*; and projecting clauses e.g. *it is possible that...* (*objective implicit*) (Halliday & Matthiessen, 2014). However, when a clause presents with two modal operators of different types of modality or even of the same type of modality (prosody of modalization or modal concord), such as the example illustrates in Extract 6.2 and Extract 6.6 in Chapter 6, there will be problems for the audience to distinguish whether the proposition is related to the speaker (*subjective*) or irrespective of the speaker (*objective*) (Argamon et al, 2007). It is suggested that further research should investigate clauses with two modal operators of different types of modality in other discourses.

For the *manifestation* aspect of modality, the use of modal nouns and modal adjectives, which are not presenting as projecting clauses, are not clearly described in SFL theory. When modal adjective (e.g. *possible*) does not exist in projecting clauses (e.g. *it is possible...*) to present the degree of probability, rather, as an epithet added in a nominal group like the one presented in CN16.1, Extract 6.4, it is problematic to assess the *manifestation* aspect of modality. Similarly, when a modal noun (e.g. *possibility, uncertainty*) is used to present the degree of probability such as the example shown in Extract 6.8, it is also indefinite to assess the *manifestation* aspect of modality. Modal nouns and modal adjectives are not included in the four SFL categories of *orientation* and *manifestation* of modality.

Further studies on the uses of modal nouns and modal adjectives in presenting modality in other discourses are suggested.

Secondly, when modality is used in reported speech, there is also a variation in the *type of assessment* of modality. For example, the degree of obligation presented in Extract 6.16 in Chapter 6, a command is the speaker is ‘demanding something from the listener’ or ‘requiring something of the listener’ (Halliday & Matthiessen, 2014: 135), and the response of the listener of the command is undertaken, either to obeying or refusing the command (Halliday & Matthiessen, 2014: 137). However, when a command or the degree of obligation is expressed in a reported speech as example in Extract 6.16, it is interpreted as an exchange of information rather than exchange of goods and services and the speech function is a *statement* rather than a *command*. When modality, such as an expression of command, is presented in reported speech, it shows problems in the interpretation of the *type of assessment* of modality, as illustrated in the example just mentioned. However, there are limited discussions in literature concerning modality in reported speech. Further studies on the modality used in reported speech in other discourses are suggested to answer the questions.

Thirdly, conditionals are used to present conditions that are possible, likely, unlikely and impossible and the main clause is usually presented with future meaning as realized by modal verbs (Carter et al, 2011) of low or median value such as *could*, *can*, *will* and *would* . Modal verbs are present in the main clause to indicate possible situations or results in the future. When two modal operators of different values are present in the main clause of conditionals as illustrated in the example in CN18.1 and CN18.2 of Extract 7.9 in Chapter 7, it is expected to indicate a different degree of probability of future result. There are discrepancies in the interpretation of the proposition in terms of value of modality. More importantly, there is a lack of literature and discussion in SFL regarding the presentation of modality in conditionals. More data from other discourses for further investigation is considered to answer the question and fill the gap.

Fourthly, as mentioned in Section 3.3.2, modality is various kinds of intermediate degrees between ‘yes’ and ‘no’ (Halliday, 1994). However, there are variations and ambiguities in making classification and categorization of modality. Modal operators, in particular modal verbs, do not carry only one meaning. The use of modality itself aims to express indeterminacy between yes and no (Halliday, 1994). However, there may be confusion for the audience to interpret whether the modal verb *can*, for example, is expressing possibility or ability or other meanings. It is

even harder for the audience to make a judgement about the truth of a proposition expressed or the actualization of that situation (Huddleston & Pullman, 2012).

For Objective (iv), i.e. to *enrich the body of knowledge on public health and risk communication with linguistic analysis*, as mentioned in Section 1.5, most of the literature on the SARS epidemic and the swine influenza pandemic are from a medical and public health perspectives such as the effectiveness of hand-washing (Fung & Cairncross, 2006) and facemasks (Tang & Wong, 2004) ; treatment effects of SARS (Stockman et al., 2006); or the swine influenza vaccine (Henrich & Holmes, 2011; Lundström et al., 2012; Ward & Draper, 2008; Wong et al., 2010); infection control of the epidemic (Wenzel et al., 2005). Other discussions include the ethical issues raised from SARS and swine influenza such as quarantine (Singer et al., 2003); psychological and behavioral responses to influenza pandemic (Cowling et al., 2010; Lau et al., 2011). Studies on SARS and the media (Eagleton, 2004; Huang & Leung, 2005; Lewison, 2008; Washer, 2004; Zhang, 2006); swine influenza and the media (Blakely, 2003; Fogarty et al., 2011; Nerlich & Koteyko, 2012) are ample.

There is a lack of studies on the discourses of public health and risk communication, particularly detailed analysis of discursive and communication practice during

disease outbreaks. Also, in case of scientific or epidemiological approach to risk, very often, it is communicated through a presentation of numerical value of probability such as 1 in 1000 or 25%. Regarding this issue, Aven and Renn (2010: 161) argue that most technical experts try to communicate in technical details. Conversely, the general public may be only interested in the opportunity to be exposed to risk and the impact on their health. Thus, the first step in risk communication is to find a common denominator or a common language and assess the need of the audience. Accordingly, this study adopts a linguistic perspective and examines how risk and uncertainty are presented by modality in public health and risk communication during SARS and swine influenza pandemic, as presented in Chapter 6 and Chapter 7 respectively.

8.3 Contributions of the Present Study

8.3.1 Practical Contributions

The SARS epidemic and the swine influenza pandemic are two major public health threats confronting the world in the 21st century. The discourses of these two events are chosen in this study because the events exemplify serious public health threats: the disease causative agents - the SARS coronavirus and the influenza A (H1N1) were of novel nature; and in the initial period of the disease outbreaks, there were no treatments and no vaccines available. These properties of the events are also observed in other public health threats, such as the Ebola outbreak in 2014,

the Middle East Respiratory Syndrome (MERS) outbreak in Middle East and the Republic of Korea in 2015, and the recent Zika virus in 2016. The attributes of risk and uncertainty (WHO, 2005) are inherent to the discourses of these disease outbreaks. It poses an enormous challenge for public health authorities and officials in terms of public health and risk communication on the nature of diseases, which is crucial for control of disease transmission and containment. This is reflected in the language of the discourses of the SARS epidemic and the swine influenza pandemic selected for the study. As pointed out by the WHO (2003), it is important to learn from the past and shape future strategies against subsequent infectious epidemics and this study attempts to contribute with a linguistic approach. The target of the study is to identify the opportunity and risk challenges of this kind of discourse. As health professionals are experts in medical sciences, they are not linguists. It is unrealistic to teach the health experts how to use modality operators when communicating risk and uncertainty. However, the data reflected in the study data is what we see in the discourses and what was given by the health authorities to the general public. For example, if the classification of modal verb *can* is ambiguous, it is suggested to avoid using *can* so as to differentiate the functions of *can* as probability and ability. However, how to implement the plan to change the practice is out of the scope of this thesis. Accordingly, the findings of the study contribute to the health authorities in the development of effective tools for better pandemic preparedness planning for credible communication to mitigate the impact in subsequent disease epidemics and pandemics.

8.3.2 Theoretical Contributions

The study also theoretically adds to the body of knowledge and explores the theoretical contributions to current debates on modality, the discourses of public health and risk communication, within the framework of systemic functional linguistics.

The SARS epidemic and the swine influenza pandemic have provided a good ground for studying issues on risk and uncertainty from a linguistic perspective. Many studies in risk communication have focused on genetic counseling (N. L. Green, 2010; O'Doherty, 2006; O'Doherty & Suthers, 2007; Sarangi et al., 2003) and cancer (Bottorff et al 1998), and food hazards (Miles & Frewer, 2003). For example, regarding studies on presenting risk to cancer patients, the risk information, very often, is presented in numerical data to compare the risk and benefits of treatment options. Then, patients have to make related medical decisions based on the numerical information. However, patients may have cognitive difficulty in numeracy skills (Fagerlin et al., 2011). It is important that risk communication is to contribute to public understanding and to take action and mitigate risk and hazards ultimately. However, studies are lacking on the discourse of public health and risk communication, in particular a detailed analysis of

discursive and communication practice during disease outbreaks. It is more than just presenting the statistical information concerning the risk of the diseases and the risk and benefits of the treatment options. It is essential to find a common denominator or to find a common language and assess the need of the audience. This study contributes to the public health and risk communication from a linguistic perspective. It is worthy to further study the response of the general public about the message of the risk and uncertainty of the two events, which will be further discussed in Section 8.4.

The present study has identified areas in which the existing theory on, and description of, modality need to be further developed, e.g. modality in modal adjectives and modal nouns; modality in reported speech; modality in conditionals; and meanings of modal verbs.

First, the *orientation* and *manifestation* aspects in modal nouns and modal adjectives are not specified in the existing SFL theory. As mentioned in Section 3.3.2, the SFL theory on modality includes four aspects: the *type*, *value*, *orientation* and *manifestation* (Halliday & Matthiessen, 2004). The existing SFL theory only mentions about the *orientation* and *manifestation* of modal verbs, modal adjuncts

and interpersonal metaphors presenting by projecting clauses (Halliday & Matthiessen, 2004; Taverniers, 2003). However, when a modal adjective (e.g. *possible*) presents the degree of probability not in a projecting clause (e.g. *it is possible...*) but as an epithet added in a nominal group (e.g. *possible* source of transmission), as shown in extract 6.4 and discussed in Section 6.2.2, it is problematic to assess, with the existing SFL description, the *orientation* and *manifestation* of modality. Similarly, when a modal noun (e.g. *possibility*) is used to present the degree of probability such as ‘The *possibility* of an oral-faecal route of transmission’, as shown in extract 6.8 and discussed in Section 6.2.2, it is also indefinite to assess the *orientation* and *manifestation* aspect of modality with the existing description. The conception of epithets (Simon-Vandenberg, 1997) complements existing SFL description, with which the use of modal nouns and modal adjectives in non-projecting clauses may leave the *orientation* and *manifestation* of modality unspecified. This shows that in the configuration of modality, there is a possibility to select features of the subsystems of *type* and *value* without selecting features in *orientation* and *manifestation*. Alternatively, the SFL description of modality should be enriched to make it possible to cover cases in which the *orientation* and *manifestation* are not specified. Nonetheless, the present analysis has identified modal nouns and modal adjectives in non-projecting clauses that can be candidates for more focused analysis in the future to enrich the existing description, but this requires more specific data with larger amount of these incidents.

Second, when modality is used in reported speech, there are variations in the *type of assessment* of modality that are not covered in existing SFL description. In the existing SFL theory, a command is the speaker's demand of something from the listener', and the response of the listener can either obey or refuse to undertake the command (Halliday & Matthiessen, 2014). However, when a command, or more specifically the modality in terms of the degree of obligation, is expressed in a reported speech such as 'He said government officials in Hong Kong and the mainland *should*, however, act swiftly to establish the source of the outbreak', as shown in extract 6.16 and discussed in Section 6.2.4, with the existing SFL description, it is interpreted as an exchange of information rather than exchange of goods-and-services, thus the speech function is a *statement* rather than a *command*. The type of modality (i.e. obligation) is therefore conflictual to the nature of exchange (i.e. information). Modality uses in reported speech are rarely discussed and specified in the SFL literature. The present analysis contributes to include modality used in reported speech by introducing indeterminacy of the speech function of a clause complex of reported speech. For instance, a clause complex of reported speech primarily realizes the speech function of *statement*, but there is a secondary speech function of *command*. As discussed, such usage of reported speech may impact on the clarity of messages in the context of public health and

risk communication, but this phenomenon has helped enriching the SFL description on role modality plays in the realization of speech functions.

Third, the SFL theory also does not specify the modality uses in conditionals. In conditionals, modal verbs are used in the main clause to indicate possible situations or results in the future. However, when two modal verbs of different values are used in the main clause such as ‘*If this is the case, it may be that one dose will be sufficient*’, as illustrated in the example in Extract 7.9, the clause should be considered as indicating a different degree of probability of future result. Furthermore, there are discrepancies in the interpretation of the proposition in terms *value* of modality as discussed in Section 7.2.2. The present analysis shows that the incidents of modality within a conditional bear unequally “weighting” of their contribution to the overall modality of the clause. For instance, the attributing clause, i.e. ‘it *may* be’, it is argued to have a greater impact on the overall modality. However, a systematic and focused analysis with higher number of incidents of this kind will be necessary for making any valid generalization.

Fourth, the variation of meanings of modal verbs needs to be elaborated in the existing SFL theory. The use of modality itself aims to express indeterminacy between yes and no (Halliday, 1994), while each modal verb usually has more than

one meaning and function. For example, the modal verb *can*, may be interpreted as expressing probability or ability (Carter et al, 2011) such as ‘*Several laboratory tests can detect SARS-CoV, the virus that causes SARS*’, as shown in Extract 6.1 and discussed in Section 6.2.1. Although both interpretations are classified as a degree of probability in the SFL approach to modality, there may be confusion for the audience to interpret whether the modal verb *can* is expressing the possibility of the detection or the ability with which the tests possess. It is even harder for the audience to make a judgement about the truthiness of a proposition expressed or the actualization of that situation (Huddleston & Pullman, 2012). The present analysis has shown the variations and ambiguities in making classification and categorization of modality, which enrich the existing SFL description from the assumption that each incident of the use of modality realizes only one type of modality.

8.4 Limitations, Challenges and Recommendations

The previous section discusses the contribution of the study to the theory and practice of public health and risk communication and also to the current debates of the SFL theory of modality. Yet there are also limitations and challenges with the study and issues that recommend the need for further research.

Firstly, as mentioned in Section 1.5, the main objective of the study is to explore how modality and its expressions are used to present risk and uncertainty in public health and risk communication during the 2003 SARS epidemic and the 2009 swine influenza pandemic. In other words, the study is of an exploratory in nature in the quantitative part of the findings as it only gives an overview of the number of occurrences in the datasets of the study. As the major focus of the study is not to make a comparison of modality in the two events, the findings of modality, especially the quantitative findings of modality, can only provide a description of the frequency of occurrences of modality presented in the data sets selected for the study.

Secondly, the rationale for selecting data of the WHO is that it is a world health organization. The primary role of the WHO is “to direct and coordinate international health within the United Nations’ system” (World Health Organization, 2016). In other words, the WHO is an international body and authoritative voice to provide information about public health emergencies such as the SARS epidemic and the swine influenza pandemic. However, the data sets from the press updates provided by the WHO concerning the SARS epidemic and the press conferences held by the WHO concerning the swine influenza are different in nature. The mode of press updates is only presenting the information while the

press conferences have conversation between the WHO experts and the journalists attending the press conferences. The difference in mode of press updates and press conferences reflects the difference in length of texts presented in the two data sets: 1,219 clauses in 19,837 words of 30 texts in Press Updates; 12,206 clauses in 154,772 words in 32 texts in Press Conferences. The difference between the two data sets also reflects the frequency of occurrences of modality. In Press Updates, there are 294 modal operators. In Press Conferences, there are 4252 modal operators. However, if there were similar press conferences with dialogue between the WHO experts and the journalists concerning the SARS epidemic, it would provide a more detailed comparison between the quantitative findings of modality presented in the two events.

Apart from the limitations of the study, there will be challenges if the thesis is made to publication. Most of the public health and risk communication issues are discussed and published in scientific journals while the works of linguistics are generally published in journals of humanities. In other words, the challenges are present if researchers are from multi-disciplinary or cross-disciplinary background. Aagaard-Hansen (2007) states that if researchers are from different disciplinary background, they may face difficulties in collaboration due to “lack of knowledge, divergent standards, different approaches, or simply negative attitudes and prejudices” (Aagaard-Hansen, 2007: 427). Different researchers may adopt

different in methodologies in data collection and analysis. The divergences may be due to the choice of research design (qualitative versus quantitative). Argaard-Hansen (2007) also presents different aspects of the challenges of cross-disciplinary research, such as closed versus open approach, objectivism versus subjectivism, causality versus description, text versus context. According to Argaard-Hansen's description (2007), the text refers to a phenomenon or a sentence or an act etc. while the context is the setting or the socio-cultural environment in which the text is situated. For example, the centre of attention of biomedical research is the text (or the dependent variable) e.g. incidence of disease. Biomedical researchers try to control the context (or the independent variable) e.g. the temperature or potential risk factors. On the contrary, the main focus of anthropological research is the context for its multiplicity. Aagaard-Hansen (2007) explores in detail about the challenges of research collaboration from researchers with different disciplinary background. Such challenges can also be foreseen if the present study is sent to scientific journals for dissemination of the use of modality in presenting risk and uncertainty. As public health experts or medical professionals, who are not linguistics, usually present risk in term of statistical percentage or in odds ratio. They probably have difficulties in interpreting the different aspects of modality, the analytical framework of the present study. The examples in Extract 6.2 and 6.3 discussed the use of concord as modality. Public health experts may not be curious about the use of '*would*' and '*probably*', which

have different effect or showing different degree of probability. This is a great challenge to get the current study publishing in scientific journals.

With the limitations and challenges mentioned above, some suggestions for future research concerning the topics of public health and risk communication from a linguistics perspective are presented here.

Firstly, as mentioned in Section 1.3.3, the WHO (2005) claims that disease outbreaks are inherent with uncertainty, confusion and urgency. The feature of uncertainty has been reflected in the findings of modality and its expressions from the discourses of the two events selected for the study. The WHO further discusses the importance of risk communication in its report 'SARS: lessons from a new disease' of its document *The World Health Report 2003 - Shaping the Future:-*

“Risk communication about new and emerging infections is a great challenge, and it is vital to ensure the most accurate information is successfully and unambiguously communicated to the public.” (World Health Organization, 2003b)

As discussed in Section 1.3, the risk and uncertainty of the diseases poses great challenges for public health officials delivering such information to the general public. This is also reflected in the examples shown in Extract 7.3 of Chapter 7, in which the speaker uses different types, values, orientations and manifestations of

multiple modal operators to express propositions about the risk and uncertainty of swine influenza and the severity of related illnesses.

However, as mentioned in the previous section, the study investigates how modality and its expressions are used in public health and risk communication during epidemics and pandemics. When uncertainties exist in the initial periods of a pandemic, for example, lack of commitment to the proposition becomes the major strategy rather than making a strong commitment. It is hard to make a subjective judgment about the appropriateness of such practice, and whether the information delivered is accurate, successful and unambiguous. Accordingly, further investigations is needed to relate the audience's interpretation and understanding of the messages with multiple use of modality in a clause, as illustrated in Extract 7.3 of Chapter 7.

Secondly, as mentioned in Section 1.3, the SARS epidemic and the swine influenza pandemic are two major public health threats and where no treatment and no vaccine was identified in the initial periods of the disease outbreaks. For example, although the Zika virus has not been causing outbreaks globally, it is noted from recent development of the Zika virus in Brazil, the country hosting the 2016 Olympic Games, that modality is also used in public health and risk communication

of the disease. For example, the Government of Hong Kong Special Administrative Region (HKSAR) has issued a press update concerning the preparation of the risk of infection by Zika virus arising from the 2016 Olympics in Rio de Janeiro, Brazil (The Government of the HKSAR, 2016), in which a spokesman of the Department of Health in Hong Kong mentioned that the Hong Kong Government is in line with the WHO to take public health actions against the Zika virus and risk communication is one of the public health actions. Accordingly, the following quote concerning the Zika virus is from a spokesman from the Food and Environmental Hygiene Department of Hong Kong:

“Aedes aegypt (A. aegypt) is the principal vector for Zika Virus infection and is active both indoors and outdoors. A. aegypt found in Brazil feeds almost exclusively on human and can bite throughout the daytime. As the bites cause minor localized itching and irritation to the skin, one may not notice them. Travellers should hence take personal protective measures even while staying indoors to prevent mosquito bites, particularly in areas without air-conditioning. If a person infected with Zika virus during travel is bitten by a vector mosquito after returning to Hong Kong, the infected mosquito may spread the disease in Hong Kong by biting other people” (The Government of the HKSAR, 2016)

The above information is about the vector surveillance and control of the Zika virus (The Government of the HKSAR, 2016), which concerns with the nature of the disease (Geering & Amanfu, 2002) in public health communication. As shown in the above quote, various modal operators are used to present the speaker’s proposition about the risk and uncertainty of the Zika virus. For example,

“If a person infected with Zika virus during travel is bitten by a vector mosquito after returning to Hong Kong, the infected mosquito may spread the disease in Hong Kong by biting other people” (The Government of the HKSAR, 2016)

The above example shows that the speaker uses the modal verb *may* to express the possibility of the spreading of the disease in Hong Kong by an infected person bitten by infected mosquito with Zika virus. The use of modal verb *may* in the statement is less determinate (Halliday, 1994) than presenting in a polar form or unmodalised way (Huddleston & Pullman, 2002). Thus, it is suggested to conduct research in ethnographic approach that “focuses on detailed and accurate description rather than explanation” (Babbie, 2004:289). For example, it is worthy of studying the recent development of Zika virus or other subsequent incidences of epidemic and pandemic with the aspect of culture as the major component while language and linguistics as other components of the studies.

8.5 Chapter Summary

This final chapter presented how the study has achieved the research objectives by highlighting the major findings with respects to the research objectives of the study. The practical and the theoretical contributions to the public health and risk communication were also discussed in the chapter. The chapter also presented the contribution of the study to the current debates on the SFL theories of modality.

The chapter also discussed the limitations and challenges of the study and made recommendations for future research.

APPENDICES

Appendix A: Extracts in Chapter 6

I. Expressing Signs and Symptoms of Diseases

Extract 6.1: SARS: DH website

Clause No. (CN)	Clause
1.1	Severe acute respiratory syndrome (SARS) is a viral respiratory infection caused by a coronavirus (SARS-CoV).
2.1	Symptoms <i>usually</i> appear within 2 - 7 days
2.2	after contracting the disease,
2.3	but the incubation period <i>can</i> be up to approximately 10 days.
3.1	The initial symptoms are influenza-like.
4.1	Patients with SARS <i>usually</i> begin with fever, which is <i>often</i> high (38°C or above),
4.2	and <i>sometimes</i> associated with chills, rigors, headache, malaise, muscle pain or even diarrhoea.
5.1	At the onset of illness, some patients <i>may</i> only have mild respiratory symptoms.
6.1	After a few days, symptoms of lower respiratory tract infection <i>may</i> follow, including cough without sputum and difficulty in breathing.
7.1	In around 10% of patients, the illness <i>may</i> rapidly progress to respiratory failure requiring intensive medical care.
8.1	Symptoms <i>can</i> be more variable among elderly patients.
9.1	Several laboratory tests <i>can</i> detect SARS-CoV, the virus that causes SARS.
10.1	Some tests <i>can</i> detect virus in clinical specimens, including respiratory secretions and stool.
11.1	Serological tests <i>can</i> detect antibodies to SARS-CoV which are produced from around 10 days after onset of the illness.

Extract 6.2: Swine Flu: NHS Website

Clause No. (CN)	Clause
77.1	If you are pregnant
77.2	and you catch swine flu,
77.3	the symptoms are likely to be similar to those of normal flu.
78.1	You <u>will usually</u> have a fever (a high temperature of or above 38C/100.4F), plus two or more of the following symptoms: unusual tiredness, headache, runny nose, sore throat, shortness of breath or cough, loss of appetite, aching muscles, diarrhoea or vomiting.
79.1	Most pregnant women <u>will</u> have only mild symptoms
79.2	and recover within a week.

Extract 6.3: Swine Influenza: WHO Press Conferences (dated 29-04-2009)

Clause No. (CN)	Clause
40.1	The illness that we are seeing is generally consisting with seasonal influenza infection.
41.1	That is the kind of symptoms that the milder cases are experiencing and generally what are seen with other influenza viruses,
41.2	although there is some suggestions that <u>perhaps</u> cases are developing diarrhoea more <u>often</u> than is normal with seasonal influenza or seen with seasonal influenza.
42.1	So we <u>will</u> continue to follow this and see how the picture of clinical symptoms evolves.
43.1	The question that is really on many people's mind is what <u>we can</u> say about the severity of the illness at this point.
44.1	<u>I think</u>
44.2	that the information to date clearly points out
44.3	that this infection <u>can</u> result in anything from very mild illness, where people do not need to be hospitalized and generally recover without any complications after several days, to fatal illness.

II. Expressing Medium of Disease Transmission

Extract 6.4: Swine Influenza: WHO Website

Clause No. (CN)	Clause
15.1	Respiratory transmission occurs mainly by droplets disseminated by unprotected coughs and sneezes.
16.1	Short-distance airborne transmission of influenza viruses <i>may</i> occur, particularly in crowded enclosed spaces.
17.1	Hand contamination and direct inoculation of virus is another <i>possible</i> source of transmission.

Extract 6.5: Swine Influenza: DH Website

Clause No. (CN)	Clause
7.1	A person <i>may</i> spread the virus to another person one day before symptoms start, and up to seven or more days after becoming sick.
8.1	This <i>can</i> be longer in some people, especially children and people with weakened immune system.
9.1	Therefore, people with HSI virus infection <i>should</i> be considered contagious
9.2	for as long as they show symptoms.
10.1	People <i>may</i> also become infected by touching objects soiled with flu viruses and then touching their mouth, nose or eyes.

Extract 6.6: SARS: CDC website

Clause No. (CN)	Clause
18.1	The main way that SARS seems to spread is by close person-to-person contact.
19.1	The virus that causes SARS is thought to be transmitted most readily by respiratory droplets (droplet spread) produced
19.2	when an infected person coughs
19.3	or sneezes.
20.1	Droplet spread <u>can</u> happen
20.2	when droplets from the cough or sneeze of an infected person are propelled a short distance (generally up to 3 feet) through the air
20.3	and deposited on the mucous membranes of the mouth, nose, or eyes of persons who are nearby.
21.1	The virus also <u>can</u> spread
21.2	when a person touches a surface or object contaminated with infectious droplets
21.3	and then touches his or her mouth, nose, or eye(s).
22.1	In addition, <i>it is possible</i> that the SARS virus <i>might</i> spread more broadly through the air (airborne spread) or by other ways that are not now known.

Extract 6.7: SARS: WHO Press Updates (dated 25-03-2003)

Clause No. (CN)	Clause
16.1	Today's report of a <u>possible</u> transmission of SARS on board a flight is undergoing investigation.
17.1	As "close" contact is <u>possible</u> during a flight, in passengers sitting close to an infected person,
17.2	such transmission <u>cannot</u> be ruled out.

Extract 6.8: SARS: WHO Press Updates (dated 07-04-2003)

Clause No. (CN)	Clause
21.1	Evidence that the causative agent is excreted in faeces has focused attention on the <i>possibility</i> of an oral-faecal route of transmission,
21.2	though no conclusions have been reached.

Extract 6.9: Swine Flu: WHO Press Conferences (dated 29-04-2009)

Clause No. (CN)	Clause
141.1	At this point, I want to make it very clear that <i>we do not believe</i> that the infections occurring in people are associated with getting infected from exposure to pigs.
142.1	This is a different situation from what we saw with avian influenza – the bird flu – in which people got clearly infected by birds.
143.1	In this situation, even though the virus originated in pigs,
143.2	<i>we do not believe</i>
143.3	that people are getting infected by pigs.
144.1	This is really a virus that is being transmitted from person-to-person.
145.1	Therefore, <i>we think</i>
145.2	that with food-handling practices, the eating of pork meat does not pose a danger to people.

III. Expressing Prevention and Treatment of Diseases

Extract 6.10: SARS: NHS website

Clause No. (CN)	Clause
	Treatment for SARS
29.1	There is currently no cure for SARS,
29.2	but research to find a vaccine is ongoing.
30.1	A person suspected of having SARS <i>should</i> be admitted to hospital immediately
30.2	and kept in isolation under close observation.
31.1	Treatment is mainly supportive
31.2	and <i>may</i> include: assisting with breathing using a ventilator to deliver oxygen; antibiotics to treat bacteria that cause pneumonia; antiviral medications; high doses of steroids to reduce swelling in the lungs.
32.1	There is little in the way of scientific evidence to show
32.2	that these treatments are very effective.
33.1	The antiviral medication, ribavirin, is known to be ineffective at treating SARS.
	Prevention advice
34.1	You <i>should</i> avoid travelling to areas of the world where there is an uncontrolled SARS outbreak.
35.1	To reduce your risk of becoming infected,
35.2	avoid direct contact with people with SARS (until at least 10 days after their symptoms have gone).
36.1	To avoid spreading the infection, it is important to follow the prevention advice outlined below:
37.1	wash your hands thoroughly using an alcohol-based hand detergent
38.1	cover your mouth and nose when you sneeze or cough
39.1	avoid sharing food, drink and utensils
40.1	regularly clean surfaces with disinfectant
41.1	In some situations, it <i>may</i> be appropriate to wear gloves, masks and goggles to help prevent the spread of SARS.

Extract 6.11: Swine influenza: NHS Website

Clause No. (CN)	Clause
104.1	Relenza <i>should</i> not affect your pregnancy or your growing baby.
105.1	However, Tamiflu <i>should</i> be offered instead of Relenza
105.2	if you: have a condition such as asthma or chronic obstructive pulmonary disease
105.3	have difficulty taking an inhaled antiviral
105.4	develop a severe or complicated disease due to influenza where you <i>will probably</i> be treated in hospital.

Extract 6.12: Swine Influenza: WHO Website

Clause No. (CN)	Clause
33.1	Ill persons <i>should</i> be encouraged to practise cough etiquette
33.2	maintain distance,
33.3	cover coughs
33.4	and sneezes with disposable tissues or clothing, wash hands.

Extract 6.13: Swine Influenza: DH Website

Clause No. (CN)	Clause
13.1	People who develop flu symptoms <i>should</i> put on a mask
13.2	and consult a doctor as soon as <i>possible</i> .
14.1	Those who have been to affected places or been exposed to sick persons <i>should</i> tell the doctor the travel and contact history.
15.1	Antiviral agents <i>can</i> reduce the severity and duration of illness
15.2	but <i>must</i> be used under doctor's prescription.
16.1	It is important for people not to self-medicate.

Extract 6.14: SARS: DH website

Clause No. (CN)	Clause
31.1	<i>Always</i> carry a handkerchief or tissue paper.
32.1	Cover the nose and mouth with it when sneezing or coughing.
33.1	Remember to wash hands immediately with liquid soap afterwards.
34.1	People with symptoms of respiratory tract infection or fever <i>should</i> wear a mask
34.2	and consult a doctor promptly.

IV. Expressing the Role of Health Authorities

Extract 6.15: SARS: SCMP (dated 12-02-2003)

Clause No. (CN)	Clause
19.1	The officials said
19.2	there were no effective drugs to treat the disease, which has the symptoms of a flu and lung infection.
20.1	The two important things we <i>must</i> do are control the spread of the disease
20.2	and step up publicity to allay people's fears,
20.3	health department chief Huang Qingtao said.

Extract 6.16: SARS: SCMP: (dated 17-03-2003b)

Clause No. (CN)	Clause
12.1	Lau Kong-wah, legislator with the Democratic Alliance for Betterment of Hong Kong, agreed
12.2	that in the absence of any concrete information linking the spread of the illness to an act of bio-terrorism, drawing such an inference was only speculation.
13.1	He said
13.2	government officials in Hong Kong and the mainland <i>should</i> , however, act swiftly to establish the source of the outbreak.

Extract 6.17: SARS: WHO Press Updates (dated 03-04-2003)

Clause No. (CN)	Clause
14.1	In Beijing, the government of China is now gearing up to fight SARS on a priority basis.
15.1	Reports in today's media referred to a State Council executive meeting on SARS
15.2	and described three key decisions:-
16.1	A special task force, headed by Minister of Health Dr Zhang Wenkang, <i>will</i> take charge of the fight against SARS.
17.1	A vice secretary-general of the State Council <i>will</i> coordinate actions by relevant ministries.
18.1	The task force <i>will</i> provide updates on SARS to WHO.
19.1	A nationwide mechanism for outbreak alert and response <i>will</i> be set up shortly to ensure rapid detection and reporting of outbreaks.
20.1	Dr Zhang appeared on Chinese national TV to address SARS-related issues

Extract 6.18: Swine Influenza: WHO Press Conferences (dated 29-04-2009)

Clause No. (CN)	Clause
40.1	The illness that we are seeing is generally consisting with seasonal influenza infection.
41.1	That is the kind of symptoms that the milder cases are experiencing and generally what are seen with other influenza viruses,
41.2	although there is some suggestions that <i>perhaps</i> cases are developing diarrhoea more <i>often</i> than is normal with seasonal influenza or seen with seasonal influenza.
42.1	So we <i>will</i> continue to follow this and see how the picture of clinical symptoms evolves.

Appendix B: Extracts in Chapter 7

I. Expressing Risk and Uncertainty of Diseases

Extract 7.1: Swine Influenza: WHO Press Conferences (dated 26-04-2009)

Clause No. (CN)	Clause
12.1	When we see such a new virus,
12.2	if it has the ability to infect people to move from person to person in a way that it is able to cause community outbreaks, large outbreaks of infection,
12.3	then we <u>certainly</u> have the potential for the virus to spread from one country or one location to another.

Extract 7.2.: Swine Influenza: WHO Press Conferences (dated 26-04-2009)

Clause No. (CN)	Clause
114.1	So when viruses evolve,
114.2	clearly they <u>can</u> become more dangerous for people,
114.3	that is, to cause more serious disease,
114.4	or they are also able to mutate
114.5	so they cause less serious disease
114.6	and that is very difficult to predict.

Extract 7.3.: Swine Influenza: WHO Press Conferences (dated 29-04-2009)

Clause No. (CN)	Clause
50.1	Is it theoretically <i>possible</i> that this epidemic <i>could certainly</i> stop for unknown reasons,
50.2	although this is <i>probably unlikely</i> at this point.
51.1	<i>It is also possible</i> that we <i>could</i> continue on with spread of relatively mild illness in most countries
51.2	recognizing that death and serious illnesses <i>will</i> occur <i>sometimes</i> .
52.1	And <i>it is</i> also <i>possible</i> , that as we go into the future,
52.2	we <i>will</i> see more serious cases.
53.1	These options are all <i>possible</i> .
54.1	<i>We do not quite know</i> how this is going to evolve
54.2	but we <i>will</i> , << >>, monitor the situation very carefully.
54.3	<<as we mentioned over the last few days>>,

Extract 7.4: SARS: SCMP (dated 17-03-2003)

Clause No. (CN)	Clause
11.1	Secretary for Health, Welfare and Food Yeoh Eng-kiong said yesterday there <i>might</i> be infections of atypical pneumonia in the community directly related to the outbreaks involving mostly medical workers from four public hospitals and one Mongkok clinic.
11.2	

Extract 7.5: Swine Influenza: WHO Press Conferences (dated 11-05-2009)

Clause No. (CN)	Clause
13.1	Right now as you know,
13.2	we are at this so-called Phase 5, and in sort of dry terms,
13.3	what this reflects is that <i>we believe</i> there is sustained community transmission, from person-to-person, occurring in two countries in one region, which is North America –which is one of the WHO Regions.
14.1	We have not gone up to 6,
14.2	and as we have gone on over and over again,
14.3	<i>I think</i> with these press briefings,
14.4	we have said,
14.5	you know,
14.6	we <i>cannot</i> predict the future,
14.7	so <i>it is possible</i> that we <i>will</i> go up to Phase 6,
14.8	we <i>could</i> go up there quickly,
14.9	we <i>could</i> go up there after a long period of time,
14.10	<i>it is possible</i> for us to go up,
14.11	but <i>it is</i> also <i>possible</i> for the current situation to stabilize where it is now,
14.12	and then <i>it is possible</i> that we <i>will</i> go back, down to Phase 4 in the future.

Extract 7.6: Swine Influenza: WHO Press Conferences (dated 26-04-2009)

Clause No. (CN)	Clause
110.1	So currently cases we are mild
110.2	and we see cases which appear to be quite severe,
110.3	although again <i>we don't know</i> the exact relationship of this specific swine 'flu viruses to the serious cases,
110.4	you know
110.5	<i>we don't know</i> how <u>often</u> it causes serious disease as opposed to mild disease.

Extract 7.7: SARS: SCMP: (dated 18-03-2003c)

Clause No. (CN)	Clause
12.1	Dr Yeoh said
12.2	the infectious agent had still not been identified.
13.1	He criticised the WHO for sending out a travel advisory on Saturday which he said cast the definition of severe acute respiratory syndrome (Sar) too wide.
14.1	You really need to be sensible about this and not to have a whole global panic about this infection
14.2	because <u>we do not know</u> about its origin,
14.3	<u>we do not know</u> about its extent,
14.4	he said.

II. Expressing Risk and Uncertainty of Vaccines

Extract 7.8: Swine Influenza: WHO-Press Conferences (dated 13-07-2009)

Clause No. (CN)	Clause
85.1	The vaccines which are produced now are much better purified than the way they were in 1976,
85.2	so <i>we really do not think</i>
85.3	that <i>it is likely that we will</i> have these side effects again,
85.4	but to be <i>absolutely</i> honest,
85.5	of course it is only when you have a large scale distribution of vaccines that you know with <i>certainty</i> the safety profile of the vaccine.

Extract 7.9: Swine Influenza: WHO-Press Conferences (dated 06-05-2009)

Clause No. (CN)	Clause
15.1	For H5N1 – avian influenza vaccine – it has been shown
15.2	that you need two doses.
16.1	For this new vaccine, nobody knows.
17.1	It <i>may</i> be the case that the population has already some experience, some "priming"
17.2	as we say,
17.3	and has already encountered the H1N1 (unintelligible) – not the new one – but the human H1N1 seasonal strain,
17.4	and because of that there is already some background level of immunity.
18.1	If this is the case,
18.2	it <i>may</i> be that one dose <i>will</i> be sufficient.
19.1	But this still needs to be demonstrated,
19.2	and it is only in clinical trials in humans with the first doses of vaccine available,
19.3	that this <i>will</i> be completely clear.
20.1	Therefore, we <i>will</i> still need a few months to know whether we <i>will</i> need one or two doses.

III. Expressing Consequences of Diseases

Extract 7.10: SARS: SCMP: (dated 19-03-2003)

Clause No. (CN)	Clause
11.1	However, some parents have taken to issuing individual alerts, with one anonymous circular signed by a very concerned parent warning of the potential for an epidemic.
12.1	Up to now the infection seems to have been limited to the hospital staff and their families,
12.2	the statement said.
13.1	If the second outburst took place in one of the schools,
14.1	the consequences <i>could</i> be very disastrous.
15.1	Then Hong Kong <i>will</i> be in the grip of a gigantic plague, like the one which killed tens of thousands of people in 1894.
16.1	The statement slammed the complacency of the Education and Manpower Bureau (EMB) in issuing cautionary guidelines to school authorities.

Extract 7.11: SARS: SCMP: (dated 29-03-03b)

Clause No. (CN)	Clause
1.1	Hong Kong workers <i>may</i> face another round of redundancies
1.2	if the community fails to contain the spread of atypical pneumonia, triggering the collapse of consumer confidence.

Extract 7.12: SARS: SCMP: (dated 03-04-2003b)

Clause No. (CN)	Clause
29.1	<i>Certainly</i> , the disease <i>will</i> take an economic toll, coming on the heels of worries about the Iraq war and a jittery world economy.

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