



**A corpus linguistic study of Australian and Chinese health news reporting
on salt consumption**

By:

Mengdan Zhao

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Department of Chinese Studies
School of Languages and Cultures
Faculty of Arts and Social Sciences
The University of Sydney

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STATEMENT OF ORIGINALITY

This is to certify that this thesis is my own original work and does not incorporate without acknowledgement any material previously submitted for a degree or diploma in any university. I declare that, to the best of my knowledge and belief it does not contain any material previously published or written by another person where due references is not made in the text.

Mengdan Zhao

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ABSTRACT

Dietary health risks are among the lifestyle-related health challenges seen all over the world, and are connected to every individual's daily behavior. They have motivated a shift from reactive healthcare to proactive health communication and promotion, and therefore have attracted the increased interest of communication professionals and researchers. Salt consumption has become a major dietary risk in the current world, which has been linked to a variety of noncommunicable diseases. China has the world's third highest mortality rate caused by a diet high in sodium while Australia has made remarkable strides in controlling salt consumption.

Exposure to persuasive health communication has been viewed as a significant strategy to influence people's beliefs, attitudes, intentions, or behaviors with the goal of public health intervention. In this regard, the overall purpose of this research is to investigate and compare the linguistic characteristics of health news between the comparable and bilingual Australian-Chinese mass media news corpora. The comparable corpora are self-built, compiled with health-themed news reporting on salt consumption. By analyzing the corpora, this study analyzes communication characteristics from two perspectives, namely information evidentiality and relevance. Analysis will reveal how health messages are presented to be persuasive and effective, which are integral to public health issues and risk perception.

Through the application of corpus linguistics and computational linguistics techniques, the similarities and differences of linguistic characteristics will be revealed. This study attempts to advance comparable health communication research. The research findings will send a critical message to communication professionals that health news has the potential to change people's risk perceptions. This will hopefully have broader implications for the improvement of health news quality.

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GLOSSARY

Concordance Analysis: concordance is one of the methods used in corpus linguistics. A concordance is a display format that shows a search word with a specified amount of co-text to its left and to its right. (Mahlberg, 2010)

Co-occurrence Analysis: this study considers co-occurrence as the simultaneous appearance of a target word with other words; or the simultaneous appearance of several topics in a counting unit, such as a sentence, a paragraph, or a corpus (Galliker et al., 1998).

Force Atlas 2 layout algorithm: Force Atlas 2 is a continuous force-directed layout algorithm for handy network visualization designed for the gephi software. (Jacomy et al., 2014)

Information Evidentiality: the linguistic encoding of the basis of the source's information in news texts for a factual claim and argumentation; it is based on journalist's knowledge and judgements.

Information Relevancy: the extent to which health news messages are relevant to the lives of news audiences (i.e., the general public). This study conceptualizes information relevancy as comprising proximity and personalization.

Latent Dirichlet Allocation: LDA is a computational content analysis technique of topic modeling that can be used to investigate the hidden thematic structure of a given collection of texts. (Maier et al., 2018)

News Communication Model: this study conceptualizes a communication model as comprising two components, frames and formats.

News formats: codes of news presentation.

News frames: broader emphases of news discussion.

Personalization: the degree to which health news concerns ordinary individuals, and their experiences, practices and emotions, with special references to different population groups and human emotions.

Proximity: the degree to which the news content is close to the target audience, with special references to geographical closeness and cultural closeness.

COMMON ACRONYMS

ABS	Asian Barometer Survey
ACHS	Australia-China News Corpora on the Health Impacts of Excessive Salt-intake
ANTMN	Analysis of Topic Model Networks
AusCorp	Australian Corpus
AWASH	Australian Division of World Action on Salt and Health
BoW	Bag-of-words Model
CDA	Critical Discourse Analysis
CDC	China Centers for Disease Control
ChnCorp	Chinese Corpus
CIT	Communication Infrastructure Theory
COA	Co-occurrence Analysis
CSRI	China Salt Reduction Institute
DALYs	Disability Adjusted Life Years
FHD	Food and Health Dialogue
FOP	Front-of-pack
GI	General Inquirer
HBM	Health Belief Model
HSR	Health Star Rating
ICT	Information Communication Technology
IE	Information Evidentiality
IHME	Institute for Health Metrics and Evaluation
IR	Information Relevancy
LDA	Latent Dirichlet Allocation
LIWC	Linguistic Inquiry and Word Count
MNDs	Mental Non-communicable Diseases
M&M	Morbidity and Morality

NCDs	Non-communicable Diseases
NHMRC	National Health and Medical Research Council
NLP	Natural Language Processing
PPL	Perplexity
SFL	Systematic Functional Linguistics
TTR	Type-token Ratio
USAS	UCREL Semantic Analysis System
VSRP	Victorian Salt Reduction Partnership
WHO	World Health Organization
YLDs	Years Lived with Disabilities

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CHAPTER 1 INTRODUCTION

1.1 Overview of chapter 1

“Most people consume double the WHO-recommended 5g of daily salt intake, putting themselves at greater risk of the heart diseases and strokes” (WHO, 2020). In its online news, the World Health Organization (hereafter WHO) discussed the "WHO Global Sodium Benchmarks for Different Food Categories" on 5 May 2021. The WHO has initiated various campaigns to control salt consumption with a goal of reducing global salt intake by 30% by 2025 as excessive salt intake is a health risk globally. The implementation of a global action plan on salt reduction requires national support in numerous aspects, ranging from regulation and policies to health promotion and public education. Mass media health communication is examined here as a critical health intervention strategy to combat excessive salt consumption.

This is an empirical linguistic study exploring the roles of mass media news and linguistic characteristics in public health risk communication across cultures and languages. It focuses on how the presentation of news translates health knowledge into public health discourse, specifically the health impact of excessive salt-intake as one of the dietary health risk factors worldwide. Salt consumption is related to daily life, so managing salt intake and food choices is crucial for community health. This study will focus on comparing the reporting of this topic by mainstream media in Australia and China, given their distinct salt control approaches. The first chapter provides an introduction to the study. Section 1.2 introduces the social research background of this topic. Section 1.3 explicates the aims and rationale of the study and introduces the analyses covered in the thesis and Section 1.4 presents research questions. Finally, Section 1.5 provides an overview of the thesis structure.

1.2 Social research background

The study is interdisciplinary in nature, as it combines corpus linguistic discourse analysis, public health analysis, and media communication analysis. This section provides the social

background of the research by introducing four aspects: the health impacts of excessive dietary salt-intake; salt-intake and control in Australia and China; the role of mass media communication of public health risk (Chapman, 2007); and finally, the existing problems with health risk communication in China.

1.2.1 Health impacts of excessive dietary salt consumption

The trend to urbanization, particularly in developing countries, has not only had positive implications but has also resulted in health risks which have been described as an "urban health penalty" (Gould, 1998). WHO statistics show that urban areas with a large population are primarily affected by Noncommunicable Diseases (hereinafter NCDs), which are collectively responsible for approximately 70% of all deaths worldwide (WHO, 2014). As a result of urbanization, it appears that people are exposed to greater risk factors including excessive salt consumption, which has led to and continues to contribute to the spread of NCDs such as hypertension, which is common among elderly Chinese.

Lifestyle changes are often accompanied by dietary changes. High sodium consumption has been caused by various factors, including the modernization and urbanization processes, which have altered many aspects of human life. The physical growth of urban areas and the rural-urban migration (Chace & Walsh, 2006) have contributed to a remarkable change in human dietary habits, which has led to ultra-processed foods gradually replacing fresh organic products in the diets of urban residents. Two factors have led to this phenomenon. First, urban expansion has led to insufficient agricultural resources, such as less land and fewer farmers. As many rural dwellers move to urban areas, China is experiencing a lack of agricultural labor and uneven development across regions. Second, the fast pace of urban life leaves little time for food preparation. In addition, some low-income urban populations, particularly those in slums, have limited access to high-quality and nutritious foods, which may lead them to choose cheap and ultra-processed foods (CDC, 2019).

Furthermore, the relationship between human health and the environment is complex. Rapid farming has resulted in a decline in the nutritional density of crops, despite the fact that industrialized agriculture has reduced the need for labor. In addition, pesticides and other chemicals are a serious global health issue. Pesticides and chemicals are ubiquitous in the environment, are present in food and water and last for decades. Carson's argument, made in the 1960s that environmental disruptions produce human health disruptions (Carson & Lear, 1999, c1962; Seager, 2014), and that humans get lost in the midst of uncertainty of environmental health risks, of which dietary health risks are an aspect, still has implications today.

The lure of low prices and convenience has led to a higher reliance on processed foods among urban residents, particularly the urban poor (Zhu et al., 2021). Processed foods high in sodium, however, pose a chronic health risk. Based on Afshin et al.'s (2019) claim, malnutrition is primarily represented by overweight, obesity, and then NCDs due to low quality caloric intake, not inadequate caloric intake as is traditional. Among developing countries around the world, urban health penalties are evident in the prevalence of NCDs (Gould, 1998). According to Zhu et al. (2021), the "urban penalty" counteracts the urban advantage for middle-aged and young populations in China, as evident in an empirical analysis of urban-rural health disparities in age profiles.

Dietary health risk factors have a profound impact on health due to their high morbidity and mortality (hereafter M&M) outcomes. However, as noted above, an unhealthy, or inappropriate diet may be a modifiable risk factor for affecting both physical and mental health. Research on the relationship between dietary habits and health risks has been conducted both in clinical and public health fields and verified with empirical data. As claimed, dietary risks were responsible for 11 million deaths and 255 million Disability-Adjusted life-years (hereafter DALYs) in 2017 (Afshin et al., 2019). Worldwide, cardiovascular disease was the leading cause of high morbidity and mortality rates, followed by cancers and type-2 diabetes, regardless of gender, age or socio-demographic composition. More than 50% of deaths and 68% of DALYs

worldwide are attributed to non-optimal intakes of three dietary factors: insufficient intakes of whole grains and fruits, and excessive salt consumption (Afshin et al., 2019).

Excessive salt consumption is a chronic health threat that accumulates over time. Globally, excessive salt consumption has irreversible and pervasive health effects on all populations. The impact of dietary health risks on morbidity and mortality rates for the public is much greater than that of pandemics, for example, COVID-19 (Afshin et al., 2019; Li et al., 2021), and should not be underestimated. Dietary health risks, therefore, require more attention as a branch of public health not only in daily life but also in various research domains.

WHO (2020) defines high sodium consumption as more than 2 grams per day, equivalent to 5 grams salt per day. Worldwide, most people consume 9-12 grams of salt per day, or about twice the recommended daily amount (WHO, 2020). Many people are therefore at risk of adverse health outcomes. High salt consumption is considered to be a major contributor to hypertension and cardiovascular disease. Hypertension, commonly known as high blood pressure, considerably increases the risks of stroke, coronary artery disease, arrhythmias, and all other diseases that involve the heart and blood vessels. As a result of excessive salt intake, adverse health outcomes adversely affect life expectancy and quality, as well as increasing the burden on the medical and public health systems. The image in Figure 1.1 is from the WHO website, which advocated for reducing salt intake.

Figure 1.1: Salt reduction will advance the world's noncommunicable disease targets



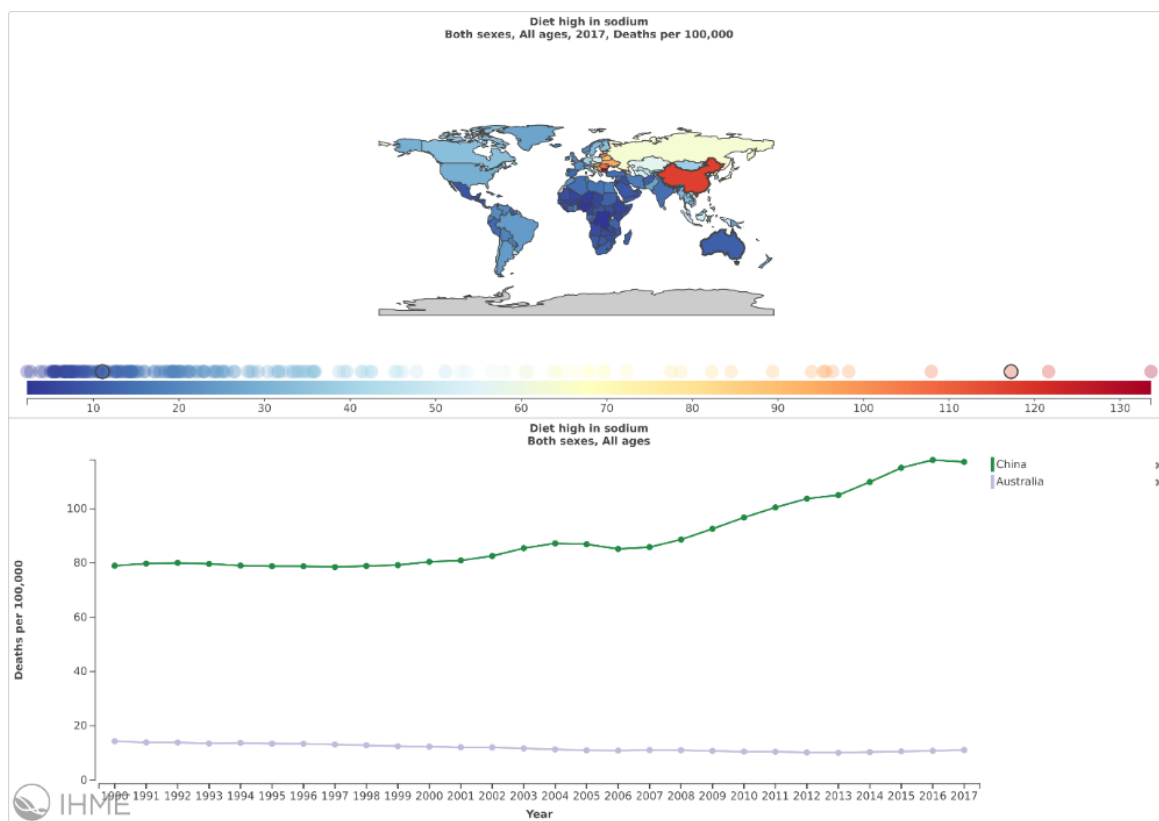
Note: this image is retrieved from the WHO website

(https://www.who.int/images/default-source/infographics/ncds/reducing-salt-intake-will-give-better-chance-at-longer-healthy-life.jpg?Status=Master&sfvrsn=16b34758_2)

1.2.2 Salt consumption and control in Australia and China

This study focuses on unhealthy dietary habits as one of the most significant health risks of urban residents around the world. The study examines the risks associated with excessive salt consumption, which is getting increasingly more attention.

Figure 1.2: The upper part world map shows the global mortality rates (2017) caused by a diet high in sodium; the lower part shows the temporal trend (1990-2017) of mortality rates caused by diet high in sodium in Australia and China



Note: the data in figure is provided by the IHME

(<https://vizhub.healthdata.org/gbd-compare/>)

Among all the countries in the world atlas of IHME data, mainland China has the third highest mortality rate, 117.25 deaths per 100,000 caused by a high-salt diet in 2017. Comparatively, Bulgaria ranked first with 133.61 deaths per 100,000, and Georgia ranked second with 117.25 deaths per 100,000, in 2017. In contrast, Australia ranked among the best-performing regions in the world with the mortality rate caused by high salt diets, 11.07 deaths per 100,000 in 2017, about a tenth of China's. Similar trends were observed for the rates of YLDs and Disability-Adjusted-Life-Years (hereafter DALYs) caused by a diet high in sodium. The lower half of Figure 1.2 shows the trend of mortalities caused by high-salt diet in Australia and China spanning from 1990 to 2017, indicating that China's trend, the green line, was high while Australia's trend, the grey line, was low. China has not only had a high mortality rate continuously, but also the gap with Australia has grown.

Research findings about dietary salt intake levels could explain the different mortality rates

caused by high-salt diets in Australia and China. The WHO (2020) recommends that adults should consume less than five grams of salt per day as a reasonable intake to reduce the risk of cardiovascular diseases. It also recommends a reduction in salt intake in a population of 30% as an effective prevention and control strategy for NCDs.

In Australia, the National Health and Medical Research Council (NHMRC, 2013) has established a maximum daily salt intake of six grams beyond which it is considered harmful. Infants, children, older people, pregnant and nursing women should be given special considerations. Considering the current dietary sodium intake level, Australia has a commendable average daily salt intake of about four grams, while China is located in one of the highest salt-intake regions in the world, namely East Asia, where the average sodium intake level is eight grams, which is 60% higher than the WHO recommendation. Average Chinese adults consume over 10 grams per day on a consistent basis, twice the WHO recommendation. In China, Japan, and Thailand, salt consumption has been the primary cause of deaths and DALYs rates (Afshin, 2019). Salt intake in China differs greatly among different regions due to divergent dietary habits, with some regions having extremely high sodium intake levels and high morbidity and mortality attributable rates.

Australia has been working on salt reduction at the population-level, progressing from advocacy to action. Webster et al. (2015) mentioned that the Australian Division of World Action on Salt and Health (hereafter AWASH) has been promoting salt-intake reduction since 2005. Australians have initiated a number of salt-reduction programs in the last twenty years. As an example, the Health Star Rating (hereafter HSR) system was launched in 2014 and applies to front-of-pack (hereafter FOP) food packaging. As an indicator of food healthiness for consumers, this system assigns ratings from 1/2 to 5 stars to packaged food products. See figure 1.3 for an example of the HSR system.

Figure 1.3: Australia's Health Star Rating system

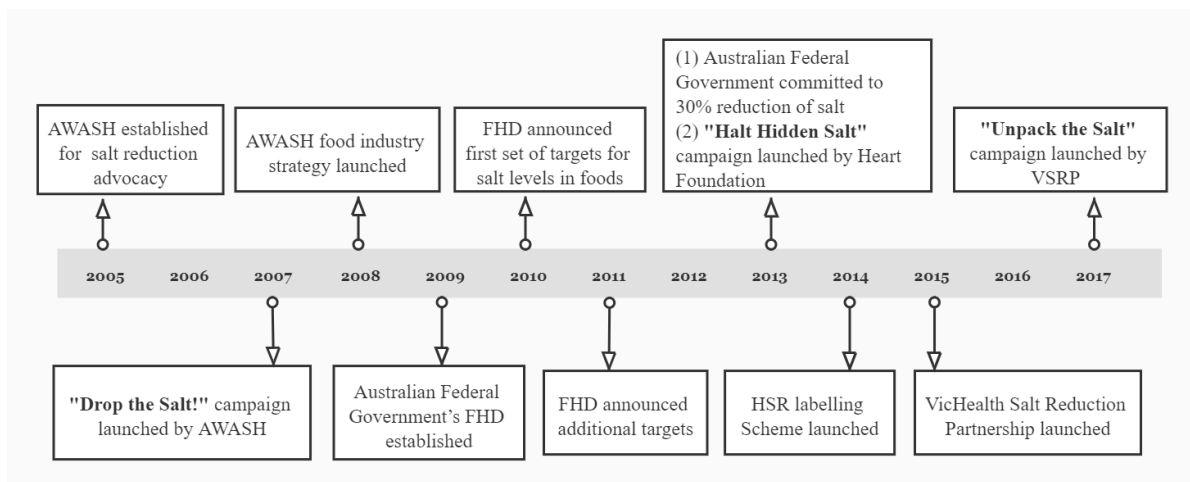


Note: this image is retrieved from:

(<https://www.eatforhealth.gov.au/eating-well/how-understand-food-labels/>)

The Victorian Salt Reduction Partnership (hereafter VSRP) launched the "Unpack the Salt" campaign in 2017. By collaborating on initiatives and programs, the salt-reduction goal will be on track to achieve the proposed 30% reduction in Australia by 2025. An overview of salt reduction activities in Australia from 2005 to 2017 is provided in figure 1.4.

Figure 1.4: Australia’s activities in salt reduction



Note: this figure is adapted from Rosewarne et al., (2020) and Webster et al., (2015)

China has a different situation. According to the data from IHME for China, metabolic risks (e.g., high body mass index), environmental risks (e.g., air pollution), and behavioral risks (excessive salt intake) have been the leading risk factors for morbidity and mortality. Salt and seasonings are the most common sources of sodium in today's China, and urban residents rely heavily on ultra-processed foods and eating out, which contribute to the increase of salt consumption (The George Institute for Global Health, 2021). Since urban residents typically rely on these foods for convenience, they need to be made aware of the health risks of high-

salt foods, such as being a major cause of cardiovascular disease.

Due to gaps in knowledge, and limited intention to reduce salt consumption in the Chinese population, as revealed in Chen et al.'s (2020), China should consider more national and regional campaigns to reduce salt consumption (Trieu et al. 2015; Xi, Hao & Liu, 2014). In 2010, the China Salt Reduction Institute (hereafter CSRI), a non-governmental public health sector organization, launched a national campaign for salt reduction in China. The target proposed by the CSRI was to reduce salt intake level by five grams within 10 years. However, it is clear from the current salt consumption level in China that this goal is far from being achieved. In 2018, China has made a critical step that strategies for salt reduction in food industry was first officially proposed by China Centers for Disease Control (CDC, 2019).

Overall, salt-intake and national efforts to reduce salt consumption are quite different between Australia and China. Therefore, the focus of this study is the over consumption of salt, which is an important health risk factor associated with urban residents in these countries. This study examines mainstream news coverage of excessive salt intake in China and Australia, since health knowledge is translated into culturally relevant and evidence-based messages by mass media. The next section will discuss the importance of persuasive and effective health risk communication based on information evidentiality and relevance.

1.2.3 The importance of mass media communication of public health risk

This study focuses on health news reporting in mass media. The mass media informs the public and promotes the understanding of topics and issues of public interest; the public is often informed of health risks, including excessive salt consumption, through the media. In spite of the fact that diverse media channels coexist today, mass media plays an integral role in shaping and influencing public opinion. Information Communication Technology (hereafter ICT) has contributed to a dilemma in which the more data becomes available, the more authentic and relevant information is lost to the public. During such times, media greatly influence public

risk perception. This has resulted in more barriers for the public to develop digital health literacy, specifically the capability to ascertain the accuracy, credibility of online health information. Even though social media has been an avenue for public health institutions, this study focuses on mass media as a more reliable and useful medium for public health communication.

The public health agenda is heavily influenced by mainstream media, and specifically mainstream media outlets (Gollust et al., 2019; Odone & Signorelli, 2016; Tong, 2014). Mass media plays an influential role in people's lives by informing audiences of common issues and problems making it a major channel for communicating health risks to the public. Altheide (1997) has claimed that mass media and public perceptions over certain issues are inexorably connected because of the critical role it plays in shaping the agendas and influencing public thinking. Often audiences' risk perceptions are based on the most accessible information they are exposed to. In the era of information explosion, audiences are frequently overloaded with information without enough time for careful verification and digestion. Evidentiality and relevance of health messages are thus crucial for the public's knowledge.

Risk depiction and public acceptance are closely linked through the media. For example, many people are ignorant of which foods are healthy and which are not, which can result in long-term effects on their health. Dietary health risks can cause invisible but often irreversible harm; therefore, the construction of dietary health risks constitutes a part of our "risk society" (Beck, 1992). The characteristics of invisibility, permanence, systematicity and irreversibility of dietary health risks only exist in scientific knowledge and thus are open to social definition and construction (ibid., 1992). The media can shape and reshape news coverage about dietary health risks, making media communication about dietary health risks extremely challenging. Ashorkhani et al (2012) argued that mass media plays an important role in informing the public with up-to-date health related news; likewise, Song et al. (2016) asserted that the public are very interested in absorbing health related information from the mass media. The interaction between the public and mass media is helpful for the dissemination of health knowledge and

to promote healthy behaviors. Considering that health knowledge is associated with complex and technical matters, ensuring that media information is relevant, understandable and persuasive for target audiences is challenging.

Global communication patterns are rapidly changing, and digital media have taken over people's daily lives. Traditional mass media, which has traditionally relied on print media, have adapted to the digital age by establishing mainstream digital news outlets, which increase access to health information globally. Since conventional public health communication is difficult to succeed alone, innovative media channels are utilized to attract public's attention and provide opportunities to engage the public.

Excessive dietary salt-intake as a major dietary health risk in the current world, the severity of which is associated with various non-communicable diseases and health damage (Zhao & Lyu, 2021). Dietary habits are more modifiable lifestyle health risk factors than other significant variables such as socioeconomic status and hereditary tendency. To influence the public's understanding and to shape their dietary behaviors, it is important to effectively communicate salt reduction and control guidelines. There is a need for research that focuses on mainstream media coverage of dietary health risks associated with excessive salt consumption.

This research focuses on mainstream news communication regarding dietary salt intake, and its control for four reasons: (1) the public has been intensively exposed to mainstream digital media rather than print media; (2) digital media can provide approachable sources of knowledge rather than academic sources for the public; (3) mainstream digital media can reach a large audience via mass communication, and (4) mainstream digital media has been evaluated as an effective method of media intervention at a population-level. Therefore, the object of research is limited to digital news. The study compares the mainstream news coverage of excessive salt intake in Australia and China.

Mass media campaigns targeting salt intake reduction have been evaluated as effective

population-level media interventions (Zhao & Lyu, 2021). In the global action plan for non-communicable disease, released by WHO in 2017 (see Appendix A), the effectiveness of mass media communication campaigns is validated to have an effect size of 5% reduction in salt intake per day as a conservation option; in Australia, the same campaign had a 10% reduction in sodium intake (Land et al. 2014). As digital news media can reach a large segment of the population, they play an influential role in conveying scientific knowledge to the general population and potentially shape behavior. Because of the pivotal roles that digital news media play in public health knowledge dissemination and behavior change, an investigation into the construction of believability and effectiveness of messages is warranted. This research investigates public health knowledge dissemination and the interpretation and popularization of health knowledge into public health discourse, and analyzes information evidentiality and relevance constructions.

1.2.4 The existing problems in China

There are two types of health risks, which differ in their frequency of occurrence. One type is emergency health risk, also known as outbreak of public health, like SARS, H7N9, and COVID-19. The second type of health risk relates to the hazards of daily living, such as air pollution, tobacco and alcohol use, and adverse dietary habits. One of the core capacity areas of health regulation is the communication of risks to the public (Frost et al., 2019). Over the past decade, Chinese health emergency risk communication has made impressive strides in each of the three response phases: pre-event, during event, and post-event (ibid.). The emergency risk communication capacity has increased, as demonstrated by the handling of several outbreaks: the SARS in 2003, the H7N9 in 2013, and the current COVID-19 in China (Zhang et al., 2020). Emergency risk communication response systems established between local CDCs have contributed to the development of emergency risk communication with principles and models set for emergency risk communication.

Conversely, little has been done in China in terms of communicating the health risks of

everyday living, such as dietary behaviors. According to data from the 4th Asian Barometer Survey (ABS), food safety was considered the issue of most concern by 13% of Chinese residents, which suggests that the general public is vigilant about daily dietary health risks. As noted, China's rapid urbanization has had a substantial impact on public health risk awareness. As the most populous country in the world and with an aging population, chronic diseases have become, and will continue to be, a major health problem in China, affecting health and economic progress (Afshin et al., 2019; CDC, 2019). This research argues that, as there are several gaps in this area, the capacity for communication of everyday living health risks in China should be strengthened. First, communication concerning everyday living health risks lacks persuasiveness and does not attract widespread attention. Second, communication concerning everyday living health risks should be relevant to target audiences. This study, for instance, focuses on a type of health communication, mainstream digital news, which has great potential to appeal to and influence the general public.

1.3 Aims and rationale

In many countries, risk assessment and management of health risks has been emphasised, as well as a robust food safety and health infrastructure at both the national and international levels (Wall & Chen, 2018), but the effectiveness and persuasiveness of risk communication has been overlooked to some degree. Cultural contexts and target audiences pose many challenges to mass media health risk communication. Thus, communicating health risks in a relevant and persuasive manner remains a challenge. This research argues that news texts are structured and encoded so as to attain information evidentiality and relevance to persuade the recipients of the truth of messages and the trustworthiness of the authors, and is pivotal for constructing persuasive health communication. The same message can be presented and structured through careful selection of terms and phrases to connect to the belief system of the targeted receiver group so that it will enhance public awareness of a risk, alert the population to potential dangers, or allay fears.

The above introduction to the social background has discussed three topics: (1) the health implications of excessive salt intake and the current situation of salt consumption and control in Australia and China; (2) the capacity of mass media to reach large populations and influence risk awareness; and (3) the existing issues of dietary behavioral risk communication in China. Based on these points, the overarching research aim is to investigate the communication effectiveness in terms of information evidentiality and cultural relevance of Australian and Chinese health news texts. Research on health risk communication has been undertaken in a variety of academic areas, but an empirical perspective from discourse analysis is relevant and important to improving the persuasiveness of health communication. In this study, the researcher argues that proactive health risk communication and raising awareness of risk are more valuable than post-event reactions. Health news messages delivered with enhanced credibility and relevance could facilitate persuasiveness. Research in this area may be useful for other countries in the development of health risk communication, as well as mass media communication of other health issues.

1.4 Research questions

Onto achieve the overarching aims of the research, the following Research Questions (RQ) are posed:

RQ1: How Australian and Chinese digital news present and validate evidence of the risks of excessive salt-intake to improve public awareness of the issue? (Chapter 4)

RQ2: How Australian and Chinese digital news communicate the risks of excessive salt-intake in a culturally relevant way to increase public awareness of the issue? (Chapter 5)

Information evidentiality and relevance are two significant linguistic characteristics of health news discourse contributing to effective and persuasive health communication. This is well supported by framing theory (Goffman, 1986; Scheufele, 1999), news value theory (Galtung

& Ruge, 1965; Bednarek & Caple, 2012, 2014), and communication infrastructure theory (Wilkin & Ball-Rokeach, 2011). Framing theory stresses that the selection of information can influence audiences to interpret a reported issue in multiple ways from problem definition, causal interpretation, moral evaluation to treatment recommendation (Entman, 1993). News value theory highlights the importance of information authenticity, evidentiality and relevance in constructing newsworthy news texts (Bednarek & Caple, 2012, 2014). Communication infrastructure theory argues that local media are the meso-level storytelling agents who can bridge organizations and population in a community by disseminating highly culturally relevant health information.

Information evidentiality deals with the source of information which provide evidence and reliability for the target readers of health news. Information relevance refers to the connection between information in news texts and the real-life circumstances of the target readers of health news. To explore information evidentiality and relevance in health news communication, this study combines corpus analysis and discourse analysis, and employs the terms of news formats and frames. Formats describe how messages are presented and constructed, and information evidentiality and relevance are both formats. Frames are “some aspects of a perceived reality” which are made salient in text (Entman, 1993, p. 52). In this study, the focus of news content is termed as news frame, and conceptualized as communities in a network of news topics. This thesis employs flexible and hybrid research methodology for analysis and comparison, and empirically analyzes news discourse through a corpus-assisted and data-driven analytical framework. The approaches of corpus linguistic, computational linguistic, and qualitative interpretations are leveraged for the quantitative data analysis in this thesis. Chapter 3 will elaborate relevant theories, the analytical framework, and a completed research design.

The investigation of health news communication in this research has practical significance. The persuasiveness of health news communication contributes to the effectiveness of public health intervention. The research findings will have implications for the mass media communication of public health issues, and inspirations for health communication professionals and reporters

to strengthen the persuasiveness of health messages. Public understanding of health issues and decisions regarding health-related behaviors will be improved with the improvement of health information demonstration.

1.5 Thesis structure

The thesis is organized as follows. In this chapter, the social background of the research topic, the aims and rationale of the study, and the research questions have been introduced. This study aims to analyze and compare the linguistic characteristics, namely information evidentiality and relevance of digital health news between the two countries. Chapter 2 presents a critical review of relevant literature on health risk communication, and discourse analysis of health news. Chapter 2 will identify existing research gaps to be addressed in this research domain in this thesis, as well as analyze and compare the strengths and limitations of different approaches to news discourse analysis, which will inform the research design of this study. Chapter 3 discusses the analytical framework and research design pertinent to this research. Chapter 3 primarily reviews relevant theories and elaborates the analytical framework of news formats and frames. A detailed research design comprising data selection, collection and self-compilation of English-Chinese bilingual comparable corpora is as follows. Chapter 3 lays the foundation for subsequent analyses of information evidentiality and relevance.

Chapter 4 reports the results of information evidentiality constructions of Australian and Chinese health news corpora, via corpus-assisted and data-driven discourse analysis. Chapter 5 reports the results of information relevance constructs of Australian and Chinese health news corpora. Chapter 5 includes news frame analysis and comparison between two countries through combining unsupervised machine learning and corpus linguistics approaches. Chapters 4 and 5 highlight qualitative interpretations of the quantitative findings and compare the information evidentiality and relevance of health news. Finally, Chapter 6 offers a summary and conclusion which synthesizes the results and findings reported in this thesis. Contributions, implications, limitations, and suggestions will be discussed.

CHAPTER 2 LITERATURE REVIEW

2.1 Introduction

In Chapter 1, it is noted that this research combines public health study, media communication study, and corpus-assisted discourse analysis. By referring to new and influential literature, this chapter reviews current literature related to health risk communication, particularly in the genre of mass media news. It also discusses research methods and approaches to discourse analysis of health news. Literature is reviewed to compare the strengths and limitations of methods and approaches to information evidentiality and relevance analyses. The chapter is organized as follows. Section 2.1 is an introduction to this chapter. Section 2.2 reviews literature on health risk communication, explaining the challenges, and channels of health risk communication with a specific focus on health communication in the news genre. Section 2.3 reviews the discourse analysis of health news, by critiquing the literature of news format analysis and news frame analysis, respectively. It focuses on reviewing research methods and approaches, and compares their strengths and limitations, with close attention paid to the recent advances in corpus-assisted quantitative discourse analysis. Section 2.4 identifies gaps in the current literature that justify the use of corpus-assisted approaches in this thesis. It is argued that this approach is explorative, without a priori assumptions which may lead to bias in the use of the literature. Finally, section 2.5 summarizes the main points covered in this chapter.

2.2 A review of health risk communication

Successes in public health initiatives are not only the result of scientific research and the efforts of policy makers and health officials. The crucial role of communication in explaining and articulating health risk issues has been widely recognized (Fitzpatrick-Lewis et al., 2010; Tong, 2014). Subsections 2.2.1, 2.2.2, and 2.2.3 focus on literature relevant to channels of health risk communication, challenges of health risk communication, and health risk communication in the news genre. A final remark is made in subsection 2.2.4 based on the review of health risk communication.

2.2.1 Channels of health risk communication

Risk is a complex concept with multiple meanings. Risks are of different types and originate from different situations. In this research, the focus is on dietary health risks, that is, the chance or likelihood that a dietary factor will harm or otherwise affect human health (National Institute of Health, 2016). The research examines excessive salt consumption as one of the severe dietary health risks that harm human health, as discussed in Chapter 1. News articles reporting on this topic are research objects. Risk communication, as WHO states, “used to be viewed primarily as the dissemination of information to the public about health risks and events”, and “thinking on this has now evolved dramatically as social science evidence and new communication and media technologies and practices have evolved in the 21st century” (WHO, 2014). The predominant understanding of risk communication focuses on the traditional model of communication in that it originates from sources, flows through channels, and is interpreted by receivers (Renn, 2008). The intermediary links, i.e., the channels, play a crucial role in delivering health risk knowledge or information to media audiences in this “sources-channels-receivers” framework. In today’s complex and volatile news media environment, various media channels have become gradually intertwined, with a variety of channels to communicate health-related issues, and thus pose challenges for coordinated and efficient health risk communication. Even though social media is a significant part of people's daily lives, mass media is still an influential and credible source of health information for the public. Mass media news provides large quantities of ongoing information on health issues that influence the framing and sharing of the communication of health messages. This section highlights the roles that media channels play in health risk communication.

Mass media and social media are two basic media channels, characterized by different information transmission forms, which result in divergent ways of participation and interaction. In the meantime, the growth of new media channels, such as website-based social media, has received considerable attention in health risk communication (Murthy et al., 2019). Mass media,

which acts as a compelling information dissemination channel, can reach many audiences via widespread communication. It resembles a “hypodermic needle” in that audiences receive information in an inherently passive form (Dorey & McCool, 2009, p. 646). The value of mass media, because of its potent dissemination of information, is its salience for intervention at a population level; however, the effectiveness of mass media communication in various health and social domains has been argued (Barcla, 2015; Sargent et al., 2005). In the meantime, mass media campaigns to reduce salt intake have been evaluated as an effective intervention tool at the population level (Grilli et al. 2002).

Social media, which features user-generated content and the strong inclusiveness and interactivity of media content, emerged after mass media; it differs from mass media in that a key feature is individual participation. Every netizen in this digitalized era is encouraged to generate, receive, share and comment messages on social media platforms, for example twitter or micro-blog (a Chinese popular social media platform). However, an unrestricted and easy-accessible social media channel leaves a stage for rumors and misinformation. The concepts of “citizen journalism”, “we-media” or “self-media” indicate that the non-professional public are active in news generation and dissemination, suggesting that social media is a context for health risk communication (Park & Lee, 2018). Separating mass media from social media usually fails since these two types of media have converged to a large extent. Mass media, whose communication path was unidirectional from sources to receivers, has now become more interactive. Several traditional news outlets, such as television and newspapers, have increasingly provided information through online sites (Barnett et al., 2011), where the receivers can provide feedback.

2.2.2 Challenges of health risk communication

Managing risk to human health has been a dominant theme in the media for a long time, and investigations and discussions around the topic of managing human health risks include how

most effectively to communicate information about health risks (Börner et al., 2017). For example, the social amplification of risk impacts (Lewis & Tyshenko, 2009; van Goudoever et al., 2021) and human health risk perceptions and judgments (Kim et al., 2018; McDaniels et al., 1997). The ultimate objective of health risk communication is to help people at risk take informed actions and make informed decisions to mitigate the effects of health hazards. However, the dynamic state of health risk communication and its divergent interpretations make it challenging to conduct effective health risk communication.

Research paradigms have focused on different aspects of health risk communication. In the applied linguistic research domain, researchers have focused on communication models or patterns (Kott and Limaye, 2016; Seeger et al., 2018), at the heart of which are two issues. Firstly, what to discuss or present in health news, namely news frames. Secondly, how to present messages in health news, namely news formats. Media discourse as a subjective product, involves informational adaptation, reiteration and modification, as it blends ideologies, narratives, and attitudes. Hence, media presentation of health risk information involves more than scientific calculation and estimation of risk, and is a forum for discussion on broader issues surrounding a health topic. Concerns, viewpoints, negotiations and suggestions surrounding a health issue are usually packaged in media to cater for the requirements of target audiences. This research argues that media discourse of health risk communication should take account of information evidentiality, relevance, and in some contexts, actionability to ensure effectiveness and persuasiveness of communication.

Information evidentiality contributes to the persuasiveness of health risk communication. Evidentiality is the linguistic marking of evidence, on the basis of knowledge of a speaker or writer. It deals with the expression of knowledge, and incorporates a combination of knowledge sources and knowledge acquirement. (Bednarek, 2006; Chafe, 1986). As information evidentiality is usually connected to certainty of knowledge (modality) and is the implication of information reliability, evidence-based discourse, with expressions of knowledge, certainty and attitude, is important to persuade audiences on the risk issues of excessive salt consumption.

Meanwhile, news discourse is a genre occupied with the application of evidentiality. According to Hsieh (2008), the primary purpose of news discourse is to convey messages about what happens and what recipients should believe. Through appropriate selection of evidence, reporters could suggest their different stances towards truth value and factual claims. This thesis will investigate the constructions of information evidentiality in news discourse to analyze how knowledge and attitude of reporters are presented with the application of linguistic markers.

Information relevance contributes to the effectiveness of health risk communication. Customized, relevant, and finer-grained communication has become a critical component of effective information delivery (Erika et al., 2014). Social and cultural contextualization of health knowledge or messages usually leads to the challenges or barriers of health risk communication. As put by Conboy (2013, p.2), “language is a social practice which is one amongst many social practices of representation and significance”, and may account for the challenge or barrier of ensuring meaningful health messages reach the general population. In the arena of public health communication and dissemination, the linguistic presentation of news discourse is critical to support and promote public health improvement. The ongoing review of the risk communication content has also been identified as a requirement in this ever-changing information era. The public health discourse has usually been criticized for a lack of specificity and relevance in terms of health outcomes and health advice (Brittle & Zint, 2003). As suggested, communication professionals tailoring messages is crucial to meet the specific interests of the target audiences for their self-assessment and health-related behavior promotion. Furthermore, besides linguistic presentation, visual aids (e.g., figures and charts) are simple graphical representations that confer benefits when communicating health messages, from a multimodal perspective (Garcia-Retamero & Cokely, 2013). Figures are the most elementary languages, and symbols of certainty amidst the noise of scientific uncertainty. Health risk communication supported by understandable figures may reduce ambiguity.

In addition to the evidentiality and relevance of health risk communication, actionability has

also been explored in the literature as a key component of both patient education materials design and media communication. Proactive communication to prevent behavior that pose a risk to health and encourage appropriate health behaviors is more efficient and significant than treatment afterwards (Utley et al., 2002). For instance, health messages that can be actioned should set criteria for patient education materials as the voluntary utilization of pertinent health knowledge is important for patients (Shoemaker et al., 2014). By providing information that can be actioned, for example, practical advice healthcare givers are able to achieve a higher quality of patient care. Besides, each individual needs actionable health information, not just patients. As well as knowing what the impact is to individual-self of the health risks, how to manage risks and establish healthier dietary habits are more significant. While producing actionable health messages has received much attention, how to ensure a health message is actionable needs further investigation. The WHO has also provided some recommendations for media health risk communication. First, timelines should be a component of risk communication. That is, effective risk communication requires strong timeliness to identify risks early as well as manage rumors and misinformation. Second, as proposed by the WHO Strategic Advisory Group, a methodical and proactive communication strategy to prevent the spread of misinformation is needed. Risk communication is an ongoing process rather than a one-time concern, requiring constant evaluation and improvement (Schwalbe et al., 2019). While risk deals with uncertainty, people generally require certainties in risk communication, particularly from the perspective of actionability.

In sum, in the arena of health risk communication, barriers to broad readership of health risk communication have often been caused by limitations of information evidentiality and relevance. In the current study, discourse analysis is conducted on health news articles from Australia and China to examine the constructions of evidentiality and relevance, and the next section will review literature on health risk communication in the genre of news.

2.2.3 Health risk communication in news discourse

The communication of health risks is a complex process that involves experts, officials, media, community members, and individuals. The media plays a critical role in health risk communication by providing audiences with health risk messages. In today's complex and volatile communication environment, it is a difficult task to deliver health risk messages in a coordinated and effective way. This suggests there is a need for research on the media performance of health risk communication. The news media demonstrably influences people's perception, opinion, and even decision-making (Erika et al., 2014). As news-based health risk communication is highly functional and significant, health behavior could be predicted by effective health risk communication and interventions. As shown by the common theories of planned behavior (Ajzen, 1991; Schifter & Ajzen, 1985), and the protection motivation theory (Wurtele & Maddux, 1987), behavioral motivation or intentions are highly determined by attitudes, and attitudes are affected by information received and processed.

Media power is well documented (Adorno & Bernstein, 1991; Brown & Witherspoon, 2002; Dorey & McCool, 2009; Hepp & Krotz, 2014; Miller & Krosnick, 2000). It is recommended to engage the public in a holistic way to disseminate information, which requires the use of multiple communication channels. Mass media news plays pivotal roles in public health issues, and its interpretations. This section reviews literature focusing on health risk communication in the news genre, and discusses research findings from the following angles: (1) debates over the function; (2) agenda-setting function; and (3) recommendations for public health advocacy in mass media. The first two parts review media in general, and the third part focuses on health risk communication.

2.2.3.1 Debates

There are debates over the function of mass media in public health communication. Supporters argue for the persuasive power of mass media in health issues communication and health

education. In particular, the framing function of mass media has been claimed to raise the audience's awareness of health issues (Chapman, 2007; Martinson & Hindman, 2005; McCombs & Shaw, 1972). It has been posited that mass media news communication could shape public health policy and practice through four functions: surveillance, interpretation, socialization, and attention merchant (Gollust et al., 2019). During health emergencies, epidemics, and general public health knowledge dissemination, the power of mass media has been demonstrated. As an example, Mitchell Turner et al., (2021) argued that mass media communication is an inevitable part of the public health crisis. Through a content analysis of newspapers reporting on the Ebola crisis, this study found that health messages could increase self-efficacy and prevention behavior of audiences. Sindoni (2021) argued that mass media communication, particularly digital communication, has been at the frontier of health knowledge dissemination. Using a multimodal pragmatic analysis, verbal and visual components in digital media communication are considered to be effective in knowledge dissemination and encouraged health behavior, in the U.S. HIV prevention campaigns. General health knowledge communication, such as that relating to the harm caused by tobacco and alcohol consumption, is also a function of the mass media. Parackal, M. and Parackal, S. (2019) proposed that mix-media channels combining unidirectional and bidirectional communication should be adopted as powerful tools to communicate the danger of alcohol consumption during pregnancy. Saei et al., (2021) further argued that mass media health channels can have an impact on health literacy improvement and health behavior cultivation in the community, and this comparative study was conducted in several urban areas in Iran.

Other researchers (e.g. Swan, 2005; Woloshin & Schwartz, 2006), however, believe mass media is a poor vehicle for public health communication. Firstly, in discourse construction, journalists and public health professionals have different values and goals. In news production, journalists tend to report anecdotes and rhetorical issues and emphasize controversy over consensus and antagonism over complexity (Swan, 2005). Professional health communication, however, values validity, objectivity, and statistical evidence more highly than journalism. Secondly, due to structural limitations, news production usually features omissions,

inaccuracies, and sensationalism, which has led some authors to assert that the pursuit of evidence-based journalism is a “forlorn hope”. Reporters' analytical skills for reporting on science-related topics are one of the solutions proposed (Swan, 2005; Woloshin & Schwartz, 2006). Thirdly, political ideologies play a role in news production; leading to increasingly politicized news content with the potential to spread rumors and misinformation. In conclusion, the debates over the role of mass media in public health issues communication suggest that mass media news presentations of health issues could be improved.

2.2.3.2 Agenda-setting function

Numerous studies have investigated the role of mass media in shaping society and public issues for decades (e.g., Cook et al., 1983; Iyengar & Kinder, 1987; McCombs et al., 1997; Scheufele & Tewksbury, 2007; Walgrave & Vliegenthart, 2010). Mass media has strong effects on political agendas on a range of issues, especially political systems, economic policy, social and welfare policy including public health and practices. Public health issues that receive a high volume of mass media attention are more likely to be cognitively accessible to audiences and to be addressed by policy makers (Walgrave et al., 2008).

Mass media news plays a crucial role in channeling health-related knowledge and information (Gollust et al., 2019; Odone & Signorelli, 2016). The mass media still remains one of the most influential and reliable sources of health information and knowledge for audiences, despite debates over their role in public health communication. Because of its pervasiveness and community reach, mass media may have greater application than social media for communication of health issues. Emergency health risks and daily health risks have received considerable mass media attention. The following section briefly reviews relevant literature on mass media communication of these two aspects of public health. Communication of emergency health risks, as WHO states “includes the range of communication capacities required through the preparedness, response and recovery phases”, which aims to “encourage informed decision making, positive behaviour change and the maintenance of trust” (WHO,

2014). Only a few studies have assessed the quality of emergency risk communication, despite the role of high-quality risk communication in emergency responses and positive outcomes. Several studies (e.g., Lwin et al., 2018; Nour et al., 2017) were based on the model for Crisis and Emergency Risk Communication (hereafter CERC) to assess risk communication in contexts of mass media and social media. The CERC model was proposed by Reynolds and Seeger (2005) and comprises five phases, with communication features and requirements for each phase. These five phases are: pre-crisis, initial event, maintenance, resolution, and evaluation. This theoretical model was used to assess health communication at all stages of crisis, for example, the Middle East Respiratory Syndrome Coronavirus (MERS-CoV), and the Zika virus outbreak.

Other studies have examined the assessment of emergency risk communication from other aspects, such as the construction of self-efficacy information and individual risk conceptualization information (Saxon et al., 2019). Self-efficacy information for health emergencies includes symptomatic and precautionary information. It has been argued that understanding a disease's symptoms and use of appropriate personal protection behaviors will boost people's perception of self-efficacy (Saxon et al., 2019). People who know, for instance, that fever is a symptom of COVID-19, and that wearing a mask is an effective way to prevent transmission, will help control an outbreak of the virus. When there are outbreaks of diseases, people may respond with panic (Witte, 1992) or inappropriate responses if they lack self-efficacy. By providing clear and precise descriptions of disease symptoms and personal protective behaviors, news discourse contributes to the development and maintenance of self-efficacy.

Risk magnitude and risk comparisons are described in news discourse when it comes to health emergencies. As people usually have scant prior experience on which to gauge risks when encountering an emergency, the mass media can assist in conceptualizing personal risk through explaining and comparing risks. A systematic analysis of news discourse reporting the Ebola epidemic in the United States by Saxon et al. (2019) suggests that a parallel comparison is

effective for health emergencies in which new health risks are described and compared with familiar diseases within historical and cultural context.

In conclusion, there have been many worthwhile recommendations regarding improving communication capacity and media quality for health emergencies. Trust in media communication during public health emergencies is a common requisite; mainstream media channels are also crucial. The WHO health emergency program, in proposing the Risk Communication and Community Engagement (RCCE) approaches for the Ebola response in the Democratic Republic of Congo, recommended mass media as a pivotal channel to track and manage misinformation and rumors (WHO, 2018). A methodical and proactive media communication strategy is suggested for both prevention and response. In addition, robust communication requires community engagement when dealing with emergencies, with Frost et al. (2019) advocating collaboration among national, provincial, and sub-provincial levels for internal communication and to strengthen communication capacity.

Different from health emergency communication, daily communication of health risks, including communication of environmental health risks and dietary health risks, is another approach for mass media health communication. Environmental health risks refer to daily environmental conditions which may cause harm to communities. For example, air pollution and land overexploitation, which can pose daily health risks to humans, are prevalent in developing countries and regions (Borner et al., 2017). There are numerous studies focused on environmental health risk communication in the mass media. News communication analysis, focused on how health knowledge is represented, transformed, and communicated in the media has received considerable research attention. In Maier (2011), the researcher examined how CNN's video discourse displays greenwashing by examining the message selection process and the interaction between language and visuals. The study by Tong (2014) examined the portrayal of environmental problems in Chinese mainstream newspapers through framing analysis. In addition, with a focus on the reporting of climate change issues on television as part of a climate change mitigation initiative, Sedlaczek (2017) analyzed how these issues connected with

audiences.

Dietary health risk refers to the risk associated with a suboptimal diet and food safety issues, such as excessive sugar and salt intake, and a lack of vegetables and fruits. In a large number of studies (e.g., Ko et al., 2007), the strategy for daily health risk communication has been explored. Emotional arousal has been demonstrated as a strategy to influence attitudes and behaviors (Maddux & Rogers, 1983; Rogers & Deckner, 1975; Tanner et al., 1989). Among various emotions targeted, fear is commonly used in communicating imminent threat and danger since it has implications for risk reduction (Keller & Lehmann, 2008; Witte & Allen, 2000). Kim et al., (2014) conducted an empirical study and found eliciting fear in health messages has effects on dietary health risks communication, with its effectiveness influenced by social influence, participants' prior experiences and self-efficacy. Furthermore, it is recommended that a risk communication strategy should be multi-dimensional. Besides emotion arousal, sources of information, people's health-related perceptions, and their willingness to respond or act have an impact on the effectiveness of health communication and need to be considered when designing risk communication strategies (Barnett et al., 2014; Orazi & Pizzetti, 2015).

2.2.3.3 Recommendations

Public health communication professionals utilize the mass media as an influential channel. It has been suggested in the research literature and in professional literature that mass media communication can be leveraged for high-quality public health advocacy and promotion, with the most pertinent recommendation being the development of high-quality health stories of public health advocacy (Leask et al., 2010; Robotham, 2006). News reporters on health topics should have the same concerns as health professionals, and should consider: (1) the values of authenticity and accuracy, with a balance of factual and sensational reporting; with factual evidence-based presentation regarded as critical for health-related topics; (2) mass media as a vehicle through which the public access health information, news content should feature a

relevant personal touch to encourage audiences to stay networked; and (3) timelines, as news concerning emergency health risks usually have critical time constraints. As there is no single and effective media channel for dissemination of health risk information, a multifaceted approach that combines the diverse preferences of the target audience is deemed to be more successful in attaining a larger audience (Fitzpatrick-Lewis et al., 2010).

2.2.4 Concluding remarks

This section reviewed relevant literature on health risk communication from three perspectives: channels, challenges, and health risk communication in the news genre. In doing so, it has elaborated the agenda-setting function of mass media for public health communication and provided recommendations for developing advocacy. A limitation identified in the extant literature is a lack of empirical analysis of news discourse with most of the findings generated from non-linguistic research such as medical and sociological sciences. Language plays an influential role in health messaging, yet how to design health-related messages to motivate audiences to comply with advocated health behaviors remains an under-researched, but critical, area of study. Recommendations for authentic, evidence-based and relevant health communication have been proposed in literature, but systematic and empirical research in news discourse analysis remains under-explored.

2.3 A review of discourse analysis of health news

In addition to reviewing literature related to risk communication in health care, this section discusses empirical discourse analysis of news reporting on health risks. While news discourse presentations of health risks can play a critical role in influencing risk perceptions, different health risk communication characteristics can lead to interpretations other than those intended (Kott & Limaye, 2016). It is always imperative to determine the optimal risk communication strategy according to the specific tasks involved. There have been multi-dimensional aspects for news discourse analysis in prior research and in this section, literature associated with

linguistic characteristics which comprise news formats and frames, will be reviewed. Section 2.3.1 reviews relevant works on news format analysis focusing on methods and approaches for analysis. Section 2.3.2 reviews literature on news frame analysis. Section 2.3.3 introduces the latest advances in news discourse analysis, and section 2.3.4 provides concluding remarks on the review of discourse analysis of health news.

2.3.1 News format analysis

A news format is a way of representing news content. News format analysis evaluates how messages are packaged and presented in news discourse. In reviewing studies of news format analysis, this subsection focuses on two key news formats for health news articles and describes their methods. These news formats, associated with sources of news information and effectiveness of dissemination, are information evidentiality, and information relevance.

2.3.1.1 Evidentiality

Evidentiality is persuasive in almost all modern languages. The notion of evidentiality refers to a functional semantic domain which is a relevant category in the grammatical systems of the world's languages. Linguistic evidentiality is the explicit coding of sources and patterns of information or knowledge, that is evidence of the factual status of the utterance (Diewald & Smirnova, 2010). In modern languages, evidentiality is grammaticalized such that it is usually expressed with verbs and adverbial or phrasal units. When discussing linguistic markers of evidentiality (i.e., evidentials), the conception of "access" is used for its elasticity instead of "knowledge" to explain evidentiality as providing access to the information in an utterance.

This subsection reviews empirical research literature on the investigation of the lexico-grammatical realizations of evidentiality under headings of "attribution" or "epistemological positioning", in English and Chinese texts respectively. Research on the discourse territory of news reports is emphasized in particular. In the linguistic research domain, the research on

evidentiality includes a description of evidential systems. Chafe and Nichols (1986) argued that evidentiality refers to information sources and a speaker's attitude toward information simultaneously, and that evidentials are used differently in written language and oral speaking. Investigations of linguistic realization have included, for example, reporting verbs analyzed as evidential devices and classified and evaluated by Fairclough (1992), and Thompson and Yiyun (1991). Aĭkhenval'd (2004) also examined and compared evidentiality in different languages as a grammatical category, and the application of evidentiality in English and Chinese academic discourse was compared by Yang and Tian (2015). By comparing 50 English and Chinese abstracts of academic articles, Yang and Tian (2015) investigated the evidentiality construction. The lexico-grammatical realizations of evidentiality in this research are classified into four types: reporting evidentials, inferring evidentials, sensory evidentials, and belief evidentials, with inferring evidentials and reporting evidentials being the most frequently used in both English and Chinese (Yang & Tian, 2015). Due to the use of more diverse and complex evidence in English academic discourse, the authors argue that English academic discourse has a higher objectivity than that of Chinese academic discourse. They recommended enhancing the awareness of the truth of information in Chinese academic discourse through using evidentials to promote informational authenticity and objectivity. In their works, the application of evidentiality taxonomy, and the cross-lingual comparative aspect of this research, as well as the connection between objectivity of evidentiality, and reporting and inferring evidentials, are inspiring. However, the research of Yang and Tian (2015) suffered from the limitations of research objects. Due to the scarcity of research objects that formed the basis of the findings, namely 50 English and Chinese abstracts of academic articles, it should examine further, including a larger scale of corpus and considering linguistic and cultural factors while comparing English and Chinese evidential markers.

News story is a genre naturally preoccupied with the framing of knowledge (Bednarek, 2006). News discourse is a special aspect of discourse, the evidentiality of which is critical to construct news information that can be read as factual and neutral by news media audiences (White, 2012). The inclusion of evidentiality in the news genre, therefore, is an indicator of objectivity

and to some extent, news quality. Due to this, it is critical to examine the construction of evidentiality in news reports. Bednarek (2006) directed linguistic attention to, and discussed evidentiality in English news discourse under the heading of “epistemological positioning”, a term which overlaps with evidentiality. Through establishing the relationship between the sources and bases of a proposition, as well as the level of objectiveness, a text-driven approach was applied to analyze evidentials in a corpus of British English newspaper articles of 70,000 words. This study identified the categories of evidentiality that English language can express via manual analysis. As a result, sources of evidence included self-access and other-access, while bases of evidence used in news texts were summarized as including perception, general knowledge, proof, obviousness, unspecified, hearsay, and mindsay (Bednarek, 2006). The combination of different sources and bases of evidence contributed to different levels of objectivity. This study is illuminating and advances systematic evidentiality research by constructing an analytical framework of English evidentiality categories. A limitation is that, the category was constructed based on relatively small samples of news data; the framework, therefore, should be refined by further analyses as well as in different language genres.

White (2012) investigated attribution and attitudinal positioning for different types of news. The evidential construction varies according to different types of news and various communicative approaches of journalists. The two typical news types are “hard news” and “soft news”. Hard news is also called "strategic impersonal news", a news style associated with impersonalization and constrained attitude evaluations. “Hard news” is featured in objective news stories in which quoted sources are used to make claims from a functional truth perspective. The use of evidential devices serves as a way for journalists to express the kinds of evidence they have for making factual claims (ibid., 2012). "Soft news", as opposed to hard news, is usually called news with "reporter voice." It is more subjective, featuring more journalistic opinions regarding news stories and more personal expressions concerned with knowledge.

Hsieh (2008) examined the performance of evidentiality in Chinese news reporting and found

that evidential selection is highly functional in news articles. The distribution of two subclasses of evidential markers, reporting evidentials and sensory evidentials, was examined in varying types of news reportage. A significant difference has been found between reporting evidentials (i.e., reportatives) and sensory evidentials (i.e., sensories). While the reporting of evidentials dominates political and business news and is characterized highly-objective, sensory evidentials are frequently used in less objective local news. This disparity in the application of different types of evidential markers was associated with different news communicative principles.

2.3.1.2 Relevance

The relevance of information packages news messages to be appealing to audiences, and makes health news more effective. Effective health communication is critical to the development of informed health-related behaviors and the management of health threats (Slovic, 1987). Mass media plays the role of a translator between sources of information and targeted audiences. This is essentially a coding process to customize information according to social systems and cultures through meticulous choices of symbolic representations. The same sources of information may generate various forms of discourse to align with diverse contexts. Based on cognitive psychology and systemic functional theories (Halliday & Matthiessen, 2004), discourse is the socially constructed knowledge of reality (or human experience), standing “midway between context and expression” (Kress & Van Leeuwen, 2006, p.5). When information is tailored to become a relevant message, it can reach a wider audience to influence health-related intentions and behaviors. In other words, risk communication is more likely to be effective when this link is included.

As compared to health knowledge professionals, mass media news that resonates with the general population should include a broader range of considerations and local resources and frames in order to make health knowledge and information relevant to everyday beliefs and practices (Horlick-Jones et al., 2007; Marcu et al., 2011; Regan et al., 2014). The relevance of

information is therefore critical in delivering health knowledge to targeted audiences by constructing meaningful news stories. Balanced health news messages that combine evidence-based scientific knowledge and personal experiences relevant to our daily lives have a greater potential to resonate with personal experiences and values. It has been argued that a positive connection between health news messages and individual's everyday beliefs and further practices is predictable for effective outcomes (Jones & Prades, 2009; Marcu et al., 2011).

Creating an emotional link between health news and the audience is one way to construct relevance. For targeted audiences, message decoding, with risk perception and risk identification involved, is a complex psychological process. The way individuals cognitively process information related to health risks should be considered before examining the news content. As suggested by dual coding theories of information processing, individuals process information according to the constraints of their cognition (Wong et al., 2021). Heuristic processing and systematic processing are two main ways of information processing, which are distinct. Heuristic processing is intuitive and emotional and demands minimal cognitive resources (Chaiken & Manis, 1980). Systematic processing, conversely, is rational and effortful which requires increased cognitive resources (Eagly & Chaiken, 1993; Hilligoss & Rieh, 2008; Kahneman, 2011). These two information processing modes are influenced by psychological processes. Discrete emotions, for instance, can affect how individuals respond to a complex and uncertain risky event. It is suggested that emotions could guide people's risk perception since people also make judgments about risk based on their feelings as well as rational cognition (Slovic & Peters, 2006). Thus, emotional expressions in news discourse can contribute to the construction of information relevance and facilitate effective health communication.

Various linguistic characteristics are associated with the message decoding process which collectively influence the perception of risks. Differences in message delivery could lead an audience to interpret health risk in distinct ways. Health communication professionals (e.g., journalists) are expected to consider adapting communication strategies to account for the

media's framing function and audiences' preferences. There is no unchanging and unified standard for flawless health communication. Health communication research is a vibrant and evolving activity with two influential variables. First, the news environment is dynamic in which socioeconomic and cultural conditions always play roles, so that news is a contextualized, textured, and multi-dimensional production (Althaus & Kim, 2006; Fenton, 2010). Second, the individual differences of news recipients suggest health risk messages may be interpreted in different and unpredictable ways, rather than the intention of the communication professionals.

2.3.2 News frame analysis

Mass media, as a communication mechanism, has significant power to influence perceptions and health behaviors, and the concept of framing describes the power of a communicating text (Entman, 1993). Simply put, varying news articles on the same topic often provide different perspectives, and these perspectives are known as frames, in a broad definition (Liu et al., 2019). For example, news articles written about the health impacts of excessive salt-intake may emphasize the perspectives of supermarket food shopping, daily dietary habits, and/or salt reduction campaigns, and these different perspectives are all news frames.

Research on media communication, as well as other disciplines, emphasizes framing as one of the most popular and burgeoning areas of research (Cacciatore, Scheufele & Iyengar, 2016). Mass media frames health issues have received much research attention with an ample body of literature conducted on news frame analysis (e.g., Entman, 1991; Price et al., 1997). Framing detection and analysis are usually applied to obtain a deeper understanding of reported issues in the news genre. The following subsections review and elaborate relevant works from four aspects: (1) framing, agenda-setting, and priming; (2) conceptualizations of frame; (3) operationalization: deductive approach; (4) operationalization: inductive approach. Through a conceptual and methodical review of literature related to frame analysis, a better direction can be found for this research. This is especially in terms of the construction analytical framework

and research design.

2.3.2.1 Framing, agenda-setting, and priming

In the field of frame analysis, inconsistency in the use of terms and concepts poses a challenge. Similar but subtly different terms have been combined in pertinent literature to describe the effect of media on audiences. These media effects related models/theories are, but not limited to, “agenda-setting”, “priming”, and “framing”, with the effect of news at the center of framing, agenda-setting, and priming theories. These theories argue that news tells and influences people about what and how to think about an issue (McCombs & Shaw, 1993). Researchers have attempted to clarify the concepts of “framing”, “agenda-setting”, and “priming” by seeking connections or distinctions among them.

Some researchers have focused on the connections between, and similarities of these concepts. Iyengar and Kinder (1987) used the labels of “frames”, “agenda-setting”, and “priming” to refer to similar objects, claiming that media can frame and alter audience’s attitudes toward reported media issues. They stated that framing effects refer to “changes in judgment engendered by subtle alterations in the definition of judgment or choice problems” (ibid, p. 816). Entman (2007) stressed the connections among these concepts as opposed to their divergence, which integrate to advance the understanding of media power in political communication.

Other researchers have pointed out the divergence between these concepts. Initially, agenda-setting (McComb & Shaw, 1972) was considered as a hypothesis, which has been expanded to priming and framing for the purpose of constructing a comprehensive theoretical model (Weaver, 2007). At first, the concept of “framing” was confused with “conceptual maps”, “scripts” or “schemas”), which shared the similar concern of “how new information is interpreted and used”, and then processed, updated, and stored in short-term and working memory (Andersen & Ditonto, 2018; Lodge & Hamill, 1986, p. 506; McGraw, Lodge & Stroh

1990).

In spite of Entman's (1993) call for coherence with framing, the fractured application of related concepts has posed a continuous challenge within communication research. McCombs et al. (1997) expanded the agenda-setting theory, regarding framing as an extension of agenda-setting. With media framing labelled as “second-level agenda-setting” which was “the transmission attribute salience” that influenced the way of thinking about reported issues (McCombs et al., 1997, p. 704). Later, conceptualizations of these three models have been visited and revisited by Scheufele (1999, 2000, 2007) and Scheufele and Tewksbury (2007). It was argued that priming refers to the way that “individuals evaluate public officials by influencing the thematic areas or issues that individuals use to form these evaluations” (Scheufele, 2000, p. 297), and framing considered as the salience of attributes of the issue, or the selection of themes to be included in the media (McCombs, 1997; Scheufele, 2000).

Recent research by Chernov and McCombs (2019) has focused on the differences among these three concepts. Clarifying their relationships was considered necessary to avoid any confusion when applying these concepts. The distinctions were made on the basis of different theoretical supports, with the most significant distinction between “agenda-setting” and “framing”, as demonstrated by different epistemological bases, that is their ways of knowing. While “agenda-setting” was based on “scientific realism perspective”, “framing” belonged to “the realm of social constructivism” (Chernov & McCombs, 2019, p. 74). Therefore, “agenda-setting” and “framing” had different viewpoints on the power of media in altering audience perceptions. “The "agenda-setting model" limited the media for altering, whereas for the "framing model", media had a direct impact on audience perceptions. Meanwhile, "agenda-setting" differed from priming due to their different theoretical foundations. “Agenda-setting” was argued to make some issues salient in media, while the priming mechanism connects this prominence with evaluation. By taking the view of media effects, “priming” was considered as “a process of media consumption on behalf of the audience” (Chernov & McCombs, 2019, p. 77).

In conclusion, it has been found that the concept of framing and other media effects models have been lacking in clarity. Although framing theory has been regarded as one of the most applicable and versatile theories in communication research, the term is also contested. Research on frame analysis has been accused of having "theoretical and empirical vagueness" (Scheufele, 1999, p. 103). The next subsection reviews the fractured conceptualization and application of frame in the literature.

2.3.2.2 Conceptualizations of frame

This subsection reviews the highly debated conceptualizations of frame and framing in literature (e.g., Goffman, 1986; Entman, 1993; Scheufele, 1999). Among the first to define the concept, Goffman (1986) conceived of frames as principles for organizing experiences. Most notably, Entman (1993) described framing as the "selection and salience" of certain aspects of perceived reality and the presentation of messages. The process of framing is "to promote a particular problem definition, causal interpretation, moral evaluation, and/or treatment recommendation for the item described" (ibid, p. 52; cited by Chernov & McCombs, 2019).

Entman's definition of framing has been contested and challenged lately with many scholars raising problems, two of which, challenge the concept of "framing". First, there are many labels for "framing"; it can be, for example, a theory (Chong & Druckman, 2007), a media-effect model (Scheufele & Tewksbury, 2007), a research paradigm (Entman, 1993), or an approach (D'Angelo, 2002). As a result of this, "framing" is used as a catch-all and versatile term in media communication research: when analyzing frames in text of a communication, arguments, rhetorical devices, and themes are all titled as "frames" (Chernov & McCombs, 2019). It can be seen that conceptualizations of frame are highly flexible and have led to a fractured research paradigm (Entman, 1993). Because of these reasons, it is extremely hard to reach a consensus on a clear conceptualization of framing, which makes it pointless because its flexibility makes it more valuable.

Framing is rooted in various disciplines, and sociology and psychology are two broad foundations (Borah, 2011). It was argued that framing research generated from psychological foundation pays more attention to the framing effects on audiences (Iyengar, 1991; Pan & Kosicki, 1993), whereas framing research derived from sociological foundation focuses on empirical linguistic devices. For instance, Hamborg et al., (2019) considered framing as relating to journalists' choices and labels of words in communication while Druckman (2001) focused on "words, images, phrases, and presentation styles" (p. 227) that contribute to media content. Based on a sociological foundation, this research examines empirical linguistic presentations that contribute to framing health issues in news discourse.

In general, framing is regarded as a theory of media effects (Scheufele, 1999) to explain media effects on audiences, which has been evolving in a rapidly changing media environment (Nip & Fu, 2016). Framing is a subtle form of media manipulation in which certain aspects are highlighted to generate specific interpretations. Two notable pairs of framing have been adopted in communication research: (1) emphasis frame versus equivalence frame; (2) consistent frame (or generic frame) versus unique frame (or issue-specific frame). There is a growing body of communication research focusing on emphasis framing analysis highlighting the media manipulations of certain issues (Druckman, 2001; Iyengar, 1991; Iyengar, 2005; Valkenburg, Semetko & de Vreese, 1999). By contrast with the emphasis frame, the equivalency frame shows that logically equivalent messages, which highlight different gains or losses, could influence audiences in the decision-making process (Druckman, 2001; Kahneman & Tversky, 1979, 1984). Equivalency frames focus on how information is presented, rather than what is presented, in contrast to emphasis frame analysis. The application of equivalency framing has been seen in "gain-loss" research (Kahneman & Tversky, 1979, 1984; Kahneman, 2011). Whether a risk is characterized to be within a gain frame or loss frame has a remarkable influence on the decision-making of audiences. As an example, Zhang et al., (2017) conducted experiments and found people have different preferences for risk in gain or loss situations. In gain situations, individuals prefer to be risk averse in decision-making, while in loss situations, people prefer to be risk seeking. The application of equivalency framing in

the “gain-loss” research has practical implications for news coverage in framing risk issues, and whether to expect preventative action from audiences.

The consistent frame versus the unique frame is another frequently applied dichotomy in framing research. Consistent frame, or generic frame, refers to the application and explanation of existing frames in analysis. In such research, frames are often identified from prior research and deductive analysis is used. Since findings from such research could fit in the conceptualized network, consistent frame detection contributes to conceptual issues of framing theory. In contrast to consistent frames, unique frames, or issue-specific frames, are special frames detected for a particular issue in communication. Therefore, the findings of some studies have reported that unique frames may be distinguished from each other, and that a study may develop a unique set of frames for a specific issue. Moreover, because of their uniqueness, such research findings may not be able to connect with existing frame networks applied generically and may not contribute to developing universally recognized frames.

In summary, it is evident that researchers have debated framing theory over the years. At the heart of debates is the problem of framing conceptualization and operationalization. It is acknowledged that framing remains to be a “fractured paradigm” (Entman, 1993, p. 51), and a comprehensive understanding of its core concepts has not been reached. Consequently, different conceptualizations translate into different operationalizations and a fragmented approach to framing analysis.

Researchers have attempted to increase the validity and reliability of operationalizing framing, but usually the "frames" under the label of framing are distinct approaches. The following two subsections describe the operationalization of frame analysis by reviewing deductive and inductive approaches to news discourse analysis. Some studies will be used to evaluate the benefits and drawbacks of these approaches. A review of framing analysis approaches forms the basis of the analytical framework of this thesis outlined in the subsequent chapter.

2.3.2.3 Deductive method of analysis

As far as framing analysis is concerned, the main issue is what constitutes a frame (i.e., conceptualization) and how to measure it with minimal bias (i.e., operationalization). Derived from the conceptualizations of framing above, it is found that framing analysis studies usually have a dual purpose. Framing research based on a psychological foundation usually focuses on media effects on audiences (e.g., Nip & Fu, 2016), while framing research generated from a sociological foundation usually focuses on the presentation of communication texts (e.g., Knudsen, 2017).

In general, news frame analysis can be classified as either deductive or inductive (Touri & Koteyko, 2015). The deductive method of framing analysis typically relies on a predefined set of frames to examine news texts (e.g., Pak, 2016), whereas the inductive method extracts frames from news texts without predefined framing categories (Matthes & Kohring, 2008). Analysis of frames through inductive approaches focus on specific linguistic devices, such as words, sentences, and paragraphs in text (Pan & Kosicki, 1993; Walter & Ophir, 2019). Between deductive and inductive methods, semi-inductive methods (e.g., Boydston & Glazier, 2013), and inductive followed by deductive methods have also been intensively applied in frame analysis. The following subsections will review empirical news frame analysis in extant literature that applied deductive and inductive approaches. For a succinct purpose, several studies will be taken as examples to describe the approaches, rather than enumerating a list of studies.

Pak (2016) studied the framing of news reporting on comfort women¹ (or “sex slaves”) in newspapers using a deductive method based on Semetko and Valkenburg’s (2000) five-frame division. These frames are conflict frame, human interest frame, economic consequences frame, morality frame, and responsibility frame. For the data analysis, eligible news articles were

¹ “Comfort women were sex slaves held at or near Japanese military bases during Japan’s wars of aggression against other Asian countries and Western colonial powers in the 1930s and 1940s” (Pak, 2016, p. 1007).

collected, with 50 news articles selected as samples for the principal component analysis. The coding procedure was then subjected to intercoder reliability evaluation. The distribution of news frames between Korean and Japanese news articles was compared at different time periods. In another example, Knudsen (2017) used predefined frames to conduct framing analysis on humanities in Danish print news media. The analytical framework applied in this study was suggested by Entman (1993) and Matthes and Kohring (2008) with the set of news frames comprising four elements: problem definition, causal attribution, moral judgments, and treatment recommendation. Subsequently, the different news frames of the humanities were analyzed. These empirical studies demonstrate that a deductive methodological paradigm has been applied in framing analysis due to its convenience and high applicability. The common strategy shared by these works is the use of predefined framing categories, and qualitative interpretation of results. The reliance on predetermined categories and systematic analysis are the basic features of deductive methods. Based on a pre-existing framework, a deductive method can facilitate a stylized and step-by-step analysis of news frames. However, it also suffers from inflexibility and risks some frames being overlooked or underplayed (Matthes & Kohring, 2008). Additionally, since deductive methods are usually applied to small samples of data, the generalization of results should be taken seriously.

2.3.2.4 Inductive method of analysis

Some of the limitations inherent in deductive methods can be overcome by inductive methods. In framing analysis, inductive approaches are usually used in cases where predefined frames do not fit or large language data needs to be processed. Critical discourse analysis (hereafter CDA) is considered to be aligned with framing theory due to its common socio-cognitive theoretical and critical epistemological bases (Olausson, 2009). CDA methods have been used in inductive framing analysis because they are content sensitive and conducive to in-depth exploration. Olausson (2009), in applying CDA to analyze media frames of global warming issues, showed “how media frames constitute a cognitive window, through which global warming issue attains meaning” (ibid, p. 432).

Kim H. and Kim S.H. (2018) examined the framing of news reporting on marijuana legalization, a significant and controversial public health issue in the U.S., as understanding media frames is important to understand how audience perceptions are influenced by news stories. Two dimensions, organizing themes and tones, were used as indicators of frames. According to these two dimensions, news articles were coded and evaluated with eight issue-specific frames identified. This research offered a comprehensive analytical approach combining critical discourse analysis and framing analysis.

During the past decade, computer-assisted analysis and corpus linguistic methodologies, as well as framing analysis, have been integrated as they provide a powerful and innovative methodological path. For example, MAXqda/winMAX and ATLAS.ti are computer-assisted data analysis software applied to assist inductive and qualitative analysis used by Franzosi et al., (2013) and Paulus et al., (2019) to support their analyses. Moreover, corpus techniques have been particularly useful for frame detection since large data can be "diagnosed" by corpus linguistic tools, which allow large texts to be described quantitatively by measuring them multi-dimensionally (Koteyko et al., 2008). The advantages of corpus linguistic techniques for news framing analysis have also been demonstrated by Touri and Koteyko (2015). The function of keywords and concordances in corpus tools such as AntConc (Anthony, 2005) and WordSmith (Scott, 2014a) have been used to identify frames in UK news coverage. Zottola et al., (2020) combined corpus linguistic techniques with systematic qualitative analysis. Using a corpus-assisted frame analysis of news, which took advantage of corpus-assisted discourse analytical framework and computer-assisted frame analysis, to report on nitrogen pollution in the UK. The analysis procedures comprised three stages: keyword extraction, keyword categorization, and systematic concordance analysis. Likewise, Walter and Ophir (2019) proposed a method for news framing analysis. This inductive mixed-method and computer-assisted approach showed its ability and robustness for inductive framing analysis to demonstrate the connection of corpus linguistic techniques and computational linguistics techniques.

To conclude, inductive framing analysis has a greater degree of flexibility in terms of analytical procedures than deductive framing analysis. Frames with different levels of prominence can be identified via CDA, corpus-assisted, or computer-assisted linguistic techniques. The introduction of systematic and computational approaches suggests that automatic detection and manual interpretation is appropriate for framing analysis. An important point to note when using inductive analysis is that subjective identification and interpretation of frames should be avoided. Pan and Kosicki (1993) and Touri and Koteyko (2015) have proposed a strategy to overcome the subjectivity of the inductive method by clearly conceptualizing the frame, and clarifying the textual elements and structural dimensions that contribute to the frame.

2.3.3 Latest advances

Reviewing literature reveals the latest advances in news discourse analysis that recent advances in news discourse analysis have embraced multimodality. Modality refers to “the truth value or credibility of statements about the world” (Kress & Van Leeuwen, 2005, p. 155). Multimodal discourse thus, involves more than one mode of semiosis and makes use of the multiple semiotic resources for statements (O’Halloran, 2005). In modern communication environments, different semiotic modalities are applied which have implications for the analysis and interpretation of news discourse. Discourse is the socially constructed knowledge of reality produced and developed in specific social contexts. In other words, discourse “stands midway between context and expression” (Kress & Van Leeuwen, 2006, p. 5). Based on this viewpoint, multimodal analysis is important to understand multimodal discourse.

An epistemological and methodological transformation is evident. In multimodal news discourse, there was first and foremost an epistemological shift. The means of meaning-making have expanded to include other modes besides language, such as voices, images, and layouts. All modes make distinct and synergic contributions to discourse. Based on social semiotic theory, news discourse is viewed as gestalts or a multimodal whole. Language is not privileged in multimodal discourse analysis, but rather should be analyzed along with other modes of

communication. Secondly, a methodological transformation has taken place in multimodal news discourse analysis. Since multimodal discourse is a composite product co-deploying multiple resources, a holistic analysis that locally foregrounds selections of options is required (Thibault, 2000, p. 321). A growing number of discourse analysts have tried to apply multimodal discourse analysis to a variety of discourses. For example, text-image discourse analysis (Bednarek & Caple, 2012; Caple & Knox, 2012, 2015), and text-video analysis (Davidsen & Vanderlinde, 2014). The principal methodology and approach of text-image discourse analysis was inspired by Systemic Functional Linguistic (hereafter SFL, Halliday, 1994), supplemented with critical discourse analysis (CDA), and is related to social semiotics theory (Machin & Van Leeuwen, 2007; Van Leeuwen, 2008). Bezemer and Kress (2016) introduced a multimodal corpus analysis approach which combines SFL, social semiotic approaches and corpus linguistic methods. This approach requires corpus-based systematic analysis as well as empirical evaluation of multimodal interaction. Ismail (2017) applied a framework of corpus-assisted multimodal discourse analysis to investigate gender representations in both verbal and visual modes in Malaysian sports news. Ismail's study demonstrated the applicability and efficiency of this integrated analysis framework in large-scale investigations of multimodal discourse.

Furthermore, news photography and visual grammar have received significant attention among various modes of news discourse (Kress & Van Leeuwen, 1996, 2001, 2006). The stereotypical and traditional relationship between language and images is “anchorage-relay”, or similarly, “elaboration-extension”, which reflects the subordinated status of image or language (Barthes, 1977; Halliday, 1994). After the initial multimodal steps towards discourse analysis, the relationship between them has enabled further possible applications. Kong (2006) constructed a taxonomy of language-image interactions, which comprised six types, including logico-semantic relation, evaluative relation, and metaphorical relation. The development of this taxonomy is a critical step towards a systematic analytical framework as language and images put equal emphasis on meanings and constitute cultures (Kress & Van Leeuwen, 2006). Increasing attention has been paid to news photography as an independent mode of meaning-

making in news discourse, with images examined as a separate element of news discourse. Both image content, spatial location, and camera techniques are taken into account to analyze the contribution of images to the construction of news value (Bednarek & Caple, 2012, 2014). Low camera angles and dominant positions, for example, indicate the importance of a figure in a news photo.

Some recent studies have employed multimodal approaches in framing analysis (e.g., Dan, 2017; Dan & Raupp, 2018; Powell et al., 2015). The contributions of verbal frames, visual frames, and their interactions in news discourse construction were conducted via an integrative approach, showing flexibility and effectiveness. For example, Powell et al., (2015) provided an innovative insight that verbal and visual elements could contribute to powerful media framing effects in a synergistic manner. Dan (2017) integrated news photography in news framing analysis, while in digital news production, verbal and visual elements both contribute to media frame formation. Alonso Belmonte and Porto (2020), furthermore, drew on socio-cognitive and critical discourse analysis and conducted multimodal and cross-cultural analysis with news framing analysis.

In conclusion, representation of information has become varied, yielding interesting insights into multimodal discourse analysis. It is highlighted in this section that the use of multimodal discourse analysis in news discourse analysis has shown strong effectiveness and feasibility. Multimodal discourse analysis is a burgeoning research area, and it is highly recommended to apply multiple discourse devices in empirical studies in the future.

2.3.4 Concluding remarks

In conclusion, this section reviewed news discourse analysis from two perspectives, news format and news frame; advancements in this field were also discussed and future directions were suggested. Several limitations were identified in this review. Corpus-assisted and computer-assisted techniques could be integrated with the inductive method for the

development of a more powerful analytical framework for news media communication research, while corpus linguistics could assist with news format research. In addition, the lack of cross-cultural and cross-lingual analysis of news linguistic characteristics was also revealed.

2.4 Gaps in the literature and summary

Overall, the above sections reviewed relevant literature associated with research objects and methodology in two parts, i.e., health risk communication and discourse analysis of health news. The following gaps in the research have been identified. First, section 2.2 reviewed methods and approaches to health news discourse analysis, that is, news format and frame analysis. The first limitation is that generally small-scale news discourse and analytical approaches based on prior assumptions, which may lead to bias and over-generalization of research findings, were applied in news discourse analysis. Moreover, research on news formats is limited, and only a few research has focused on authenticity, evidentiality, and actionability. Hence, news format research deserves further attention and exploration. Second, in section 2.3, a lack of empirical and systematic news discourse analysis was found by reviewing health risk communication literature. Additionally, the design of health risk messages that satisfy the linguistic requirements of the general public remains an unexplored topic.

To fill these gaps, this study conducts a systematic and empirical analysis of news communication characteristics using corpus-assisted and data-driven approaches. By compiling the research objects into comparable corpora, the findings can be robust and persuasive. These gaps are considered when designing the research framework. Chapter 3 presents possible solutions for the limitations identified in the extant literature, elaborates the analytical framework construction and research design.

CHAPTER 3 ANALYTICAL FRAMEWORK AND RESEARCH DESIGN

3.1 Introduction

Communication is the creation and exchange of meaning. Carey (1989) proposed the ritual view of communication. In his words, “communication is a symbolic process whereby reality is produced, maintained, repaired, and transformed” (ibid, p. 23). In this perspective, health risk communication is the process that helps audiences understand and make informed decisions about potential health risks. As noted in chapter 2, while the risk management community has recognized an increasing need for research on the management and communication of dietary health risks, little effort has been paid to empirical communication studies. To fill this gap, this research investigates how mainstream digital news communicates dietary health risks, salt consumption as an example, in Australia and China, as a case study. To be specific, how health news validate evidence and present relevant messages is under investigation, through the analyses of communication characteristics of news formats and frames.

Health communication is characterized by uncertainty, and it is a challenge for both the media and the audience. Uncertainty, which refers to the “subjective perception of ignorance” (Han et al., 2011, p. 830), is omnipresent in the “risk society”. Meanwhile, the “reflexive modernization” produces growing societal and scientific uncertainties which challenge society and the individual alike (Beck, 1992, 2002). Despite the human drive to reduce uncertainty, it is difficult to achieve absolute certainty, especially when scientific inquiry into a subject is in its infancy (Bradac, 2001; Yang et al., 2020). Dietary health risks are associated with uncertainty. As a result, media communication can exaggerate or attenuate them unnecessarily. The uncertainty of dietary health risks thus could reduce the public’s intention to engage in health-related behaviors, and may consequently increase health risk (Yang et al., 2020). Furthermore, the media plays a crucial role in influencing the views of audiences and is seen as a key venue for social competition. Since there is insufficient medical evidence, the uncertainty of the health impacts of excessive salt-intake, and dietary recommendations have

been communicated in various ways in the media.

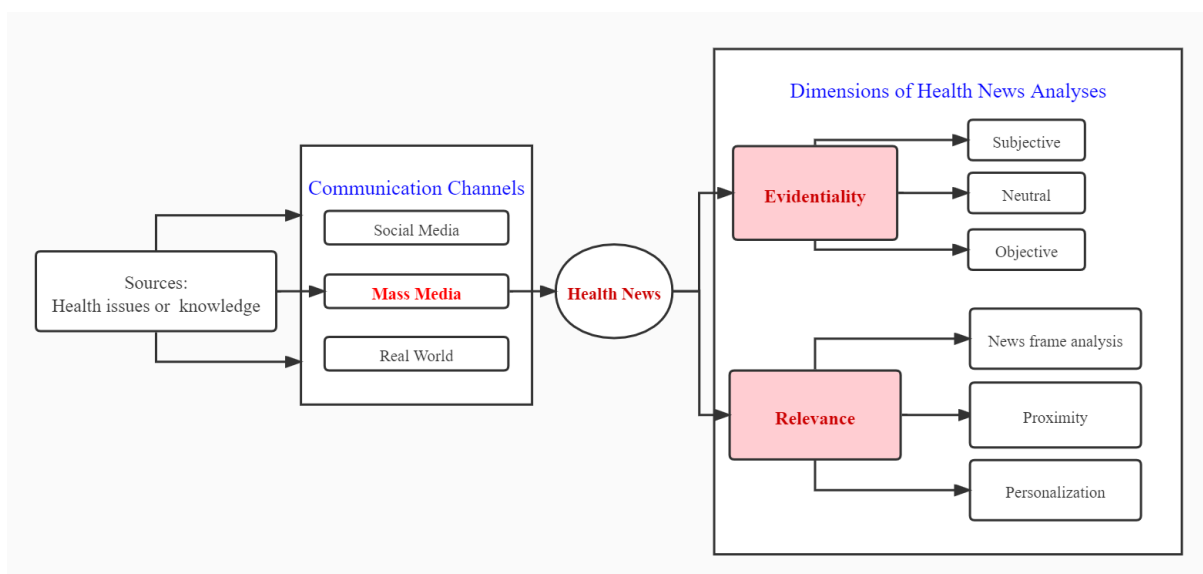
Since media communication related to public health is highly contextual, full of uncertainty, and has a profound impact on audiences, as noted above, how to construct health communication is a puzzling question. Health communication is a complex process which involves many participants. Social media, mass media, and the real world are the usual communication channels for health issues or events. Among them, mass media campaigns have been evaluated as effective for population-level dietary interventions due to their powerful dissemination of information (Grilli et al., 2002; cited by Zhao & Lyu, 2021). As population resilience could be enhanced by the dissemination of health information, journalists and communication professionals have the responsibility to and generate wider reception of health knowledge through reducing communication barriers. Improved dissemination of health knowledge, therefore, is valuable to improving public understanding and helping to reduce health disparities in society.

Perceptions of risk are inherently subjective as they are shaped by a variety of intrapersonal, interpersonal, contextual, as well as linguistic characteristics and non-verbal cues (Erika et al., 2014). Health literacy plays an influential role in risk perception, which is the extent to which individuals have the capacity to obtain, process, and understand basic health information and services needed to make appropriate health decisions (Bonaccorsi et al., 2016; Simonds, 1974; WHO, 2016). Health literacy and understandable communication are key to improving health and the quality of health care. The audiences of public health communication are non-experts rather than epistemic groups, thus esoteric knowledge needs to be used cautiously when disseminating health communication material that is widely accessible. However, as frequently observed in media presentations, the public health promotional materials contain specific knowledge that is usually packed with jargon, professional terminology, and complicated syntax, which inhibit a wide readership to understand health information and make informed decisions accordingly (Zhao & Lyu, 2021). With limited health literacy, it is difficult for the general public to understand and apply such health knowledge in their daily lives. The

effectiveness of health promotional materials is crucial to improving their comprehensibility to influence people with limited health literacy. Hence, there is an urgent call for the public health communication paradigm to be transformed from “write for literates” to “write for all” (ibid.).

This study explores mass media health news as an important component of health communication that is accessible to the general public and analyses the linguistic features of health news discourse. Borrowing ideas from framing theory, communication infrastructure theory, news value theory, and culture theory, this research proposes dimensions of analyzing health news, as shown in Figure 3.1. Aligned analytical framework and research design are proposed to explicate how to investigate health news communication about salt consumption in Australia and China. This chapter is structured as follows. This section introduces the content of this chapter. Section 3.2 presents the analytical framework of information evidentiality. Section 3.3 presents the analytical framework of information relevance. Section 3.4 presents the analytical framework of news frames. In Section 3.5, the research design is elaborated by providing information about data collection, searching syntax design, comparative corpora compilation, and providing an overview of the research data. Section 3.6 highlights the major points and concludes this chapter.

Figure 3.1: Dimensions of health news analyses



3.2 Analytical framework of information evidentiality

3.2.1 Relevant theories

Formats and frames shape mass media content (Altheide & Snow, 1991). As stated above, frames refer to the focus of discussion, whereas formats, the concept from media sociology, are fundamentally what make an issue recognizable and familiar as one thing rather than another. While frame emphasizes the content of news articles, format is the code for presenting the news content (Altheide & Snow, 1991). For example, if “child health” is proposed as a news frame, then one of the formats for presenting this frame could be “information relevance”, in which relevant dietary suggestions are presented to reduce the salt-intake of children. In a word, format is a key element to packaging news content and making it persuasive and relevant to audiences, which promotes self-efficacy in relation to health behaviors.

There is no consensus on the best approach to constructing a balanced health communication as there is always a trade-off between scientific knowledge and popular information in different contexts. In contrast to research-based news reports, general news in mass media is typically read by the general public, which does not have extensive health knowledge. Mass media health news should, therefore, take into account socio-cultural factors in order to localize health messages instead of solely relying on scientific and technical arguments. The dissemination of health information can take place in a wide variety of formats, and this study focuses on the most significant news formats in health information presentation related to the source of news and the dissemination of news, namely Information Evidentiality (hereafter IE) and Information Relevance (hereafter IR). Sources and dissemination of news are considered to be important for news with health topics. Source of news, featured by IE, is critical to the quality of health information. IE refers to the degree of credibility of news information, based on visible evidence or outcome for the statement. Dissemination of news, featured by IR, is critical for the construction of cultural proximity and relevance, as individuals understand and absorb information which resonates with their own experiences.

IR refers to whether the news information is associated with an individual's daily life. As for health news construction, health communication is more than disseminating health knowledge or reporting health issues. Addressing people's concerns is crucial. As suggested by Hinnant et al. (2012), health news should provide not only credible but also relevant information to enhance the persuasiveness and effectiveness of news for the general public. Therefore, health news should be designed in a format that facilitates dissemination and knowledge sharing among audience members. In this study, formats are regarded as the way in which news content is organized and presented. The analytical framework of news formats, in keeping with relevant theories, is constructed from two aspects, namely evidentiality and relevance.

News texts, especially those with health topics, are good sources for examining IE, because authenticity and reliability are required in this genre. In other words, news stories as naturally occurring discourse, are preoccupied with knowledge (Bednarek, 2006). News discourse as a special territory of discourse, the evidentiality of which is critical to construct detached and objective news information, that makes itself read as factual and neutral by news media audiences (White, 2012). Therefore, the basic principle required of mass media health communication is that a message must be evidence-based. Meanwhile, the presence of evidentiality is commonly an indicator to be investigated for the evaluation of objectivity of news argumentation, and occasionally news quality. In this thesis, information evidentiality is conceptualized as:

The linguistic encoding of the basis of the source's information in news texts for a factual claim and argumentation; it is based on journalist's knowledge and judgments.

The concept of IE has some overlaps with "facticity", a news value referring to the extent to which a story contains facts and figures, has received researchers' attention in the analysis of news communication (Van Dijk, 1988). News value theory is a critical concept in journalism and communication research with criteria that are considered by media editors in the process

of making selection and presentation for news publishing. Sometimes news values determine the prominence of news stories given by media agents and can explain the attraction to the audience and the effect on the audience. Along with innovations in media communication, the definitions and components of news values have evolved, from Lippmann (1922), the first researcher to argue the existence of news values, to Bednarek and Caple (2012, 2014) the most recent researcher of news values, with continuous extension, enrichment and application of the theory.

In the developing process of news value theory, Galtung and Ruge (1965), having widely influenced the subsequent studies on news values, was deemed as a pioneering work which provided an in-depth study on news values. As proposed by Galtung and Ruge (1965), reference to elites or persons acts as a component of news values in making selection and presentation for news publishing. Bell (1991) complemented the theory by adding the news value of facticity. It refers to the extent to which a news report contains the kinds of facts and figures on which news thrives. These news values have shown the importance of evidential reference and factual statement in news to ensure that the news information is authentic and believable. Therefore, this research will analyze and compare information evidentiality in the Australian and Chinese health news discourse.

3.2.2 Analytical approach

Trust is the foundation for effective health communication and the prerequisite for the audience to act upon health messages. Keeping a benign relationship with the audience is crucial for health risk communication, since it is seen as engagement with affected populations. However, information usually becomes distorted during transmission through both mass media and social media networks in practice (Nurek & Kostopoulou, 2016; Ramírez et al., 2019), which results in misinformation, fake news or rumors. This may lead to false interpretations of health knowledge and even unadvisable decisions as a result of the health information dissemination process.

News coverage should serve as a reliable source of health information by maintaining the authenticity of the information or by ensuring the reliability of the source of information. Typically, news informational authenticity is accompanied by evidentiality, i.e., those sources that indicate and interpret the sources of information. Due to this, this research focuses on information evidentiality for the linguistic presentation of reliability in news texts. The concept of evidentiality, which refers to "particular linguistic resources for talking about knowledge and especially to grammaticalized markers that indicate knowledge sources" (San Roque, 2019, p. 353), has universal applications and is vital in health news. Information evidentiality is a significant accomplishment of language structure; it enables the audience to understand shared and disparate visions of knowledge in their own cultures and even across cultures (San Roque, 2019).

News journalism commonly uses external voices (whether directly quoted or indirectly reported), with interpretations, author opinions, and beliefs conveyed to the media audience (White, 2012). By referring to knowledge sources or opinions and making interpretations or judgments, journalists typically utilize external sources and their own voices to construct factual and balanced health-related news articles. As a consequence, information evidentiality is a significant element to construct high-quality health news articles to minimize information distortion to create reliable and convincing health news messages. For this study, to avoid fake news and misinformation, only mainstream news texts were collected as research objects. One of the purposes of this study is to explore how information evidentiality is used in health news articles from various cultural and linguistic backgrounds.

Evidentiality is an aspect of language grammar and refers to the source of information for its primary meaning. Markers of evidentiality confirm the evidence a speaker or author has for his/her statement, which are termed as evidentials. As argued by Bednarek (2006), evidentials are epistemic modals that function to "express the kinds of evidence a person has for making factual claims" (ibid, p. 636), and express assessments concerning knowledge. Similarly,

Hsieh (2008) regarded evidentials as “means of coding distinctions in the source and mode of evidence for the factual status of a given utterance” (ibid, p. 205). News journalists use evidentials in reporting to convey the strength, or certainty, of their statements by indicating the sources of evidence. As a strategic impersonalization technique, the use of evidential markers in news coverage is used by news authors to make themselves invisible in objective news stories; they encode credibility and authenticity by using evidential markers.

Previous research has examined evidentiality from the following perspectives: reported speech in news reporting (Fairclough, 1992); evaluation of reporting verbs (Thompson & Yiyun, 1991); the role and positioning of quotes in news discourse (Calsamiglia & Ferrero, 2003); epistemological positioning in news discourse (Bednarek, 2006); and evidentiality in Chinese news reports (Hsieh, 2008). In this research, information evidentiality of news is conceptualized as “the linguistic encoding of the information source for a factual claim” (Hsieh, 2008, p. 207), adopting a narrow view from linguistic studies.

Evidential systems differ across languages and cultures. Every language and culture have distinct modes for factual status expression based on direct experience, or second-hand information, which constitute the two broad sub-categories of evidentiality, i.e., direct evidentials and indirect evidentials (Cornillie & Gras, 2015). Direct evidentials are also termed as sensory evidentials that usually visual evidence is used. For example, “see” and “appear” are sensory evidentials. Indirect evidentials, based on second-hand information, are also termed as reportative evidentials. “Many scientists hold that” is an example of a reportative evidential. In news coverage, the second-hand information of inferential and quotative evidence, generally, is used more frequently than sensory evidentials.

Evidentiality can be created by various linguistic resources from “lexical, morphological, and syntactic to prosodic components” (Hsieh, 2008, p. 208). The constructions of information evidentiality are distinct in English and Chinese (Perfetti et al., 1997). In English, evidentiality is grammatically encoded, shown particularly in syntactic constructions, and the

evidential marking is obligatory. Chinese language mainly expresses evidential concepts through lexical items with evidentiality mapped onto lexical forms of verbal and adverbial markers (Hsieh, 2008). Two examples of information evidentiality from AusCorp and ChnCorp are shown in the following.

(1) The **research shows** Australian dietary standards recommend men consume a maximum of 20 standard drinks a week.

(2) 结果发现，五成人有一种或以上的不健康的饮食习惯

Jieguo **faxian**, wucheng ren you yizhong huo yishang de bu jiankang de yinshi xiguan
It is **found** that half of the people have one or more unhealthy dietary habits.

Evidentiality has various taxonomy systems depending on the research purpose. This research adopts the criterion of objectiveness to classify evidentiality into three subclasses, which is adapted from Bednarek (2006): objective, neutral and subjective evidentiality. The basic argument is that a journalist's presence influences the objectiveness of evidentiality. If the presence is more explicit, the evidential marker is more subjective, and vice versa. To map the criterion of judgment onto linguistic features, two linguistic variables of an utterance determine the objectiveness of evidential markers, namely sources of proposition and bases of proposition. Table 3. 1 demonstrates the relationship between linguistic variables and the evidentiality objectiveness.

Table 3.1: The relationship between evidentiality objectiveness and features of news utterance

Evidentiality objectiveness	Sources of proposition	Bases of proposition
Subjective	Self	Internal
Neutral	Self	External
objective	other	External

Note: this table is adapted from Bednarek (2006).

Analysis procedures for information evidentiality comprise five steps. It is important to note that cultural grammar, semantics and news contexts should be taken into account in the following steps for analyses and comparisons of IE constructions. Step 1 is constructing evidentiality lexicons for AusCorp and ChnCorp. Step 2 is identifying evidential markers based on lexicons. Step 3 is classifying evidential markers according to the trichotomy. Step 4 is conducting quantitative analysis for the distributions and frequencies of each evidentiality category. Step 5 is conducting qualitative analysis and make interpretations and comparisons, by taking linguistic and cultural perspectives into consideration. Chapter 4 will describe the specific analytical approaches and reports the results of evidentiality constructions in Australian and Chinese health news corpora.

3.3 Analytical framework of information relevance

3.3.1 Relevant theories

In this research, information relevance is regarded as an important news format in the process of news dissemination. Relevance, it is argued to be critical in making news messages meaningful and effective to the public. The Communication Infrastructure Theory and News Value Theory are both supportive of the importance of information relevance to news coverage, particularly for news associated with health issues.

Communication infrastructure theory (hereafter CIT, Wilkin & Ball-Rokeach, 2011), which is developed through communication research in communities and their residents from a socio-ecological perspective, provides insights for promoting health outcomes at the levels of individual and community levels. CIT considers local media as the meso-level storytelling agents who bridge the community organizations and community residents. CIT focuses on, and makes assessments of, the quality of local media storytelling. It highlights that individual's access to community-based communication resources is a predictor for positive health outcomes at the levels of both individuals and communities. This theory regards local media as an effective health intervention tool which provides a practical way to reach and

impact the potential audience. Therefore, local media can be considered as a significant communication channel for disseminating culturally relevant and targeted health information to the public, for the purpose of health promotion.

News media and the audience have a complex relationship, which is not as simple as the causal behaviorist model suggests. As a significant factor in media communication, culture is defined as the behaviors, beliefs, and values that a group of people share. It is a vital variable in the processes of messaging, transmission and receiving of information. Communication is always built on the foundation of culture which is “the construction of a shared space or map of meaning within which people coexist” (Grossberg et al., 1998, p. 22). It is only through taking culture into consideration that communication of chaotic reality can be made meaningful and manageable. Although the media create opportunities to refresh knowledge, the audience is active in filtering the information, in the process of which, culture plays a central role in producing meaning, and affecting what we see and practice. Cultural proximity and relevance (Galtung & Ruge, 1965) are also considered important news values in news value theory, which suggest that news information should be interpreted within cultural frameworks and be relevant to the audience.

This study conceptualizes information relevance as proximity and personalization in accordance with Communication Infrastructure Theory and News Value Theory. Proximity and personalization are significant news values that make an event or issue newsworthy, and they are the imagined preferences of the audience.

Proximity refers to the degree to which the news content is close to the target audience, with special references to geographical closeness and cultural closeness.

Personalization refers to the degree to which health news concerns ordinary individuals, and their experiences, practices and emotions, with special references to different population groups and human emotions.

Health news establishes newsworthiness by constructing proximity and personalization. With the construction, health news is regarded to be more appealing and relevant to audiences and so is more likely to be newsworthy. In developing strategies for presenting, framing, and delivering health information, it is crucial to identify and address people's perceptions and concerns. Public health communication should focus not only on the findings of research, but also on the factors that influence a person's perception of risk. Professionals and experts in health communication should understand how the characteristics of dietary health risk issues influence the way they are perceived. Prior to developing health messages, it is important to consider the information relevance of the risk communication message for the general public.

Through the lens of culture theory, we can create culturally sensitive and relevant health communication. As put by Wildavsky (1987), culture theory focuses on individuals as social creatures, not only being shaped by but also actively shaping their social lives, shaping the maze and running it as well.

Culture-specific worldviews are important influential factors of risk perceptions (Xue et al., 2014). Due to the focus on cross-cultural health communication in this study, it is crucial to consider cultural perspective and approach when analyzing and comparing health news corpora from Australia and China and interpreting their health persuasiveness. Because the above theories of health news communication do not explicitly include culture as a determinant or moderator, this part will examine how culture influences a person's perception of health risk and health behavior, and ultimately determines how persuasive and effective health communication can be. Furthermore, this part will examine how culture theory integrates with the well-established theories such as framing theory, news value theory, and communication infrastructure theory.

This study incorporates culture theory (hereafter CT) developed by British anthropologists Mary Douglas and Michael Thompson, and Grid-Group Cultural Theory (hereafter GGCT)

developed by Mary Douglas and Aaron Wildavsky to health news communication and conduct comparisons between different cultures. In many domains, cross-cultural and cross-national comparative studies have used CT. As CT posits, there are two dimensions of political and social relations that generate different cultural attributes in social units (Douglas, 1978). Douglas and Wildavsky's Grid-Group Cultural Theory (GGCT) further extends CT and identifies “grid” and “group” as two important dimensions to determine cultural attributes. “Grid” refers to the extent of social regulation or individual freedom; while “group” denotes the extent of group incorporation or social boundedness. The different combinations of “grid” and “group” therefore, contribute to four typical cultures, namely individualism, egalitarianism, hierarchy, and fatalism.

Individualism and collectivism (e.g., Hofstede, 1980; Triandis, 1995), or independence and interdependence as two typical cultural theories, have been used to examine pancultural differences, including health communication and promotion in diverse cultural contexts (Sherman et al., 2011). Individualism is a cultural syndrome characterized by the model of the independent-self. Within individualistic cultures, for example, in Australia, major cultural tasks are self-definitions, self-expressions, and personal autonomy (Gelfand et al., 2011; Oyserman et al., 2002; Triandis, 1995). People's decisions and actions in an individualistic culture are highly motivated and governed by their personal goals and desires rather than those of society, that individual priority is greatly emphasized over society. Individualistic cultures have a tendency for self-regulation, tending to promote and gain rather than prevent and lose, and focus on attaining positive outcomes instead of avoiding negative ones (Elliot et al., 2001).

Comparatively, collectivism is organized around interdependent-self, which implies high context dependency, malleability, and high reliance on social relationships (Gelfand et al., 2011; Oyserman et al., 2002; Triandis, 1995). In a collectivistic cultural context, people tend to avoid mistakes and negative outcomes rather than take risky opportunities to pursue positive outcomes (Higgins, 2000). Borrowing ideas from the characteristics of individualism

and collectivism, health communication that matches independent vs. interdependent self-construal and approach vs. avoidance orientation can hopefully achieve greater persuasiveness among target audiences. Loss-framed health messages will be more effective with audiences who are more prone to avoidance orientation and prevention-focused. In contrast, audiences who are approach-oriented and promotion-focused will be more likely to be persuaded by gain-framed health messages (see Mann et al., 2004; Sherman et al., 2008 for discussion). It is important to note that, culture theory, as described by Thompson et al (1999), is a program to exterminate dualisms, rather than to deny individuality or cultural complexity. In addition, individuality in a cultural context is intrinsically relational.

The fact that recipients from different cultural contexts can interpret the same health messages differently has led to the suggestion that cultural-sensitive health communication may reduce health disparities and improve health promotion practices (Kreps, 2006). As defined, culture-sensitive health communication is “the deliberate and evidence-informed adaptation of health communication to the recipients' cultural background in order to increase knowledge and improve preparation for medical decision making and to enhance the persuasiveness of messages in health promotion” (Betsch et al., 2016, p.811). To analyze and compare health communication in varying cultural contexts, an empirically and theoretically based knowledge of culture is indispensable. As suggested by Betsch et al., (2016), the way in which a message takes cultural differences into account will affect understanding and the effectiveness of health communication. The idealized culture-sensitive health communication in practice involves three steps, namely facts of medical science; facts of behavioral, social, and communication science; and facts known by target populations in different cultural contexts. For example, people in a collectivistic culture trust more in governments, experts, and official organizations that media could facilitate to construct loss-framed effective health communication. While in an individualistic culture, people are more self-focused and motivated by self-achievement and promotion that media could construct gain-framed health messages. The multicultural world exposes people to multiple cultures, so there is no golden rule for a certain country to apply. Effective and persuasive health communication and

behavior change require understanding the broad characteristics of culture and crafting culturally congruent messages to target audiences, as this part suggests to health communication professionals.

3.3.2 Analytical approach

This study argues that if news media regularly communicated the relevance of health issues, audience members would engage with health issues much more actively. News serves as a social gathering space that allows the public to learn about health issues and events around them, with information relevance the most critical connection between them. Relevance motivates audience engagement and corresponding action. With the information explosion era, netizens are inundated with massive amounts of information, so irrelevant information is more likely to be filtered out before gaining attention. In this sense, relevance of information contributes to behavioral intentions and, consequently, to compliance.

Information relevance increases the audience's ability to process health messages. It is therefore critical in health news dissemination to increase the public's understanding of health-related messages. Language and culture are frequently barriers to a broader reception of health messages, so it is suggested that health communication also takes into account the wider cultural context in which people live. The concept of relevance has various connotations, such as geographical relevance and demographic relevance, both of which are related to proximity.

The use of abstract and technical terms will make health issues seem distant and irrelevant to the audience, which may result in a weak response. To increase information relevance for health news communication to the public requires careful consideration. First, to design community-relevant information, local news media should advise local people on health events that may affect the community, and encourage community participation in decision-making processes and practices. Second, health information should be refined and

customized for different groups of the population to motivate people to adopt well informed health behaviors. In addition, including practical behavioral recommendations can ensure that individuals see the relevance of the advice for themselves and be more likely to adopt advocated behaviors by ensuring that information is relevant to daily living. Designing daily-relevance information is a promising way to resonate with people in their daily lives.

As suggested, health communication professionals should tailor health messages to be specific and personal as it will lead to more favorable attitudes toward recommended behaviors and stronger behavioral intentions through increased self-relevance (Chang, 2016). Presenting health behavioral recommendations in relation to daily objects with which the audience is familiar may increase self-relevance (ibid.). The relevance of health news is measured by two overarching dimensions, as outlined in Table 3.2.

Table 3.2: Dimensions of information relevance and components

IR	Connotation	Component
News frames	The focus for discussing a particular event	Several frames identified by topic networks
Proximity	The degree to which the news content is geographically or culturally close to the target audiences	Geographical closeness
		Cultural closeness
Personalization	The degree to which health news concerns ordinary individuals as well as their experiences, practices and emotions	Population groups
		Human emotions

Information relevance comprises proximity and personalization. In this study, proximity, geographical closeness, is represented by the names of local or domestic places and residents, while cultural closeness refers to dietary cultural terms and other local cultural concepts. For personalization, customized health information for population groups and emotional expressions in news texts, refer to the news relevance to the audience.

Analysis of information relevance comprise three steps. Step 1 constructs relevance lexicons for AusCorp and ChnCorp with eight lexicons related to proximity and personalization. Step 2 conducts quantitative analysis for the distribution and frequency of each subclass of information relevance. Step 3 is a qualitative analysis which interprets and compares information relevance construction between AusCorp and ChnCorp. Chapter 5 demonstrates the specific analytical approaches for information relevance.

3.4 Analytical framework of news frames

3.4.1 Relevant theories

In the discussion of Framing Theory (Entman, 1993; Goffman, 1986; Scheufele, 1999), frame refers to the focus for discussing a particular event. The core of this discussion is that the selective presentation of information can influence the attitudes, beliefs, decisions, and behaviors of audiences (Chong & Druckman, 2007). The high applicability and flexibility of Framing Theory in different research fields has led the theory to be contested (Walter & Ophir, 2019). There are two competing approaches to the application of framing theory, namely equivalency framing and emphasis framing. The former involves information that is different from, but logically equivalent to produce framing effects (Cacciatore et al., 2016). While the latter is deemed a more suitable approach for understanding news frames, because its premise is that events and issues are the subjects of most news (D' Angelo, 2018). Consequently, selective presentation which can make some parts of news appear salient, could thus influence the audiences' perception.

Presentation of news is inherently a subjective production. It is filled with journalists' opinions by selecting particular aspects of an issue or event in the media, which influence the way the audience thinks about an issue. Frames of news articles define the setting within which an issue is frequently discussed; as such, frames of news are often considered as broad thematic emphases in media communication (Altheide, 1997). Through the analysis of news frames, this thesis aims to demonstrate the key points for discussing the health risks of excessive salt

consumption in news coverage, and what happens and what matters in Australia and China.

3.4.2 Analytical approach

News frame is essential to shaping news coverage with different news frames affecting perceptions and behaviors in different ways (Hoffner & Ye, 2009). Researchers have debated the conceptualization and operationalization of framing in multiple domain studies to validate the concept by examining the components of framing and how to measure framing.

In sociological literature, frames denote the persistent selection, emphasis, and exclusion of information (Gitlin, 1980) that enable individuals to locate, perceive, identify, and label information (Goffman, 1986). As the concept of framing in news discourse is a strategy of news construction or the characteristic of the discourse (Pan & Kosicki, 1993), frames of news are interpreted as themes of news due to their constructive function for news discourse. Therefore, a frame of news discourse could be interpreted as a central organizing idea (Gamson & Modigliani, 1989) that combines news content into a holistic article. The choices of analytical approaches to frame analysis are associated with different notions of frame taken by researchers. Deductive and hermeneutic approaches are commonly opted by researchers who understand frames as recurring patterns and who are interested in generic frames; inductive approaches are more likely to be preferred by researchers who regard frames as issue-specific constructions (Dan & Raupp, 2018). Moreover, the choice of research methods also differs according to the size of the data. Manual frame detection is sufficient for small language data analyses, while statistical techniques are required for big language data analyses, including factor analysis (Semetko & Valkenburg, 2000), homogeneity analysis (van Gorp, 2005), cluster analysis (Matthes & Kohring, 2008), and index building (Dan & Raupp, 2018).

While the limitations of deductive and inductive approaches are obvious, several approaches using both to conduct frame analysis have been adopted in multiple-domain research. The use of prior knowledge in the deductive strategy for frame analysis usually leads to biased results

because of limitations in the researchers' background knowledge and expectations (Matthes & Kohring, 2008). However, the development of an inductive and then deductive approach for frame analysis, such as the open-coding of texts and arranging frame devices around overarching ideas to analyze frames, still relies on prior knowledge and the subjectivity of researchers in the processes of classification and identification. Efforts have been made to develop semi-inductive approaches for framing analysis (Boydstun & Glazier 2013; Semetko & Valkenburg, 2000), however, they still rely on researchers' background knowledge and lack objectivity.

More recently, researchers have devised unsupervised machine learning approaches that potentially overcome the bias produced by manual coding in framing analysis. There are two main approaches currently practiced. Semantic network analysis has shown clear advantages in that graphic representations are used to elaborate complex data and enhance the understanding of the relationship between semantic units in text. However, the application of semantic network analysis in linguistic study should be complemented by, and explained with, additional analyses because of the relatively low-level of linguistic results (van Atteveldt et al, 2008, 2017). For text investigation and analysis, topic modelling is an approach which uses a Bayesian generative approach, within which the sets of frequency distributions of words are the texts' topics (Gershman & Blei, 2012). While topic modelling, applied to identify frames in texts automatically, has been praised by DiMaggio et al. (2013), whether this approach can be applied to news frame analysis has been questioned. It is argued that the concept of "topics" in topic modelling, conceptualized and interpreted as news frames is still challenging because topics could be irrelevant in news context (Walter & Ophir, 2019) or represent mere linguistic artifacts. Furthermore, even though topic modeling is more objective than manual investigation, researchers' subjective judgment is still vital to interpretation.

The first level of the research analytical framework involves the examination of health news frames based on innovative and computational approaches. Since this is an explorative study that focuses on naturally occurring large-scale language data, an inductive approach to

analyze frame components in health news articles was used. In keeping with the features of research objects and purpose, computer-assisted tools were applied to cluster frame components into frame packages automatically, based on their linguistic patterns.

In this research, the analytical framework of news frame analysis is in accordance with the framework proposed by Walter and Ophir (2019). It is an inductive mixed method, which shows applicability for news frame detection and compensates for the limitations of some deductive or inductive approaches. This method, called ANTMN Three-step approach, is exploratory and inductive without relying on prior knowledge to make predictions. It is in congruent with the emphasis framing approach of framing theory and regards news frames as the constant use of language elements during a period of time. In combination with the unsupervised machine learning approaches of topic modelling and semantic network analysis the ANTMN Three-step approach (Walter & Ophir, 2019) was used to construct the news frame analytical framework, which consists of three steps.

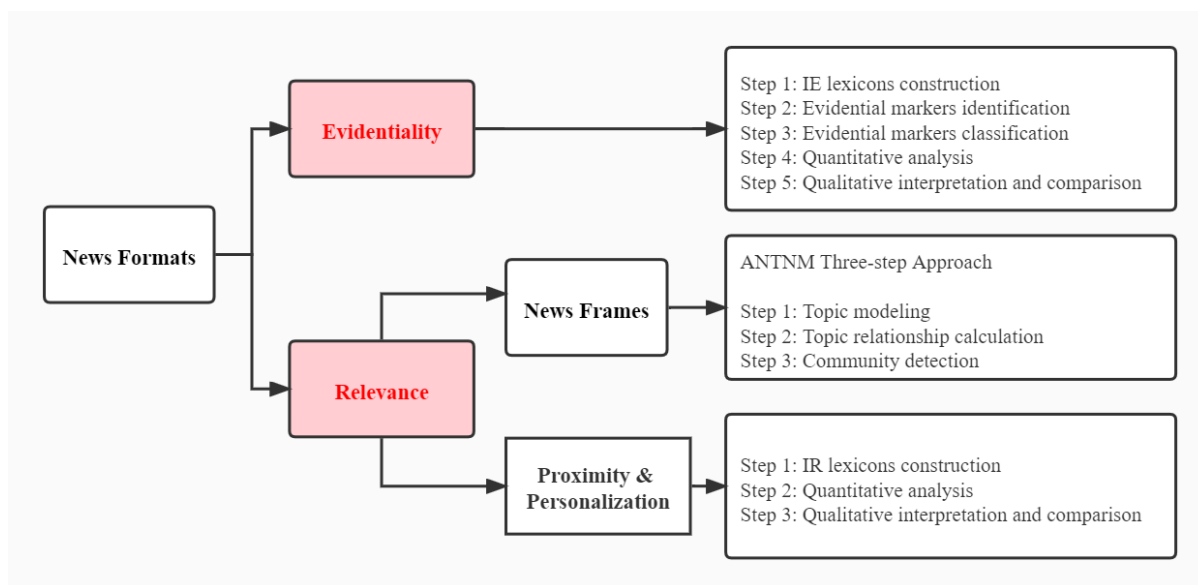
Step one is topic modeling. This step identifies frame elements, namely topics, from the observed news collections automatically. Topics are conceptualized as the frequency distributions of words, and the identified topics were conceptualized as frame elements; they then could be classified into frame packages using community detection techniques applied to the topic network (Walter & Ophir, 2019).

Step two is topic relationship calculation to create a topic network in which the identified topics are situated. Based on the calculation of the pairwise cosine similarity among topics, a topic network is organized with nodes to represent topics, and edges which represent relationships between topics in the corpus. With this step, a large amount of out-of-order topics are organized into a graphical representation that can be interpreted with regularity.

Step three is community detection. The last step aims to identify topic clusters, namely “news frames”. Community detection methods are used to further investigate inter-topic

relationships. The purpose of this step is to cluster topics into several distinctive groups: intra-community topics which share high similarities and inter-community topics which are heterogeneous, news frames that are subsequently classified. Chapter 5 will report on the results of news frame analysis. Figure 3.2 demonstrates the analytical framework of news formats and frames analysis.

Figure 3.2: Analytical approaches to evidentiality and relevance



3.5 Research design

The rationale for corpus-assisted analysis is presented in this section as well as a description of the overall research design and the use of corpus methods for the analysis. First, the research data and corpora compilation are introduced in subsection 3.5.1, and the rationale for applying corpus methods for analysis is explicated. Following this, subsection 3.5.2 provides an overview of research data to provide an overview of research objects.

3.5.1 Data and corpora compilation

The research objects in this study comprise comparable English-Chinese bilingual data sets from Australian and Chinese mainstream media respectively. The health-themed news texts

reporting on the health impacts of excessive salt consumption are collected and compiled into the comparable corpora, abbreviated as AusCorp and ChnCorp. This section first describes the data collection procedures, then the design of an accurate searching syntax for data retrieval, and finally explains the corpora compilation procedures.

3.5.1.1 Data sources

The research data consists of news articles reporting on the health impacts of excessive salt consumption in Australian and Chinese mainstream media. This is to ensure high quality news. This is because with an increasing array of media channels, some rumors or misinformation may flow through news outlets without being filtered for accuracy. The selection of mainstream media considers both their circulation and location, because circulation is considered as a convincing indicator of its influence and audience size (Tong, 2014), and a balanced selection of the locations ensures a more representative research dataset.

The investigation based on mainstream digital news, rather than printed news, magazines, academic reports or other social media articles, is based on four reasons: (1) Currently, the general public is intensively exposed to digital written media rather than print media; (2) Digital written news is an accessible and sociable source of health knowledge for the public with limited health literacy compared with academic sources; (3) Mass media information has a higher level of authenticity, and is a more reliable source of health knowledge than social media content; (4) Mass media can reach a large audience and the extent of participation predicts its influence among the population. Furthermore, the most important reason is that mass media campaigns for salt-intake reduction have been considered as an effective dietary intervention tool at the population level, as evidenced in Viet Nam (Do et al, 2016) and Australia (Land et al. 2014).

The research data is selected from the following 36 mainstream media newspapers (Australian newspapers N=18; Chinese newspapers N=18) for two reasons: (1) They are among the most

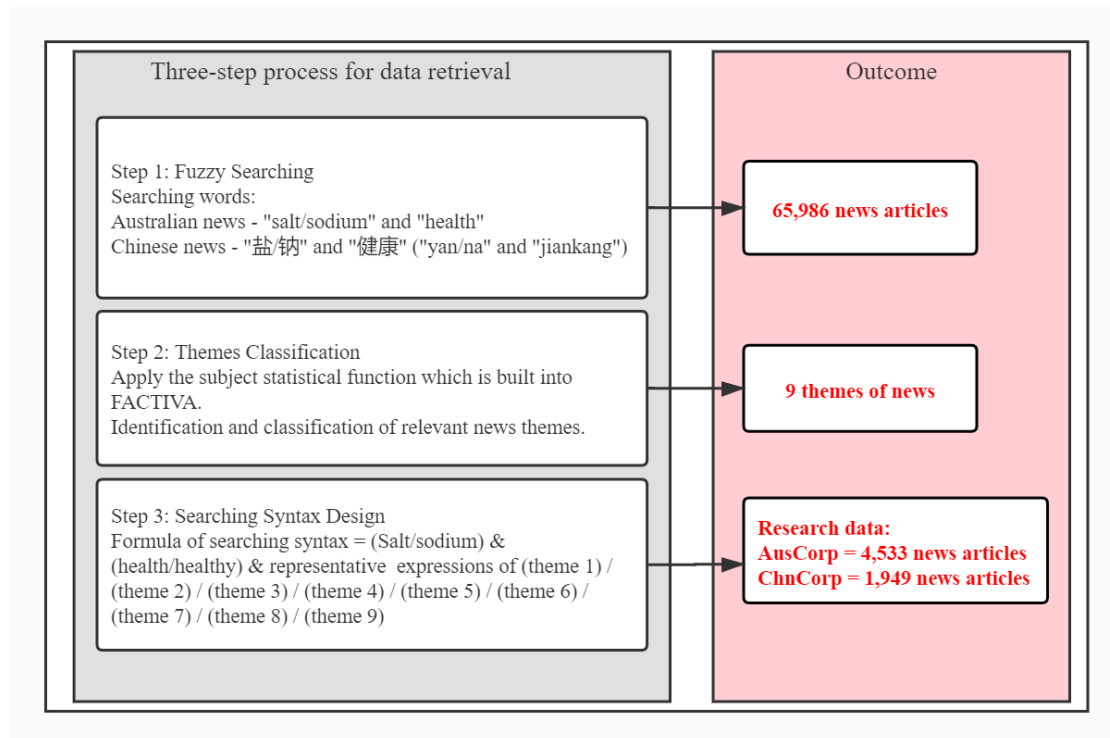
influential ones with high circulations and are issued in different geographical locations; (2) As these newspapers cover public health topics, they are appropriate sources of research data. Information about these 36 newspapers is shown in Appendix B.

The next step was to retrieve news articles reporting on the topic, the health impacts of excessive salt consumption. This step was complex and required meticulous design. At the initial step of data collection, it became apparent that news coverage reporting on the topic of health impacts of excessive salt-intake does not necessarily and accurately include the keywords of “salt” and “health” in news texts. Meanwhile, news texts including “salt” and “health” do not necessarily describe this topic. Therefore, these two words could not be applied as searching keywords for news data retrieval. For data retrieval as accurately as possible, a specifically designed searching syntax is required.

3.5.1.2 Data retrieval

FACTIVA is used as the reliable source of research data, which is a Dow Jones global news database with licensed news and data sources dating back to 1980s (Zhao & Lyu, 2021). Data of news articles is collected via a progressive search consisting of three steps. Step 1 is fuzzy searching; Step 2 is news themes classification; Step 3 is the design of the searching syntax. Figure 3.3 presents the three-step process and outcomes of each step.

Figure 3.3: Three-step process for data retrieval



For Step 1, fuzzy searching is applied to find out the general distribution of news articles concerning the topic of the health impacts of excessive salt-intake. “Salt/sodium” and “health” as two keywords are entered into the searching syntax. Therefore, in this step, the following searching syntaxes are applied in Australian and Chinese news databases respectively:

In Australian English news: (salt or sodium) and health

In simplified Chinese news: (盐 or 钠) and 健康

[In Pinyin: (yan or na) and jiankang]

The filter function of FACTIVA database was applied to set the searching time span, regions, and languages. The searching includes “all dates”, “Australia or mainland China”, “English or simplified Chinese”. The data collection date was 28th October 2019, which means news published after that date was not collected. After applying the above searching syntaxes, a total number of 65,986 eligible news articles (Australia N=33310; mainland China N=32676)

containing the keywords in searching syntaxes were collected respectively. Finally, these news articles were organized into two data sets, and were subjected to Step 2.

Step 2 is themes classification. This step aims to select relevant health news themes associated with the health impacts of excessive salt-intake. By applying the automatic subject statistical function built into the FACTIVA database, more than a hundred news themes were identified in descending order of frequency for the 65,986 pieces of news articles in total. Since Step 1 was a rough search which returned some irrelevant news to dietary health, these news articles were further classified to pinpoint the eligible ones while culling unrelated ones, based on this function.

By consulting these news themes and the corresponding news articles, three overarching themes and nine subthemes were identified from the health news database, which were highly associated with the health topics. The three overarching themes are: (1) dietary habits and diseases; (2) health disparity; and (3) health policy and food industry. These themes were determined to be in highly relevance to health. Table 3.3 presents the three themes with nine subthemes identified from 65,986 news texts.

Table 3.3: Three overarching themes and nine subthemes

Overarching theme	Subtheme	
Dietary habits and diseases	1	Food and lifestyle
	2	Hypertension
	3	Cardiovascular disease
	4	Obesity
Health disparity	5	Female health
	6	Child and teenage health
	7	Geography and health
Health policy and food industry	8	Policy and regulation
	9	Food industry

Following on, these themes and the representative expressions of each in Australian English and simplified Chinese are explained. First, dietary habits and diseases was discovered to be

an overarching theme in the 65,986 news articles in both Australian and Chinese contexts. There are articles on this topic including the connections between food and lifestyle, as well as the malfunctions and chronic diseases related to excessive salt consumption: for example, hypertension/high blood pressure, cardiovascular diseases, and obesity. The following text explains how the four subthemes of dietary habits and diseases are constructed in news, namely food and lifestyle, hypertension, cardiovascular diseases, and obesity.

Subtheme 1: Food and lifestyle. In most cases, unhealthy diets act as vectors for the spread of noncommunicable diseases. Low-quality foods and malnutrition have been suggested as modifiable health risk factors that influence both the physical and mental health of human beings. The theme of food and lifestyle is concerned with the health risks associated with excessive salt intake. A healthy diet is of daily concern for individuals, for example, food shopping, home cooking and dining out. There is an intricate connection between this theme and the general public's daily lives, and it requires the community's immediate attention.

Subtheme 2: Hypertension. The risk of cardiovascular diseases and other diseases are significantly increased by hypertension, a serious and major risk factor. The prevalence of hypertension has been found in low- and middle-income countries, with hypertension a major risk factor for health in China. The modifiable risk factors of this “silent killer” include unhealthy diet, physical inactivity, obesity, and the consumption of alcohol and tobacco. Reducing hypertension by reducing salt intake to less than five grams daily is a practical way of preventing health problems. In light of the evidence that dietary excess salt intake is strongly related to high blood pressure in different populations and age groups, many news articles focus on the causal relationship between salt intake and hypertension.

Subtheme 3: Cardiovascular disease (CVD). CVD is a collective term for a number of disorders of the heart and blood vessels. CVDs are a major cause of health problems and death globally and are mainly caused by biomedical factors, the most important of which is hypertension. As stated above, dietary habits, as modifiable risk factors for hypertension and

cardiovascular diseases, have attracted increasing attention from the news media, with many articles focusing on the relationship between excessive salt intake and cardiovascular diseases.

Subtheme 4: Obesity. Obesity is the accumulation of body fat to a level that is detrimental to human health. It has long been neglected whether there is an association between this medical condition and dietary salt intake, and whether high salt intake is an independent risk factor for obesity. The overconsumption of salt may increase the risk of obesity, especially in children and teenagers. For the intervention on juvenile dietary habits, where the news media plays an important role, this public health knowledge has great significance.

In addition to dietary habits and diseases, health disparity is another overarching theme present in the news corpora. Health disparities in society are caused by a variety of factors, and excessive salt intake has shown to be associated with significant demographic disparities. The ecological model of health determinants developed by Whitehead and Dahlgren (1991), which is called Dahlgren-Whitehead “rainbow model”, described multi-layers of health determinants for individuals, such as age, sex, and constitutional factors, which are at the core. The model also includes individual lifestyle factors, social and community networks, living and working conditions, and expands to the general socioeconomic, cultural, and environmental conditions. For instance, limited by socioeconomic status, the urban poor is exposed to ultra-processed food commodities which are salt-condensed, have the lure of lower prices and easy accessibility. It is claimed, growing malnourishment has resulted in a variety of non-communicable diseases because of low quality high caloric intake (Agrawal, Patel & Agarwal, 2016). As a social public health topic, along with the progress of health promotion, the health conditions regarding certain groups of the population have attracted the public’s attention. As an intervention and promotion of public health, the news has focused on the "salt intake and health" of different population groups, such as females, children and teens, and residents living in different geographical areas. The next section describes three

subthemes of health disparity associated with news reporting on the health impacts of excessive salt-intake: female health, child and teenage health, and geography and health.

Subtheme 5: Female health. Because females experience physiologically different stages of pregnancy, lactation, and menopause, the relationship between salt intake and female health is more complicated than for males. In the news, female health has emerged as a concern because women during these periods may need different sodium allowances to maintain health.

Subtheme 6: Child and teenage health. The media has also paid attention to the health of children and teenagers. Childhood is an influential life period for the development of taste. People are more likely to eat highly salted foods if their taste receptors are suppressed in childhood. As children and teenagers are more sensitive than adults to excessive salt intake, they should eat less salt. The over consumption of salt is associated with hypertension. It can lead to hypertension in childhood, and later in adulthood, thus contributing to higher risks of cardiovascular diseases. Thus, lowering the salt intake of children and teens may reduce their chances of contracting hypertension and cardiovascular diseases as adults, which is of great significance for the health of a community.

Subtheme 7: Geography and health. When considering health at the population level, geography is considered a variable. The interactions between people and the environment may result in different physical and mental health conditions. At national and international levels, dietary salt-intake levels differ based on climate, dietary habits and culture. Throughout China, salt consumption varies by region. The Northern and East-northern regions, for instance, consume more salt than the Southern regions. There are also differences between mountainous and plain areas.

The third overarching theme of the health news corpus is health policy and the food industry. Surveillance at the national level has significant implications for measuring and monitoring

population salt consumption. As proposed by the SHAKE Technical Package for Salt reduction (WHO, 2016), surveillance could be practiced with three interventions: measuring and monitoring population salt consumption patterns, the sodium content of food, and the impact of a salt reduction program. The effectiveness of national surveillance of health policy and the food industry has been the focus of news articles targeting the reduction of salt consumption in the population.

Subtheme 8: Policy and regulation. Policy and regulation, as well as communication and advocacy, are critical components of integrated strategies that focus on reducing salt intake. For example, nutrition labelling, among multi-component salt reduction strategies, is a policy tool in relation to food selection. Policy and regulation vary among different countries due to the different dietary habits. The World Health Organization plays the role of a bridge, between evidence and specialized policy actions. This bridge helps countries to understand what works and how to develop rational and appropriate policy actions. Policy coherence and political support maintenance, however, are more significant than policy guidance.

Subtheme 9: Food industry. Salt or condiments added at the table or while cooking, and the over consumption of ultra-processed foods are major sources of excessive salt intake in daily life. Therefore, working with and monitoring the food industry, including manufacturers, retailers, trade associations, caterers and suppliers to the catering industry, acts as a source of control of salt reduction at population level through providing strong support for the agenda of salt reduction. The United Kingdom’s salt reduction program has shown that working with the food industry, to promote the reformulation of foods to contain less sodium, has contributed to its great success. As a strategy to lower salt consumption, both Australia and China started partnering with the food industry. Table 3.4 presents these nine subthemes with examples of representative expressions, in English and Chinese respectively.

Table 3.4: Nine subthemes and examples of representative expressions

News theme	English expression	Chinese expression
Food and lifestyle	bread	零食(lingshi, snack)

	bagels crumpets muffins whole meal	熟食(shushi, deli) 腌 (yan, pickle) 酱(jiang, paste) 鸡精(jijing, chicken powder)
Hypertension	high blood pressure, elevated blood pressure, hypertension, chronic disease	高血压 (gao xueya, hypertension) 慢性病(manxing bing, chronic diseases)
Cardiovascular disease	cardiovascular disease, heart disease, stroke, arteriosclerosis, cerebral hemorrhage, hyperlipidemia	心血管疾病(xinxueguan jibing, cardiovascular diseases) 心脏病(xinzang bing, heart diseases) 脑卒中(naocuzhong, stroke)
Obesity	overweight, fat, obese, obesity	肥胖(feipang, obesity) 超重(chaozhong, overweight)
Female health	women female pregnancy lactation	女性(nvxing, female) 孕期(yunqi, pregnancy) 孕妇(yunfu, pregnant women)
Child and teenage health	child children childhood	儿童(ertong, child) 青少年(qingshaonian, juvenile) 学生(xuesheng, student)
Geography and health	urban, rural, aborigine, indigenous	南方(nanfang, South) 北方(beifang, North) 东部(dongbu, East) 西部(xibu, West)
Policy and regulation	policy, regulation, initiatives, system	政策(zhengce, policy) 法律(falv, legislation) 法规(fagui, law and regulation)
Food industry	food industry, fast food, restaurant, catering, chains	食品安全(shipin anquan, food safety) 食品生产(shipin shengchan, food production) 食品产业(shipin chanye, food industry)

Step 3 is searching syntax design. Similar to the process of finding relevant literature in a database, the searching syntax includes various terms, and combinations of them, related to the topic of the health impacts of dietary excessive salt-intake. These expressions are

representative of each theme in the searching syntax for data retrieval from FACTIVA database to find relevant news articles. The searching syntax is designed to make the search as precise as possible and to include the research objects. The formulas of searching syntax are shown as follows.

Australian English searching syntax = (Salt/sodium) & (health/healthy) & representative English expressions of (subtheme 1) / (subtheme 2) / (subtheme 3) / (subtheme 4) / (subtheme 5) / (subtheme 6) / (subtheme 7) / (subtheme 8) / (subtheme 9)

Simplified Chinese searching syntax = (盐/钠) & 健康 & representative Chinese expressions of (subtheme 1) / (subtheme 2) / (subtheme 3) / (subtheme 4) / (subtheme 5) / (subtheme 6) / (subtheme 7) / (subtheme 8) / (subtheme 9)

As can be seen, eleven sets of word groups are included to form the formulas. Word group 1 comprises “salt or sodium” and word group 2 comprises “health or healthy”, these two groups of words are the must-contains in searching syntax. Word groups 3 to 11 comprise representative expressions of the nine news subthemes respectively are connected with “or” in the searching syntax, and the words within each group are connected with “or” as well. That is, the combination of “salt or sodium” and “health or healthy” and any word from theme 1 to theme 9 is considered as an effective combination of words used to find qualified news articles on FACTIVA database. According to the formulas, the searching syntax designed for searching Australian news articles is shown in Table 3.5.

Table 3.5: The design of Australian English searching syntax

Keyword 1	Salt/sodium
Keyword 2	Health/healthy
Subtheme 1	bread/rye/whole meal/bagels/crumpets/muffins/processed/canned/sausages/packaged food/ham/spam/cheese/sports drink/sodium/potassium/calcium/magnesium/micro element/vitamin/barbecue
Subtheme 2	high blood pressure/elevated blood pressure/hypertension/chronic

	disease
Subtheme 3	cardiovascular disease/heart disease/stroke/arteriosclerosis/cerebral hemorrhage/hyperlipidemia
Subtheme 4	overweight/fat/obese/obesity
Subtheme 5	women/female/pregnant/pregnancy/lactation/menopause/maternal/maternity
Subtheme 6	child/children/childhood/teenager/juvenile/student
Subtheme 7	urban/rural/aborigine/indigenous
Subtheme 8	policy/regulation/initiatives/system
Subtheme 9	food industry/fast food/restaurant/catering/chains

Australian English searching syntax = (salt/sodium) & (health/healthy) & (bread/rye/whole meal/bagels/crumpets/muffins/processed/canned/sausages/packaged food/ham/spam/cheese/sports drink/sodium/potassium/calcium/magnesium/micro element/vitamin/barbecue) / (high blood pressure/elevated blood pressure/hypertension/chronic disease) / (cardiovascular disease/heart disease/stroke/arteriosclerosis/cerebral hemorrhage/hyperlipidemia) / (overweight/fat/obese/obesity) / (women/female/pregnant/pregnancy/lactation/menopause/maternal/maternity) / (child/children/childhood/teenager/juvenile/student) / (urban/rural/aborigine/indigenous) / (policy/regulation/initiatives/system) / (food industry/fast food/restaurant/catering/chains)

The searching syntax designed for searching Chinese news articles is shown in Table 3.6. Chinese characters, accompanied with Pinyin, and English translations are listed in Table.

Table 3.6: The design of simplified Chinese searching syntax

Keyword 1	盐/钠 yan/na salt/sodium
Keyword 2	健康 jiankang health
Subtheme 1	零食/熟食/腌/酱/鸡精/汤料/火锅/方便食品/西式快餐/钠/钾/钙/镁/微量元素/维生素/外卖/外食/重口味/家庭烹饪 lingshi/shushi/yan/jiang/jijing/tangliao/huoguo/fangbian

	shipin/xishi kuaican/na/jia/gai/mei/weiliang yuansu/weishengsu/waimai/waishi/Zhong kouwei/ jiating pengren snack/deli/pickle/paste/chicken powder/soup/hot pot/instant food/western fast food/sodium/ potassium/calcium/magnesium/micro-elements/ vitamins/take- away/dine-out/heavy taste/home cooking
Subtheme 2	高血压/慢性病 gaoxueya/manxingbing hypertension/chronic diseases
Subtheme 3	心血管疾病/心脏病/中风/脑卒中/心肌缺血/动脉硬化/脑溢血/高 血脂 xinxueguan jibing/xinzangbing/zhongfeng/naozuzhong/xinji quexue/dongmai yinghua/naoyixue/gao xuezhi cardiovascular diseases/stroke/myocardial ischemic stroke/arteriosclerosis/ cerebral hemorrhage/hyperlipidemia
Subtheme 4	肥胖/超重 feipang/chaozhong obesity/overweight
Subtheme 5	女性/孕期/孕妇/产妇/哺乳期/更年期 nvxing/yunqi/yunfu/chanfu/buru qi/gengnian qi female / pregnant women/during pregnancy/lactation/menopause
Subtheme 6	儿童/青少年/学生 ertong/qingshaonian/xuesheng children/youth/students
Subtheme 7	南方/北方/东部/西部/城市/农村/乡村/山区/沿海 nanfang/beifang/dongbu/xibu/chengshi/nongcun/xiangcun/shanqu/ yanhai South/North/East/West/urban/rural/country/mountain/coastal
Subtheme 8	政策/法律/法规/规定/安全法 zhengce/falyv/fagui/guiding/Anquan fa policy/laws/regulations/rules/safety law
Subtheme 9	食品安全/餐馆/食品生产/食品产业 shipin anquan/cangguan/shipin shengchan/shipin chanye food safety/restaurant/food production/food industry

Simplified Chinese searching syntax = (盐/钠) & 健康 & (零食/熟食/腌/酱/鸡精/汤料/火锅
/方便食品/西式快餐/钠/钾/钙/镁/微量元素/维生素/外卖/外食/重口味/家庭烹饪) / (高血
压/慢性病) / (心血管疾病/心脏病/中风/脑卒中/心肌缺血/动脉硬化/脑溢血/高脂血) / (肥
胖/超重) / (女性/孕期/孕妇/产妇/哺乳期/更年期) / (儿童/青少年/学生) / (南方/北方/东部/

西部/城市/农村/乡村/山区/沿海)/(政策/法律/法规/规定/安全法)/(食品安全/餐馆/食品生产/食品产业)

3.5.1.3 Compilation of comparable corpora

The above two searching syntaxes are determined by the representative expressions of each news subtheme. These syntaxes are applied in searching news articles on FACTIVA database to collect news reporting on the health impacts of excessive salt-intake, as accurately as possible. As a result of searching, a total of 6,482 news articles were identified and collected (Australia N=4533, China N= 1949). After optimizing the searching syntax, it can be seen that the data size was further reduced, compared with the result of fuzzy searching. Despite the imbalanced sizes of the two sets of news articles, it was an exhaustive collection of all relevant data, within a certain time period and recorded on FACTIVA database.

These news articles were first checked manually to ensure they are health-related before collecting and downloading from FACTIVA database. Then, these articles were converted to text format to be fed into WordSmith and then arranged chronologically. The news articles were stored individually in a txt file labeled with country of publication, year, and a serial number. For example, “A_2000_1” refers to the first piece of news article that was published in 2000 in Australia. “C_2000_1” refers to the first piece of news article published in 2000 in mainland China.

For the research purpose, these news articles were compiled into Australia-China comparative corpora of news reporting on the health impacts of dietary excessive salt-intake (henceforth “ACHS Corpora” or “AusCorp and ChnCorp”). While time consuming, the systematic collection of health news articles is essential for the investigation of health news communication. To conclude, the ACHS corpora are sufficient to represent the mainstream discussions on this health topic and are available for computer-assisted corpus analysis.

3.5.2 Overview of research data

This section provides an overview of research data, namely the ACHS corpora. The corpora are profiled for a preliminary understanding from the perspectives of temporal distributions, data sizes, and key discussions surround the health topic. This is an essential step before systematic corpus-assisted discourse analysis which describes basic features of research objects.

3.5.2.1 Data sizes

The overall sizes of research data, namely the ACHS corpora, are examined. For Chinese news corpus, segmentation was conducted via C++ built in Python. The purpose of this step is to divide the Chinese texts into word units for the computed analysis. The ACHS corpora consist of 4,533 Australian health news articles, with 19,088,860 words; 1,949 Chinese health news articles, with 10,936,428 words. To sum up, there are 6,482 health news articles. The lexical richness, represented by type-token ratio, is computed by the corpus tool WordSmith 7.0. Table 3.7 shows the data sizes and lexical richness of AusCorp and ChnCorp. As the data retrieval steps described in Figure 3.3, the data size has been reduced from step 1 to step 3, for an accuracy consideration.

Table 3.7: Data sizes and lexical richness of AusCorp and ChnCorp

	AusCorp	ChnCorp
Quantity	4,533	1,949
Total words	19,088,860	10,936,428
Type-token Ratio (TTR)	48.33%	48.10%

The comparison between AusCorp and ChnCorp yields several results. First, the AusCorp has a larger data size than that of the ChnCorp. The quantity of news articles is 4533 in AusCorp compared with the ChnCorp 1949 news articles. Second, AusCorp contains approximately 20 million words while ChnCorp contains about 10 million words, almost half the size of the Australian corpus. Third, the calculation of TTR indicates a slightly greater lexical richness of AusCorp than ChnCorp; “type” refers to the number of unique/different words, and “token”

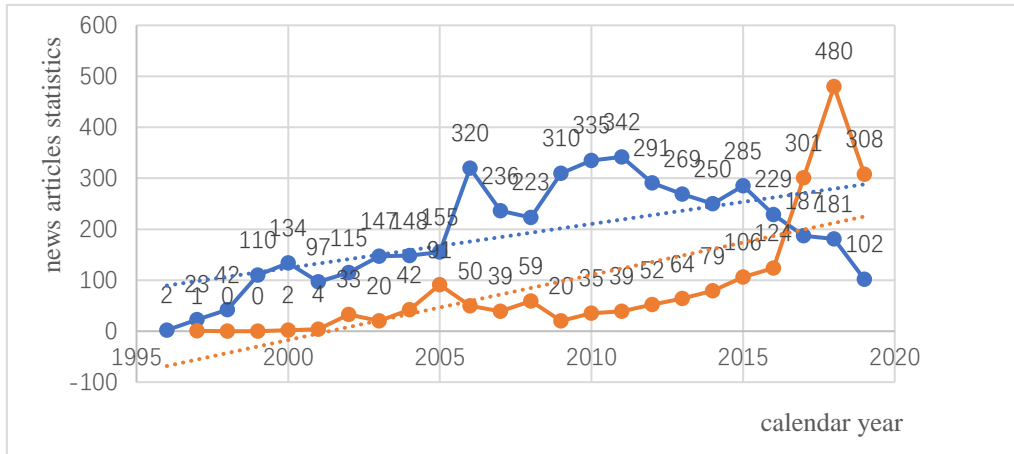
refers to the number of total words in a text (Richards, 1987). The relationship between types and tokens, known as the TTR, is a proxy to measure lexical diversity or richness within texts (Covington & McFall, 2010). A higher TTR index indicates a larger amount of lexical diversification while a low TTR index indicates relatively small diversification. To conclude, AusCorp comprises a larger size of data, both quantity and total words, and a slightly greater word diversification compared to Chinese corpus.

3.5.2.2 Temporal distributions

Following the analysis of data sizes, this subsection outlines the temporal distributions of ACHS corpora. The distribution of news articles by year was first analyzed using the statistical function of the FACTIVA database. As the trend lines in Figure 3.4 show, up to data retrieval date (28th October 2019), the overall trends of the quantity Australia (blue line) and China (orange line) news differ, with the Australian news starting earlier, in 1996. The number of news items reached the highest level from 2006 to 2011 after a steady development and is followed by a notable downward trend to 2019.

As compared with Australia, China's concern about excessive salt-intake showed a later start and the amount of news was significantly less than the Australian news media for each year until 2016. As the figure shows, the intersection of two lines occurred in 2016 to 2017, the amount of Chinese news surpassed that in Australia for the first time in 2017. This rising trend has continued.

Figure 3.4: News articles published in Australia (upper, in blue) and China (lower, in orange) by calendar year (1996 - 2019)



From the perspective of temporal distribution, Australian news reporting on this topic had an early beginning and has developed steadily over time. The most intense attention occurred from 2006 to 2011 and has gradually decreased in the following years. However, China shows a different trend. Despite the late start and slow development, the amount of Chinese news coverage increased massively from 2016 and peaked in 2018. The Chinese news coverage reveals a new trend and a recent breakthrough, suggesting that the Chinese news media has recently become more concerned about the health impacts of excessive salt intake.

3.5.2.3 Key discussions

Through a lexical cluster analytical approach, the key discussions of the topic of salt-intake and health have been analyzed. The principle of cluster analysis in WordSmith is to minimize the distance within lexical groups while maximizing the distance between the groups. Cluster analysis or the analysis of lexical bundles is a statistical analysis technique that aims to find which words repeatedly occur together to form a relatively stable multi-word unit. A lexical cluster analysis provides a basic understanding of lexical construction in a dataset. Table 3.8 shows the top-ten frequent lexical clusters of “salt” or “盐” (yan) in the corpora.

Table 3.8: Top-ten frequent lexical clusters of “salt” or “盐” (yan, salt) in AusCorp and ChnCorp

Cluster	AusCorp	Freq.	ChnCorp	Translation	Freq.
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1	Sugar and salt	556	盐的摄入量 (Yan de sheruliang)	The amount of salt intake	115
2	Fat and salt	345	油盐糖 (You yan tang)	fat, salt, and sugar	60
3	Salt and sugar	336	盐的摄入 (Yan de sheru)	Salt intake	58
4	Fat sugar and	324	减少盐的 (Jianshao yan de)	Decrease salt's	53
5	High in salt	260	科学用盐 (Kexue yongyan)	Use salt scientifically	44
6	Fat salt and	226	盐和糖 (Yan he tang)	Salt and sugar	44
7	Too much salt	221	中的盐 (Zhong de yan)	Salt in	42
8	Salt and fat	200	盐糖的 (Yan tang de)	Salt and sugar's	40
9	High in fat	194	的盐摄入量 (De yan sheruliang)	salt intake of	38
10	Sugar salt and	180	糖和盐 (Tang he yan)	Sugar and salt	33

Since the theme of news corpora is the health impacts of excessive salt consumption, the word “salt” or “盐” (yan) in Chinese are applied to cluster analysis via WordSmith. In total, “salt” accounts for 0.36% in AusCorp, and “盐” (yan, salt) .accounts for 0.07% in ChnCorp. Table 3.7 summarizes the results of cluster analysis, in which the frequent lexical bundles of “salt” or “盐” (yan) in corpora are demonstrated. It shows the top-ten frequent lexical clusters of “salt” or “盐” (yan) in AusCorp and ChnCorp sorting by frequency in descending order of frequency. As can be seen, the results identify two major concerns: (1) salt intake, and (2) salt and other dietary risk factors, namely fat and sugar. These concerns reflect the news attention on the discussion of salt consumption as well as other dietary risk factors, such as excessive fat and sugar intakes.

To summarize, this subsection first provides an overview of research data collection and corpora compilation procedures. The research data consists of comparable English-Chinese news datasets from eighteen mainstream newspapers published in Australia and China respectively. Searching syntax for news data retrieval was designed according to the results of

fuzzy news thematic analysis. As a result, finally, 6,482 eligible news articles were collected and compiled into corpora (i.e., the ACHS corpora) as research data (Australia N=4533, China N= 1949).

Second, the overall features of research data were profiled for a preliminary description. According to the results of temporal distributions, Australian news about the topic showed an early start from 1996, with the quantity of news reaching a peak in 2011 and followed by a downward trend. While Chinese news had a later start, the amount of news surpassed that in Australia in 2017, continuing the rising trend until 2019. AusCorp presents a larger quantity of data than ChnCorp and has slightly higher word diversification than ChnCorp. Additionally, cluster analysis results indicated that the dietary risk factors of salt intake and fat and sugar intake were discussed simultaneously in both AusCorp and ChnCorp.

3.6 Summary

This chapter exposes the relevant theories, analytical framework, and research design of this thesis. Framing Theory, Communication Infrastructure Theory, News Value Theory, and Culture Theory are supporting theories from the perspectives of news formats and frames. These are linguistic characteristics that influence the audiences' perception of health risk, and behavioral intentions. In accordance with the relevant supporting theories, this chapter proposes an analytical framework, in which the approaches to analyze news formats and frames are constructed from corpus linguistic paradigms and computer-assisted methods. Thus, naturally occurring language data could be empirically analyzed in depth. Next, this chapter described the research design. The procedures of research data collection and comparable bilingual corpora compilation, which included the design of a searching strategy for news data retrieval, were elucidated. The data sizes, temporal distribution of news articles, and the key clusters of "salt/sodium" were explained to provide an overview of the research objects.

In this chapter, it has been demonstrated that the use of the analytical framework, and the

research design, support the identification of news frames and the assessment of news formats. The news frame analytical framework extended Walter & Ophir's (2019) work to include Chinese texts, a corpus-assisted qualitative interpretation, and a cross-cultural comparison. While the news format analysis was empirical and corpus-assisted, it was followed by outcome interpretation and comparison. Toward this end, this chapter developed a corpus-assisted and data-driven approach to news frames and formats analysis to facilitate cross-lingual news discourse analysis. In the following chapters, Chapter 4 will present information evidentiality analysis based on the analytical framework proposed in this chapter. Chapter 5 will report on information relevance analysis.

CHAPTER 4 INFORMATION EVIDENTIALITY CONSTRUCTION IN AUSCORP AND CHNCORP

4.1 Introduction

Across the globe, diet-related health risks are evident with every individual's daily behavior and with profound public health implications. In light of this, communication professionals and researchers suggest a shift from reactive and passive healthcare to proactive public health communication and promotion. Improving the persuasiveness and effectiveness of health communication has greatly interested communication professionals and researchers as a strategy to facilitate and catalyze this shift.

People's attitudes, intentions, and behaviors about health are influenced by persuasive health communications. The communication of health information can be an external trigger of health-related behaviors, with people exposed to persuasive health materials likely to have a better perception of health risk and be more likely to follow informed health-related behavioral advice. Nevertheless, it is an unexplored and worthy field of study how to design persuasive health communication, in particular how to identify the linguistic features that contribute to it. The purpose of this chapter is to analyze the evidentiality constructions in Australian and Chinese news in order to answer research question 1 posed in chapter 1: How can Australian and Chinese digital news present and validate evidence to improve public awareness of the risks of excessive salt consumption?

Since authenticity and reliability are significant considerations for health news, they are appropriate contexts for examining evidence. As news stories are naturally occurring discourses preoccupied with knowledge (Bednarek, 2006), the evidentiality of news discourse, as a special territory of discourse, is vital to construct detached and factive news information, so that it is read as factual by news media audiences (White, 2012). As with news discourse, evidentiality can indicate objectivity and, sometimes, even news quality, so it's worth investigating. It has been shown that evidentiality overlaps with "facticity", a term used to

describe the extent to which a story contains specific facts and figures in news investigation (Van Dijk, 1988). Facticity and evidentiality refer to truth value and knowledge status as critical to health news communication. Facticity is measured by the volume of evidence in news stories, whereas IE is defined by lexical-grammatically encoded language devices.

Evidentiality is considered vital for health news since journalists package knowledge, evidence, and argumentation into evidentiality in order to create news that is persuasive. There is a comparison in this chapter between evidentiality constructions in AusCorp and ChnCorp, which focuses on how evidentiality is used linguistically in the news genre. An argument is made that evidentiality influences an individual's perception of health risk and encourages readers to take informed health-related action or alter their behavior. This study suggests that the frequent use of linguistic evidence contributes to creating reliable health information that enhances readers' perception of health risks. By comparing the employment of different evidential markers and the objectiveness, the construction of evidentiality will be compared between AusCorp and ChnCorp.

The first section of this chapter provides an overview of the corpus-assisted empirical discourse analysis of evidentiality in AusCorp and ChnCorp. Towards the definition of information evidentiality and the construction of an analytical framework, Section 4.2 explains the notion of evidentiality in the domain of health news communication. The classification of evidentiality in news is explained with linguistic features. Results of the data analysis, and qualitative interpretations in Sections 4.3 and 4.4 provide insights into the constructions of evidentiality in AusCorp and ChnCorp, and the distribution of objective, neutral, and subjective evidentiality. As a conclusion to this chapter, section 4.5 summarizes the research findings.

4.2 Conceptualization and operationalization of evidentiality

This chapter uses a corpus-assisted news discourse analysis framework to examine how evidentiality is constructed and expressed linguistically in Australian English and Mandarin

Chinese health news corpora, namely AusCorp and ChnCorp. It begins with a discussion of the meaning of evidentiality in the news genre. Then, a practical description of how to operationalize evidentiality based on corpus linguistic features is provided. Following on, this section explains the analytical stages and presents the results of the quantitative data analysis.

4.2.1 The conceptualization of evidentiality

The concept of evidentiality was introduced by Jakobson (1957), as reviewed by Ivan Fónagy (1985), as a verbal label indicating the basic information on which a statement is made. As Mushin (2001) describes, the linguistic study of evidentiality is concerned with the status of evidence form and evidence meaning in morphological systems. According to a broader definition, evidentiality involves more than marking evidence; it encompasses attitudes and assessments of knowledge expressed linguistically (Chafe & Nichols, 1986). In this model (*ibid*, p. 262), “the basic information whose status is qualified in one way or another by markers is evidentiality”, meaning that by language marking of evidentiality (or evidential markers), the status of knowledge is qualified. Through reviewing relevant literature, “evidentiality” is found to be commonly overlapped with the notion of “epistemological positioning” or “epistemic modality”. As noted by Bednarek (2006, p. 636), evidentials are epistemic modals that function to “express the kinds of evidence a person has for making factual claims”. Hsieh (2008) regarded evidentials as “means of coding distinctions in the source and mode of evidence for the factual status of a given utterance” (p. 205). Rocchi (2012) and Rocchi and Musi (2017) regarded information evidentiality as having argumentative functions and proposed that linguistic expressions of evidentiality in corpora could be analyzed for argument mining purposes. Tantucci (2013) regarded evidentiality as “acquired knowledge” which has different types of informational encoding, such as direct visual and auditory evidentials and indirect reported and inferential evidentials. It also conveys the experiencer's (i.e., receiver's) concern by way of averral (i.e., statement) or attribution. Evidentials, according to Bowler (2018), are the ways in which speakers know, including direct (eyewitness) and indirect (inferred) evidence. San Roque (2019) asserts that evidentials are particular linguistic markers that indicate

knowledge sources.

The notion of evidentiality is composed of three components: (1) the expression of knowledge, (2) the marking of evidence linguistically, and (3) the speaker/writer, who is the agent of evidentiality. As journalists' attitudes are key to evidence construction in news discourse, the broader definition of evidentiality is used to conduct empirical corpus-assisted news discourse analysis. This study combines the concepts and discussions on evidentiality in the linguistics and media communication research literature. By doing so, a concept of evidentiality in the genre of news is formed by selecting relevant assertions. The concept of information evidentiality can be described as follows:

Journalists encode their judgments and knowledge into news text by linguistically encoding the source's information to support a factual claim or argument.

In this chapter, evidentiality constructions are examined in health news articles for their objectiveness. Comparisons are made between AusCorp and ChnCorp.

4.2.2 The operationalization of evidentiality

The purpose of this section is to explain the operationalization of information evidentiality by mapping the linguistic features onto a corpus-assisted discourse analysis framework. Existing literature adopts a variety of taxonomy systems for categorizing evidentiality. Evidence is classified as (1) directness, (2) certainty of knowledge, or (3) other semantic differences (Bednarek, 2006; Chafe & Nichols, 1986). Generally, evidence is classified as direct or indirect based on the directness criterion. The sensory evidence such as "see" and "look" are direct, whereas the reportative evidence such as quoted remarks is indirect, since it is based on others' testimony. Another frequently-used criterion of evidentiality classification is the degree of certainty which encompasses evidence with high certainty (e.g., must, of course), medium certainty (e.g., probably, seems), and low certainty (e.g., appears, might). Also, in terms of

linguistic devices, various elements, such as lexical, morphological, syntactic, and prosodic components, contribute to the construction of evidentiality (Hsieh, 2008). For instance, in Chinese language, evidentials could be: high certainty (e.g., 众所周知, zhongsuo zhouzhi, well-known), medium certainty (e.g., 当然, dangran, sure), and low certainty (e.g., 也许, yexu, may). Different contexts may alter the certainty level of a certain evidential, and language systems also construct evidentiality differently. In light of the diversity of taxonomy systems and linguistic representations, operationalizing evidentiality is extremely challenging. In keeping alignment with the research purpose and large-scale corpus data, the criterion of objectiveness is employed for evidentiality classification in this study. Credibility and persuasiveness are rated higher for news based on objective evidence. AusCorp and ChnCorp are mapped to a set of verbal and adverbial markers for the operationalization of evidentiality. According to Bednarek (2006), evidential markers are mapped onto a continuum of objectivity (i.e., subjectivity, neutrality, and objectivity). The extent of a journalist's presence influences whether evidentiality is subjectified or objectified, according to her. The more explicit the presence of journalists is in news texts, the more subjective the evidential marker becomes. In contrast, the more implicit the presence of journalists, the more objective the evidential marker, while neutrality is placed in the middle. For statistical analysis and comparison, evidentiality classification is categorized according to three different levels of objectiveness: objective evidentiality, neutral evidentiality, and subjective evidentiality.

The objectiveness of evidential markers is determined by two variables: (1) sources of proposition (hereafter "source/sources") and (2) bases of proposition (hereafter "base/bases"). "Source" denotes "the source to which knowledge can be attributed" (Bednarek, 2006, p. 639), and "basis" refers to "the basis for the source's knowledge" (ibid, p. 639), that is, the basis of journalist's claim in news. Sources include "self" and "other", that "self" refers to the experiencer self, for example, the journalist self. "Other" indicates that the "source" is other people, for example, an expert. "Bases" includes four types, internal bases comprise "perception" and "obviousness", while external bases comprise "general knowledge" and "proof". Different combinations of "source" and "basis" types contribute to different levels of

objectiveness. The following table shows how to classify sources and bases of proposition in order to determine the objectiveness of the evidence.

Table 4.1: Classification of sources of proposition and bases of proposition

Sources of proposition	Connotation	Bases of proposition	Component	Connotation
Self	The experiencer self, for example, the journalist self,	Internal	Perception	Internal mental perception, sensory perception, and ‘showing’
			Obviousness	Not needing evidence, common sense
Other	Other people, for example, an expert.	External	General knowledge	External communal knowledge and background shared by journalists and audiences
			Proof	External hard proof such as results of tests

This classification will be applied to both English and Chinese discourse analyses. To make it clear, sources of proposition and bases of proposition are explained with two examples from news corpus.

Example 1. There are so many health claims made on food packaging these days, the supermarket sometimes **seems** more like a pharmacy.

Example 2. Experts agree that healthy eating messages sometimes **appear** confusing and contradictory to the public.

(Excerpts from the AusCorp)

The bolded words in the above examples are evidential markers. In the utterance of Example 1, “seems” is the evidential marker, the source of the proposition is “self” and the basis of the proposition is “perception”, since this claim is based on journalist’s self and mental perception. In Example 2, “appear” is the evidential marker, the source of proposition is “other” and the basis is “perception”.

The combination of different types of “sources” and “bases” contributes to the degree of objectiveness of evidentiality, which is classified into three subclasses, namely subjective, neutral, and objective. As the following Table 4.2 shows, if an evidential marker indicates “self” source and “internal” basis, it inclines to be subjective (e.g., I am sure that); and the combination of “self” source and “external” basis inclines to be neutral (e.g., it appears that); an “other” source and “external” basis is regarded as objective (e.g., there was proof that). The relationship between lexical evidentiality and the level of objectiveness, however, is not one-to-one because contexts play an influential role in altering their relationships.

Table 4.2: The relationship between “source”, “basis”, and evidentiality objectiveness

Evidentiality objectiveness	Sources of proposition	Bases of proposition
Subjective	Self	Internal
Neutral	Self	External
Objective	Other	External

Table 4.2 indicates that if an evidential marker employs an internal “basis”, it is identified as subjective. If a marker employs an external “basis”, whether it is neutral or objective, depends on the context. For example, an utterance “I think the results of the test prove that...” is neutral since it is self-access. Another utterance “an expert thinks the results of the test prove that...” is objective since it is other-access. To conclude, the identification of “subjective” depends on the basis of proposition, while the identification of “neutral/objective” depends on contexts. As subjectivity, neutrality, and objectivity have been clarified, it is time to determine the relationship between concrete lexical expressions and internal/external bases.

For the purpose of comparing the construction of evidentiality in AusCorp and ChnCorp, a corpus-assisted methodology that allows for quantitative statistical analysis and qualitative interpretation is adopted. The analytical framework is constructed from the framework proposed by Bednarek (2006) and Hsieh (2008), as well as the semantic classes of the UCREL Semantic Analysis System (hereafter the USAS; Piao et al., 2005) developed by the University

of Lancaster. The following is a brief introduction to them. Bednarek (2006) conducted a corpus-driven analysis of linguistic expressions concerning knowledge, termed epistemological positioning, and focused particularly on the construction of evidentiality. Without a prior categorization, the analysis is conducted through interrogating the corpus for relevant expressions. In this thesis, the source of proposition and the basis of proposition are criteria applied for evidentiality classification. The trichotomy of subjective/neutral/objective is derived from this study.

Hsieh (2008) examined the construction of evidentiality in Chinese news reports, and identified correlations between evidential markers and the dimensions of objectivity/subjectivity in news. The criterion applied in Hsieh's (2008) evidentiality classification is directness. Evidential markers are grouped into reportatives and sensories. According to this study, in objectivity-oriented news articles such as those about politics and business, reportative evidence is more often used than sensory evidence; whereas in "soft" news discourse, the use of sensory evidence which indicates a journalist's personal engagement is more likely to lead to subjective assessments. This thesis utilizes Hsieh (2008)'s abundant and genuine news dataset to compile a Chinese evidentiality lexicon.

The USAS was developed as a framework for undertaking automatic semantic textual analysis. This research draws on the semantic category system of USAS which is arranged in a hierarchy consisting of 21 major discourse fields expanding into 232 category labels (Piao et al., 2005). For example, category A is labelled as "general & abstract terms", and comprises the subclasses A1 to A15, each has different semantic labels: A1 general; A2 affect; A3 being; A4 classification; A5 evaluation; and so forth (ibid.). By examining all the semantic categories, five categories of USAS, i.e., A1, X1, X2, X3, and X7, are identified to be associated with information evidentiality. This identification is adapted from Ji et al. (2021) by adding X3 as a relevant category. The compilation of Australian English evidentiality lexicon takes these categories into account in this thesis. Components and examples of these five relevant categories are shown in Table 4.3 as follows.

Table 4.3: Five categories in USAS related to information evidentiality

Category	Component	Example
A1 general	A1.1 general actions; damaging and destroying; A1.2 suitability; A1.3 caution; A1.4 chance, luck; A1.5 use; A1.6 physical/mental; A1.7 constraint; A1.8 inclusion/exclusion; A1.9 avoiding	Act, arrange, comply, etc.
X1 general	Terms relating to psychological actions, states and processes	Mentally, mind, oedipal, etc.
X2 mental actions and processes	Terms relating to mental actions and processes in general X2.1 thought, belief; X2.2 knowledge; X2.3 learn; X2.4 investigate, examine, test, search; X2.5 expect	Beware, cynical, devious, etc.
X3 sensory	X3.1 sensory: taste X3.2 sensory: sound X3.3 sensory: touch X3.4 sensory: sight X3.5 sensory: smell	Experience, notice, sense, etc.
X7 wanting; planning; choosing	Terms depicting (level of) desire/aspiration	Ambitious, aspiring, desired, etc.

Note: this table is summarized according to Piao et al., 2005, and the USAS website.

<http://ucrel.lancs.ac.uk/>

The analytical framework was developed by adapting the frameworks of Bednarek (2006), Hsieh (2008), and relevant USAS semantic classes, as demonstrated above, and aligning them with Australian English and Mandarin Chinese. The rationale for the development of analytical frameworks lies in that: (1) Bednarek (2006) mapped evidential markers onto the continuum of objectiveness, which aligns with the purpose of this research – to discover the objectiveness of evidentiality construction. (2) Hsieh (2008) focuses on the evidentiality of Chinese news

reports, and discovers the correlations between evidential markers and the dimensions of subjectivity/objectivity, which partly aligns with the objects of this research, and is similar to the framework of Bednarek (2006). Therefore, the comparability of these two frameworks and the relevant USAS semantic classes was employed in this case study in order to provide an analytical framework for the analyses and comparisons of English and Chinese evidential markers in news.

4.2.3 The analytical process of evidentiality

An automatic identification of evidentiality in large-scale news documents is challenging and probably bias-causing. It is difficult to analyze evidentiality in a large-scale corpus of English or Chinese because there is no morphologized system of evidentiality (Bednarek, 2006). Moreover, the fact that the identification of a linguistic expression as an evidential marker depends on the context makes the analysis more difficult. A mixed-method design of data analysis is employed in this study in order to overcome the inherent challenge, as well as the research purpose of analyzing the evidentiality of news genres. The corpus-assisted examination of information evidentiality consists of the following stages.

Table 4.4: Stages for IE construction analysis in news corpus

	Stage	Explanation
1	Constructing evidentiality lexicons	Build two English-Chinese comparable lexicons of evidentiality based on frameworks proposed by Monika Bednarek (2006), Hsieh (2008), and USAS, and make adaptations to make them as aligned and balanced as possible.
2	Identifying evidential markers	After the lexicons ² are built, linguistic evidential markers in AusCorp and ChnCorp are identified based on the comparable lexicons and via the corpus tool WordSmith.
3	Classifying evidential markers	Classify evidential markers according to the criterion of objectiveness: (1) subjective evidentials; (2) neutral evidentials; and (3) objective evidentials. Subjective evidentiality is determined by internal basis in utterance,

² Please refer to Appendix C for Australian and Chinese lexicons of information evidentiality.

		while neutral and objective evidentiality are judged depending on news contexts.
4	Quantitative analysis	Quantitative analysis of the distinctions, distributions and frequencies of each evidentiality category.
5	Qualitative interpretation	Qualitative interpretation of the evidential markers based on the comparable news corpus and make a comparison between analytical results.

Summing up the analytical stages, a corpus-assisted analysis of news evidentiality is conducted for this case study. Furthermore, it is important to note that the identification process of a linguistic evidentiality expression is associated with self-built lexicons and manual judgment of the news context. In other words, bearing the lexicons in mind, the corpus is searched for evidentiality expressions, followed by collecting and categorizing them without a determined criterion. This is to ensure the collection process is not affected by prior bias of the researcher, and meanwhile to collect evidential markers as exhaustively as possible. It is important to note that while these stages are meticulously designed for IE analyses, they do have some limitations due to that evidentiality is highly contextual and requires manual identification. Thus, alternative approaches should be developed further to overcome biases that may be brought by the researcher’s subjectivity. Python was utilized to “read” the ACHS Corpora, and collate the sentences containing specific node words from the lexicon. Results were exported into text files. Figure 4.1 below shows an example of the exported results of the node word ‘suggest’. The first ten sentences containing “suggest” were shown as a demonstration.

Figure 4.1: A demonstration of the exported results by searching “suggest”
in AusCorp

```
(1, 'The Australian Consumers Association suggests')
(2, ' It asserted that "to suggest ')
(3, ' The authors suggest ')
(4, 'Evidence suggests')
(5, " I'm not sure how this health news will help women other than to suggest ")
(6, 'A study of 22,000 US doctors suggeste')
(7, 'The experiment suggests')
(8, ' Vaccine beforehand is suggeste')
(9, ' MY doctor suggests')
(10, ' An editorial in the same MJA suggests')
```


4.2.4 Data analysis

55 English evidential markers and 46 Chinese evidential markers were identified from the health news corpora. As the total number of sentences containing these evidential markers exceeds 230,000, assessing the objectiveness of each occurrence is exceedingly time-consuming. It is useful to make some basic distinctions before examining the evidential markers in detail.

First, according to the judgment criterion, “sources” comprise self and other, while “bases” comprise internal (perception, obviousness) and external (general knowledge, proof). The formulas are summarized as follows:

Formula 1. Subjective evidentiality = Self Source + Internal Basis

Formula 2. Neutral evidentiality = Self Source + External Basis

Formula 3. Objective evidentiality = Other Source + External Basis

According to the formulas, subjective evidentiality is determined by internal basis. Since there is no correlation between basis and neutral/objective, news contexts are the key to distinguishing them. The following distinguishes internal from external bases. Internal basis of proposition comprises: (1) perception (sensory perception, mental perception), (2) “showing”, and (3) obviousness. External basis of proposition comprises: (1) general knowledge and (2) proof. Complying with this criterion, evidential markers are identified by internal and external bases of proposition from corpus. Examples are as listed in Table 4.5. For full lists, please refer to Appendix C.

Table 4.5: Examples of evidential markers with internal/external bases of proposition

Basis of proposition	Category		English marker	Chinese marker
Internal bases	Perception	Sensory	Look, hear, watch	看(kan, look) 听说(tingshuo, heard)
		Mental	Seem, believe, feel/felt	似乎(sihu, seem)

		Modal verbs (may, can, could, have to, might, must, ought to, shall...)	可能(keneng, may)
	“Showing”	Reveal, show, confirm, emerge, indicate, sign, claim, suggest, argue, assert, claim, state	发现(faxian, find) 认为(renwei, think) 揭示(jieshi, reveal) 提出(tichu, propose)
	Obviousness	Clear/clearly Obvious/ obviously Plain/ plainly Sure/ surely Certain/ certainly Natural/ naturally	显然(xianran, obvious) 确实(queshi, indeed) 当然(dangran, sure)
External bases	General knowledge	Famously/infamously, oddly	众所周知 (zhongsuo zhouzhi, well-known)
	Proof	Prove/proving/proved Reported Proof	根据 (genju, according to) 证明(zhengming, prove)

As already noted, the category "general knowledge" designates the marked content that is considered external knowledge and background shared by journalists and the target audience. Another category of “proof” indicates that the marked content is based on a kind of hard proof (instead of general knowledge). It is commonly the result of professional and rigorous investigation, test or experiment. Corpus-assisted analysis of external bases is conducted to look into contexts for the purpose of distinguishing “self” and “other” sources of proposition.

Information evidentiality has been identified and illustrated as the core concept of this section. The objectiveness of evidentiality is determined by sources and bases of proposition. While different combinations form subjective, neutral and objective evidentiality, the judgments should take news contexts into account. The next two sections present the identifications and analyses of evidentiality in AusCorp and ChnCorp. Afterwards, the quantitative results are interpreted with examples taken from the ACHS Corpora, and AusCorp and ChnCorp are compared.

4.3 Information evidentiality construction in AusCorp

Evidentiality is applied to different degrees of personal involvement of journalists or authors in news reports. Whereas explicit involvement, as conceptualized in this chapter, contributes to subjective information evidentiality, implicit involvement results in objective information evidentiality, with neutral information evidentiality is a construct between them. The key devices to distinguish them, based on the operationalization, are sources of proposition and bases of proposition. For evidentiality constructed on external bases, others take responsibility for the information, while for internal bases, the author him/herself takes direct responsibility. Meanwhile, sources of proposition also determine the objectiveness of information evidentiality. The correlations between them have been noted in section 4.2.4. In consistency with this benchmark, this section analyzes and discusses the construction of subjective, neutral, and objective evidentiality in AusCorp. The results contribute to the overall depiction of information evidentiality construction as an important part of news formats to package and deliver news messages in a persuasive and convincing manner.

4.3.1 Subjective evidentiality

As suggested by Formula 1:

$$\text{Subjective Evidentiality} = \text{Self Source} + \text{Internal Basis}$$

Subjectivity is the combination of a “self” source and “internal” basis. If an evidential marker is based on an “internal” proposition, it is then conceptualized as a marker of subjective evidentiality. Four subclasses of internal bases are identified, each corresponds to a set of evidential markers. As Table 4.5 presents, these four subclasses contribute to four types of subjective evidentiality: (1) sensory perception evidentiality, (2) mental perception evidentiality, (3) “showing” evidentiality, and (4) obviousness evidentiality. The common feature of these four types of subjective evidentiality is the explicit involvement of journalists' voices and judgments in evidentiality construction which render subjectivity. A journalist's

sensory and mental perception is a result of his or her experiences, whereas "showing" and obviousness are a reflection of their judgements.

A mixture of subjective voices and opinions are prevalent in news coverage supporting the communicative purposes and interactions between news texts and audiences. For example, sensory evidential markers provide unbiased evidence (such as factual observations) to enable news audiences to experience events as their own, while "showing" evidential markers comprise evaluative opinion or commentary of journalists and are based on second-hand information. Obviousness evidentiality indicates communal knowledge background is marked in news texts to resonate with audiences.

Table 4.6 presents the subjective evidential markers (lemmatized) identified for each of the four categories from AusCorp, and their raw word frequencies as well as their percentage frequency in AusCorp (%). The frequency (freq.) of evidential markers (lemma) is statistically analyzed to comprise a set of derivative words. For example, the lemma LOOK comprises four words: "look", "looks", "looked", and "looking". To simplify the expression, only lemmas (in uppercase) are shown in the table. While not exhaustive, Table 4.6 includes commonly occurring subjective evidential markers from AusCorp of health news coverage. Raw frequency refers to the number of instances of occurrence, while frequency in corpus (‰) indicates the occurring frequencies of each individual marker within the entire corpus data, and measured by permillage (one over a thousand).

Table 4.6: Category and frequency of subjective information evidentiality in AusCorp

Category	Evidential marker (lemma)	Raw freq.	Freq. in AusCorp (‰)
Sensory perception evidentiality	SEE	3999	0.21
	LOOK	2759	0.14
	WATCH	778	0.04
Mental perception evidentiality	SEEM	965	0.05
	APPEAR	749	0.04
	AWARE	625	0.03
	BELIEVE	1213	0.06

	FEEL	2154	0.11
	THINK	2911	0.15
	PERHAPS	247	0.01
	PROBABLE	673	0.03
	POSSIBLE	931	0.05
	Modal		
	CAN	19781	1.04
	verbs		
	COULD	3443	0.18
	MAY	4405	0.23
	MIGHT	1456	0.08
	MUST	1071	0.06
	SHALL	122	0.006
	SHOULD	4286	0.22
	WILL	7526	0.39
	WOULD	4479	0.23
“Showing” evidentiality	SHOW	3307	0.17
	REVEAL	665	0.03
	EMERGE	209	0.01
	INDICATE	446	0.02
	DISPLAY	134	0.007
	DEMONSTRATE	131	0.006
	STATE	1364	0.07
	MEAN	2247	0.12
	ARGUE	244	0.01
	ASSERT	30	0.002
	CLAIM	1724	0.09
	NOTE	638	0.03
	PROPOSE	369	0.02
	SUGGEST	1431	0.07
Obviousness evidentiality	OBVIOUS	247	0.01
	CLEAR	908	0.05
	PLAIN	404	0.02
	SURE	6103	0.32
	APPARENT	141	0.007
	INDEED	53	0.003
	CERTAIN	873	0.05
VISIBLE	84	0.004	
Total		86325	4.48

The following sections provide a distributional analysis and in-depth manual elaboration of

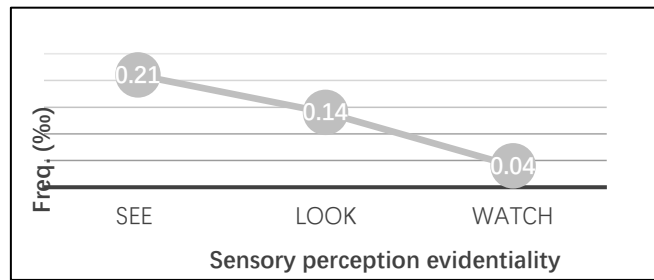
subjective IE construction in AusCorp. As shown in Table 4.6, 43 lemmas of evidential markers are identified as constructing subjective IE in AusCorp, and some atypical and low-frequency markers are omitted. The detailed analyses of the four subclasses, namely sensory perception evidentiality, mental perception evidentiality, “showing” evidentiality, and obviousness evidentiality are presented in the following sections. They are first quantitatively analyzed and then manually interpreted with news texts in AusCorp.

The quantitative distribution of these four subclasses of subjective evidential markers is shown in the following figures. In each figure, the frequencies (%) of each evidential marker in AusCorp are presented in descending order. The horizontal axis is labeled with evidential markers in decreasing frequencies of their presence in corpus from left to right. On the vertical axis, the corresponding percentages plot the occurrence frequency of each individual marker in the whole corpus data (frequency of each marker/total words). Since evidential markers are inherently minor linguistic devices in the whole news articles, the absolute frequencies of them are predictably at low levels. Meanwhile, very few empirical studies have been conducted on the frequency of evidential markers in English or Mandarin Chinese. This part aims to compare the inter-frequencies of four groups of evidential markers in AusCorp and ChnCorp and the intra-frequencies of evidential markers between AusCorp and ChnCorp. The distributional analysis and the representative linguistic evidential markers of each subclass are discussed in more detail in the following sections.

4.3.1.1 Sensory perception evidentiality

Sensory perception evidentiality refers to evidence that is obtained through the senses of sight, hearing, smell, taste, and touch. As sensory perception evidentiality is first-hand, the journalist is directly involved and thus the involvement is very explicit; it is considered a subclass of subjective evidentiality.

Figure 4.2: Frequencies of sensory perception evidentiality in AusCorp



As Figure 4.2 shows, SEE (0.21%) is the most frequent sensory evidential maker, followed by LOOK (0.14%) and WATCH (0.04%). The analyses are focused on the language patterns of lemmas SEE, LOOK, and WATCH as found in the concordances of relevant evidential markers in order to gain a better understanding of the news contexts in which these markers appear. As previously noted, this corpus linguistic tool, WordSmith, is useful for identifying frequent language patterns in large-scale discourse, as well as locating statistically significant or salient words, patterns, or clusters. Salient language patterns surrounding target words (or node words), that is evidential markers, can be examined from the Concordance and Collocates functions in WordSmith (Scott, 2014b). In this regard, the word concordances are examined for derivations of these lemmas via WordSmith and search the AusCorp for selected words (relevant words of the lemmas SEE, LOOK, and WATCH) as node words. As a result, every instance of a node word, with the news contexts in which it occurs, is presented. Figure 4.3 shows an example of the concordance lines when searching for “looks” from AusCorp via WordSmith.

Figure 4.3: Concordance lines of “looks” in AusCorp: A default output

N	Concordance	Set	Tag	Word #	Sent. #	Sent. Para	Para #	H. #	H. Sect	Sect #	Sect Pos
1	burgers, chips and sundaes at the diner. "This looks like heart attack in a paper bag," says Saxelby.	...	S	11,876	682	3	01..5				01..5
2	deceptively simple. "Like France has its omelette, it looks easy but it is difficult to do well." Health : In the	...	S	15,958	885	8	05...7				05...7
3	from a snack-vending machine? Fiona Hudson looks at the choices YOU'RE at work, school or the	...	S	25,863	1..7	4	05..2				05..2
4	of food really keep the doctor away? Pamela Wilson looks at how the food we eat affects our health IT IS	...	S	50,876	3..6	4	03...5				03...5
5	are finding new niches," he says. This snack boom looks like having a long shelf life. In the GBS survey,	...	S	58,554	3..1	5	03..3				03..3
6	may eat her offspring. Does this mean, when mum looks a bit stressed, her kids should run for their	...	S	64,823	4..5	7	04..2				04..2
7	pill, which don't produce sound sleep but ruin your looks and make you feel lethargic. One common	...	S	69,224	4..2	18	03..3				03..3
8	of water, but kids hate the stuff because they think it looks and tastes like sawdust. Child-health expert Dr	...	S	83,909	5..0	23	03..8				03..8
9	go straight to our waists. PATRICK McDONALD looks at ways to maintain a sensible balance over	...	S	85,573	5..2	4	05..2				05..2
10	may eat her offspring. Does this mean, when mum looks a bit stressed her kids should run for their	...	S	89,161	5..6	7	03..0				03..0
11	Gibbons. Packaging is important for children; if it looks appealing, they will be more likely to eat it. A	...	S	94,241	5..0	9	04..0				04..0
12	and milkbars all offer junk food, and it always looks so good to eat in those television ads. But	...	S	94,744	5..6	20	04...3				04...3
13	growing taller. And much, much fatter. MICK Fahey looks at photos of his father and his grandfather.	...	S	101,073	5..4	4	0 1...				0 1...
14	all of them. After one man's visit, he said ruefully, "It looks like the pie and sauce is just a memory for us	...	S	114,983	5..9	10	0 1...				0 1...
15	. She is obviously doing a lot of things right, and looks better than she ever has in the 10 years I've	...	S	126,470	7..0	12	0 1...				0 1...
16	your health outlook for 2000 and beyond, and looks particularly at the prospects for those born	...	S	128,587	7..2	16	0 1...				0 1...
17	MARINE LE GUERANDAIS. This French salt looks like finely crumbled beige sand, tastes	...	S	149,811	7..7	5	0 1...				0 1...
18	, but it can be slowed. This first in a two-part series looks at ways to help you stay younger longer	...	S	169,648	8..0	8	0 1...				0 1...
19	, living with stress and not smoking. The book also looks at ways of preventing the problems that come	...	S	169,770	8..8	5	0 1...				0 1...
20	assistant will think you're a nutcase. The strange looks they give you might make you stop and think	...	S	173,860	9..2	4	0 1...				0 1...
21	new products on shelves quickly. The Body Shop looks at areas and products others in the cosmetics	...	S	180,689	9..0	5	0 1...				0 1...
22	S	180,728	9..3	12	0 1...				0 1...

Following that, the Patterns function is applied to show the span of multiple words (five at most) that are frequently collocated with the node word on either side. The salient language patterns of sensory perception evidential markers in AusCorp are categorized and summarized, as shown in Table 4.7. L1/R1 (Left/Right 1) denotes the word one place left or right of the node word. L2/ R2 denotes the word two places to the left/right, and so on. Words to the left and right can be sorted to reveal frequent linguistic patterns of a node word.

Since the node words are verbs related to sensory perceptions, the left patterns typically reveal information related to subjects of verbs, for example, agents of action, or agents responsible for sensory evidential markers. Whereas the right patterns of these node words normally reveal objects of actions or issues of discussion. In this sense, the left and right patterns are further categorized into two groups, namely “people” and “other”. In order to understand better the language patterns of sensory perception evidential markers, words related to people are classified as "people" and other words are classified as "other".

Table 4.7: Language patterns of derivative words of SEE, LOOK, and WATCH
in AusCorp

Sensory evidential markers	Left patterns	Right patterns	
See	People	L1-Children, we’ll, you’ll, people L2-people L3-people	R1-their, people, someone R2-doctor, people, dietitian R3-their
	Other	L1-Would, can’t, could, don’t, should, often L2-expect, wanted, likely, could L3-would, don’t, foods	R1-whether, which R2-right, eating, difference R3-health, could
Sees	None		
Saw	None		
Seen	People	L1-we’ve	None
	Other	L1-seen, often seen, never seen, haven’t seen	

Seeing	People	L1-we're	None
	Other	None	
Look	People	L1-people L2-people	R2-their
	Other	L1-should, don't, always, closer, would	R1-after, forward, younger, better, around R2-products, other R3-health, heart, great, other, foods
Looks	None		
Looked	People	L1-researchers	None
	Other	None	R1-after
Looking	People	L1-you're, we're L2-people	R2-their
	Other	L1-start, always L2-should	R1-after, forward
Watch	People	L1-children	R1-their
	Other	None	R2-weight R3-intake
Watches	None		
Watched	None		
Watching	People	L1-you're L2-children	R1-their
	Other	L1-while	R1-television R2-weight

To summarize the results shown in Table 4.7, the frequently occurring words related to people in AusCorp are: “people”, “children”, “researchers”, “doctor”, “dietitian”, “we”, “you”, and “their”. Below are the concordance lines for both people and sensory evidential markers (in bold).

- (1) Instead, it is the macronutrients in our foods, such as fat and salt, which are linked to the major health problems **we see** in Australia today.
- (2) Before dropping food groups, go and **see a dietitian** who can supervise an elimination diet.
- (3) When a man first discovers he has high blood pressure, he needs to **see a doctor**.
- (4) Where they intersect is the price per kilo, so **people can see** for themselves which products

are better value.

(5) **I look at** how we can incorporate their favorite little bits and pieces, either in a modified form such as lower in fat or it just might be a smaller volume of it.

(6) **He watches** everything I do and he knows he's the taste tester.

(Excerpts from the AusCorp)

In Example (1) to (6), it can be seen that these sensory markers are usually not used as indicating sensory perceptions, such as “see a doctor”. A few examples, however, used SEE, LOOK, and WATCH as sensory evidentiality markers. Based on the findings of the construction of sensory perception evidentiality, as a subclass of subjective evidentiality, it was found that visual perception is the most commonly used perception in news reports, compared to auditory and other perceptions. Sensory perception evidentiality is effectively used to construct IE (Cornillie & Gras, 2015) which brings the journalists’ first-hand and direct feelings to audiences. Nevertheless, a close manual examination of the news corpus indicates that most cases do not present sensory evidence, and sensory perception evidence is rarely found in AusCorp. This indicates that sensory perception evidentiality is very limited in AusCorp of health news coverage.

4.3.1.2 Mental perception evidentiality

Mental perception evidentiality and sensory perception evidentiality are two highly correlated concepts. An utterance concerning subjective evidence can be marked as being saw/watched/looked/heard by an “experiencer”, or being felt/thought by a “senser”. In many cases, mental perception gradually evolves into sensory perception, and the predominant distinction between them can be explained (Bednarek, 2006). Sensory and mental perceptions serve different, but both critical, communicative functions in health news discourse. Journalists’ mental experiences and evaluations of a health event or issue play an influential role in constructing information evidentiality in news discourse. As conceptualized, mental perception evidentiality comprises two types, one type is the words associated with the mental evaluations

and judgments of a “senser”, for example, SEEM and BELIEVE. Another type is modal verbs which reflect the judgments and definitions of the possibilities or impossibilities of actions on the basis of knowledge, for example, CAN and COULD.

Figure 4.4: Frequencies of mental perception evidentiality in AusCorp

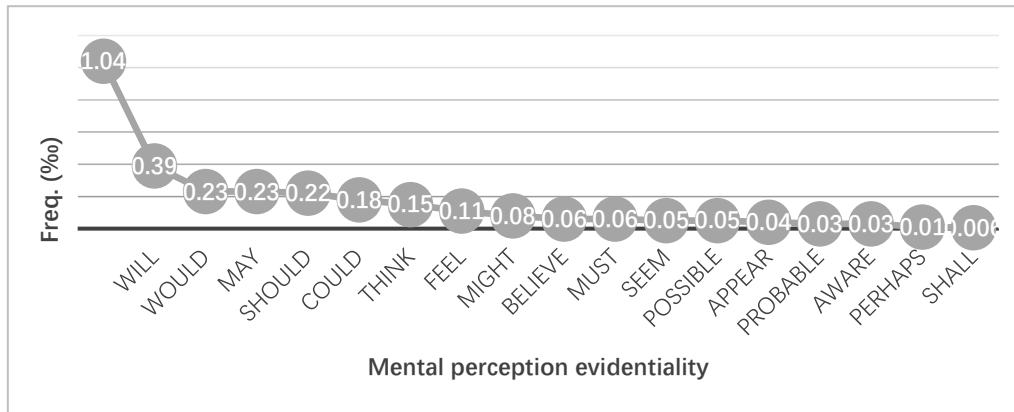


Figure 4.4 shows the frequencies of mental perception evidential markers occur in AusCorp in a descending order. CAN (1.04‰) is the most frequent evidential marker in the subclass of mental perception evidentiality, followed by WILL (0.39‰), WOULD (0.23‰) and MAY (0.23‰). Similar to the analysis procedures of sensory perception evidential markers in section 4.3.1.1, the Concord function of WordSmith is applied to look into the news contexts in which these evidential markers appear. Figure 4.5 presents an example of WordSmith default output of the concordance lines of “can” in AusCorp.

Figure 4.5: Concordance lines of “can” in AusCorp: A default output

N	Concordance	Set	Tag	Word #	Sent. #	Sent. Pos.	Para. #	Para. Pos.	H. #	H. Pos.	Sect. #	Sect. Pos.
1	is a problem because prolonged high blood pressure can lead to heart disease, strokes, kidney disorders	...		1,218	67	11	01...7					01...7
2	reading was 155/100. But blood pressure can fluctuate and his may have increased because it	...		1,391	79	5	01...0					01...0
3	and says 75 per cent of men with hypertension can reduce their blood pressure with exercise. Four	...		1,483	83	21	01...2					01...2
4	the severity of the problem, there are three ways it can be handled. First, the man can try modifying his	...		1,664	92	14	01...3					01...3
5	are three ways it can be handled. First, the man can try modifying his lifestyle. If this works, he has to	...		1,670	93	5	01...9					01...9
6	. This is a lifetime commitment to medication that can have side effects. The third option is to modify	...		1,707	96	10	01...6					01...6
7	lifestyle and use low-dose medication. Losing weight can make a significant impact on blood pressure.	...		1,724	98	4	01...3					01...3
8	. Jennings says that for every kilogram lost, a man can expect his average blood pressure to fall by two	...		1,741	99	11	01...0					01...0
9	. "But really, armed with a little knowledge, you can tell a lot without the book." WHAT'S IN A NAME	...		2,513	139	10	02...2					02...2
10	. Wholegrain, Wholemeal, Rolled oats. SOY CAN BE SO GOOD FOR YOU. THE whole family -	...		2,597	141	3	02...6					02...6
11	FOR YOU. THE whole family - not just women - can benefit by including soy in their diet, according to	...		2,611	142	10	02...0					02...0
12	. Studies show a daily intake of 47 grams of soy can lower total cholesterol in women and men by up	...		2,632	143	12	02...1					02...1
13	high-fibre diets protect against many illnesses. "Fibre can reduce the risk of heart disease by controlling	...		2,975	163	3	02...4					02...4
14	risk factors such as high cholesterol and obesity and can help manage diabetes by slowing the rate at	...		2,993	163	21	02...2					02...2
15	rate at which sugar is absorbed," she says. "Fibre can normalise bowel functioning, preventing bowel	...		3,009	164	3	03...8					03...8

For mental perception evidentiality, the most frequent modal verbs: CAN (1.04‰) and WILL

(0.39%); and non-modal verbs: THINK (0.15%) and FEEL (0.11%), are further investigated closely. In modern modal logic, modal verbs concerning epistemic modality or knowledge modality generally express the possibilities/impossibilities or certainty/uncertainty of an action being realized on the basis of knowledge. For example, MUST and MAY are modal verbs with different levels of certainty and define different degrees of realization of an action. CAN and WILL are two evidential markers, defined as modal verbs with high possibility and certainty, with high frequencies in AusCorp. CAN indicates high certainty, definitive claim and decisiveness, while WILL indicates high possibility of happening. An assertive sentence with CAN or WILL expresses a high possibility of an action to be realized by its agent, while in a negative sentence, CAN or WILL expresses a high possibility of not realization.

To examine the news contexts of CAN or WILL, their concordances in AusCorp are investigated. For a comprehensive examination of language expressions of evidentiality, a pattern or cluster analysis is necessary. Due to the relatively high frequencies of CAN and WILL in AusCorp, clusters are identified showing the words “repeatedly together in each other’s company, in sequence” (Scott, 2014b, p. 426). In clusters, three words including the selected word, represent more salient and stable language expressions in AusCorp than indicated by Patterns, and thus render a convincing result. The most common clusters identified for CAN and WILL in AusCorp are summarized in Table 4.8 in a descending order of frequency.

Table 4.8: The most frequent clusters of CAN and WILL in AusCorp

Rank	CAN	Freq.	WILL	Freq.
1	Can lead to	314	It will be	127
2	It can be	242	There will be	89
3	Can be a	184	Will have to	82
4	You can do	149	Will be able	70
5	That can be	140	Will have a	66
6	Can also be	126	And you will	59
7	So you can	108	Will need to	57
8	Can be used	105	Will not be	55
9	And can be	104	Will help you	55
10	Which can be	104	They will be	54

The frequently occurring clusters of CAN and WILL in Table 4.8 are mostly presented in a positive context. Since modal verbs indicate the possibility or certainty of associated actions, the verbs accompanying CAN and WILL are a focus for examination. These verbs are: lead to, be, do, use, have to, able (to), have, need, and help. In order to gain a deeper understanding of modal verb usage in news texts, the concordance lines containing common clusters (in bold fonts), particularly those with notional verbs, are examined with examples, as shown below.

- (1) Dehydration **can lead to** headaches, fatigue and an inability to concentrate.
- (2) It's particularly good for soothing inflammation in the body and **can be used** either externally or internally.
- (3) Children will not have to worry about unnecessary wrappings in their lunch box, they **will be able** to eat their food wraps.

(Excerpts from the AusCorp)

Examples (1) to (3) are concordances that discuss health issues in AusCorp. With health-related recommendations proposed in news texts, it is found that associated actions and suggestions are usually accompanied with an attitude of high certainty and possibility.

The next analysis is of two non-modal verbs with high frequencies, i.e., THINK (0.15%) and FEEL (0.11%), suggest the mental perception and evaluation of author-self in constructing subjective evidentiality. A similar analysis procedure (from Concordance to Patterns or Clusters) is adopted to analyze the frequent collocates of the derivative evidential markers of these two lemmas. After searching these node words in AusCorp, the frequent surrounding words are sorted into left and right patterns and categorized into groups of 'people' and 'other', as in Table 4.9.

Table 4.9: Language patterns of derivatives of lemmas THINK and FEEL in AusCorp

Node word	Left pattern	Right pattern
THINK		

Think	People	L1-people, parents L2-people L3-people	R1-people, you're, their, they're R2- people
	Other	L1-don't, might, would, didn't, really, often L2-because L3-healthy L4-health	R1-about, twice, again, there, that's R2-should, about, healthy, could, would, eating, before R3-doing, about R4-healthy, right, would, because R5-would, right, which
Thinks	None		
Thought	People	None	None
	Other	L1-previously	R1-about R2-would R3-going
Thinking	People	None	None
	Other	L1-start L2-fooled L4-could	R1-about
FEEL			
Feel	People	L1-people, women, you'll L2-people	None
	Other	L1-don't, doesn't, mouth, might, often L2-makes, making, start L4-because	R1-better, great, guilty, tired, satisfied, unwell, fuller, stressed, hungry, about, quite, thirsty R2-about, though, little R3-better, longer, about
Feels	None		
Felt	People	None	None
	Other	None	R1-better
Feeling	People	L1-you're	None
	Other	L1-without L2-leave L4-which	R1-tired, great R2-fullness R3-longer

The linguistic patterns of THINK and FEEL in AusCorp indicate that frequently occurring words related to people are: (1) Left patterns: people, parents, women, you; (2) Right patterns: people, you, they. To gain a deeper understanding, news texts containing THINK or FEEL and ‘people’ words are extracted for a close investigation. The examples are shown below.

(1) A lot of **people think** nutrition is less important as we age. It's not. A healthy diet is vital from go to whoa.

(2) Many **people think** advertising is damaging for children.

(3) Many **parents thinking** they're following correct advice are inadvertently feeding their kids five times the WHO recommendations.

(4) A good calcium supplement has been shown to make **people feel** better in 60 to 70 per cent of cases.

(5) She said while the burger exceeded the recommended daily fat intake for an adult man of 50g to 60g, its low-fibre content meant it would leave **people feeling** hungry again after a short time.

(6) Often **women feel** it is more difficult to continue or they think they should stop exercising, but maintaining exercise is better in the longer term.

(Excerpts from the AusCorp)

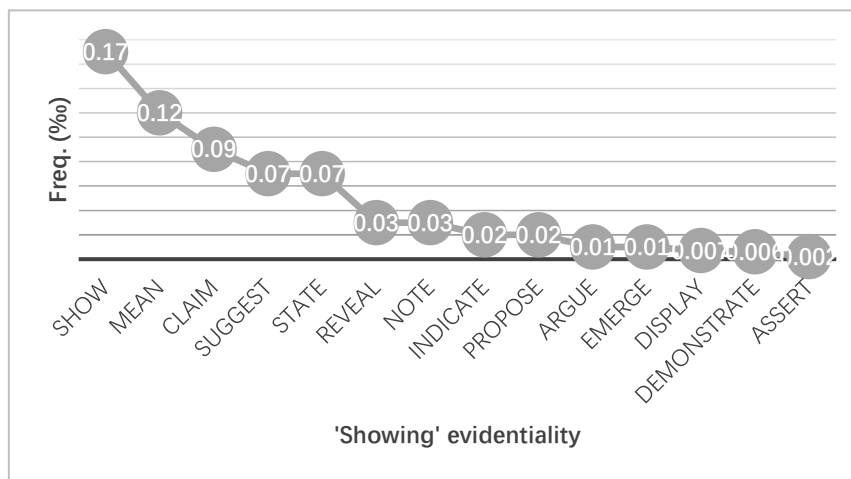
Examples (1) to (6) present the agents “people”, “parents”, and “women” with mental perception evidential markers THINK and FEEL. Health recommendations are proposed from the aspects of dietary habits and food nutrition. Meanwhile, these examples indicate an emphasis on children's and women's health.

In summary, several findings are presented in relation to the construction of mental perception evidentiality in AusCorp. First, modal verbs CAN and WILL, and non-modal verbs THINK and FEEL are frequently used subjective evidential markers. Second, CAN and WILL indicate an attitude of high possibility with certainty frequently expressed. Third, examination of the linguistic patterns reveals a concern for children's and women's health in AusCorp.

4.3.1.3 “Showing” evidentiality

Sensory and mental perception evidentiality differs from 'showing' evidentiality in how they are constructed. Sensory and mental perception are based on first-hand sensory and mental experiences, whereas “showing” evidentiality is based on the integration of journalists’ knowledge bank with sensory and mental perceptions. “Showing” evidentiality is critical in evidentiality construction in news texts to indicate journalists’ subjective evaluations and judgments of certain issues or events. 14 lemmas are identified to be “showing” evidential markers from AusCorp.

Figure 4.6: Frequencies of “showing” evidentiality in AusCorp



The frequencies of each lemma after statistical analysis, are arranged in a descending order from left to right. As Figure 4.6 shows, the most frequent three “showing” evidential markers are SHOW (0.17‰), MEAN (0.12‰), and CLAIM (0.09‰). Following a “Concordance to Pattern” analysis approach, WordSmith is applied to examine the news contexts in which the derivatives of lemmas appear. Figure 4.7 presents an example of WordSmith default output of the concordance lines of “show” in AusCorp.

Figure 4.7: Concordance lines of “show” in AusCorp: A default output

N	Concordance	Set	Tag	Word #	Sent. #	Para #	Para #	H. #	H. #	Sect #	Sect #
				# Pos	# Pos	# Pos	# Pos	# Pos	# Pos	# Pos	# Pos
1	up to 5 per cent of Australian children under 18 show some degree of hyperactivity and that boys			33,1702...	1	15	03..9				03...9
2	Australian Journal of Nutrition and Dietetics in 1995, show that 22% of an adult's energy comes from			1,1...8433...	3	23	04..2				04...2
3	Australian Institute of Health and Welfare, from 1999, show some 338,000 Australians have suffered brain			1,1...8114...	0	13	04..0				04...0
4	Control and Prevention Fact Book 2000/2001 show that one in every 10 adolescents is overweight			306,2677...	8	14	0 3...				0 3...
5	could be severe. Don't take the risk. 63. SHOW WILL POWER Dying without a will can leave			1,3...5445...	3	3	0 3...				0 3...
6	option not the expensive choice." PAGES 76-77: Show results FATTY FOOD AT THE SHOW Item			909,2180...	6	4	0 2...				0 2...
7	types wolfing down their mains before taking in a show at the nearby Sydney Theatre Company. Not			1,6...1822...	4	17	0 2...				0 2...
8	and fat. No one should eat the entire contents of a show bag in one day. Sisters Kristina, 24, and			2,2...8977...	2	11	0 1...				0 1...
9	and a Berocca. I don't want to eat too much before a show, but need sustained energy. 10:30pm: A glass			2,7...8122...	3	10	0 3...				0 3...
10	information among this demographic. "We made a show like this one because we realised there was			2,7...0413...	6	11	0 3...				0 3...
11	. Swamped by bad publicity, the chains made a show of mending their ways - salads appeared on			779,4284...	1	5	01...0				01...0
12	are dead, but the TV channels are all putting on a show of happiness. "Do the news people have no			2,2...3063...	6	10	0 1...				0 1...
13	up to work naked. Twice a week Lyons hosts a show on community radio station 3WBC 94.1 FM,			343,2723...	9	16	0 3...				0 3...
14	and, come to think of it, when Grey's Anatomy was a show worth watching. Since Grey's Anatomy and			2,8...4291...	5	8	01...5				01...5
15	part of the brain involved in memory formation ac show who progresses faster to disease. They are			1,6...8711...	6	37	0 2...				0 2...
16	can help reverse the damage of years of neglect. ac Show your heart the attention it deserves by ticking			2,8...228 990	28	09..4	09...4				09...4
17	can help reverse the damage of years of neglect. ac Show your heart the attention it deserves by ticking			2,8...4701...	2	17	03...6				03...6
18	age should be raised to 21 was an accidental show of strength. Before he quickly backpedalled,			2,8...788 491	17	05..4	05...4				05...4
19	, which makes Vegemite, the most recent accounts show earnings before interest and tax (EBIT) in			1,5...4765...	5	74	0 1...				0 1...
20				2,0...4822...	3	11	0 2...				0 2...

Further analysis investigates the language patterns of lemmas SHOW, MEAN, and CLAIM. After searching these words as node words via Concord function, the left and right patterns are identified and grouped as shown in Table 4.10. Left patterns usually reveal the agents of the words, while right patterns indicate the content of discussion.

Table 4.10: Language patterns of derivatives of lemmas SHOW, MEAN, and CLAIM in

AusCorp

Node word	Left pattern	Right pattern
SHOW		
Show	L1-studies, figures, statistics, surveys, cooking, results L2-evidence	R1-people R2-children
Shows	L1-research, study, evidence, cooking, which, report, health L2-recent, research, health L3-recent, health	R1-children R2-people, eating
Showed	L1-research, study, results, survey, which L2-study, research, recent L3-recent, journal	R2-people, could
Shown	L2-studies, research, study L3-which, recent	R2-reduce, people, improve R3-blood
showing	L1-research, studies, study L2-research	None
MEAN		
Mean	L1-doesn't, necessarily, could, might, would, always L2-doesn't, which	R1-healthy R2-should

Means	L1-which, usually L2-eating	R1-people, eating, you'll R2-source
Meant	L1-which	None
Meaning	None	
CLAIM		
Claim	L1-health, experts, level L2-health	None
Claims	L1-health, these, nutritional, nutrition, content, level, misleading, nutrient, marketing L2-nutrient, making, level, general, health L3-health, making	R1-about, would, which R2-foods, their R3-labels, products
Claimed	None	
Claiming	None	

For the evidential lemma SHOW, the agents are associated with study, research, and evidence, while “children” and “people” are frequently discussed; for MEAN, health and eating habits are usually discussed; and for CLAIM, nutrition, food label, and health are the frequent topics. Related news texts are selected from AusCorp for further investigation with examples shown below.

- (1) The **research shows** Australian dietary standards recommend men consume a maximum of 20 standard drinks a week.
- (2) The term ‘natural’ did not necessarily **mean** healthy because the food might be loaded with sugar.
- (3) Supermarket-bought pizzas were no better for accurate information, with all four frozen Woolworths Select samples with higher sugar levels than **claimed**.

(Excerpts from the AusCorp)

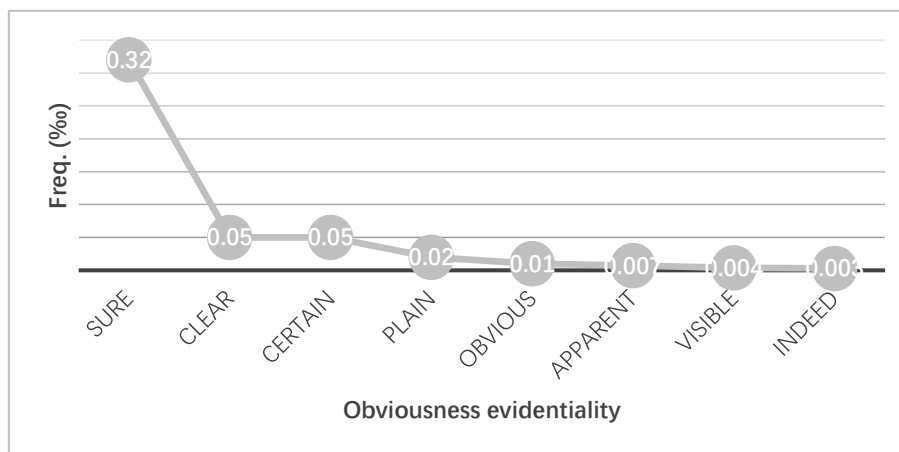
Examples (1) to (3) are concordances containing SHOW, MEAN, or CLAIM and discussing health issues in AusCorp. SHOW and MEAN are frequently used for explanations of health-related topics. To sum up, quantitative and qualitative analysis of the data relevant to subjective IE construction in AusCorp reveal, firstly, that lemmas SHOW, MEAN, and CLAIM are the

most frequently occurring “showing” evidential markers identified in AusCorp. Secondly, examination of the linguistic patterns indicates that these “showing” evidential markers are used for explanations concerning research findings and health topics.

4.3.1.4 Obviousness evidentiality

The category of obviousness evidentiality refers to the kind of evidential markers which mean self-evident, generally acknowledged truth, or not needing evidence. As the judgment of obviousness lies in journalists’ knowledge and internal cognition, therefore it is regarded as contributing to subjective IE construction in news. 8 lemmas are identified as showing obviousness from AusCorp. Figure 4.5 illustrates that SURE (0.32‰) is the most frequent marker indicating obviousness evidentiality, followed by CLEAR (0.05‰), CERTAIN (0.05‰), and so forth.

Figure 4.8: Frequencies of obviousness evidentiality in AusCorp



Subsequently, Concordance and Patterns analysis is conducted for the three lemmas of obviousness evidentiality. Figure 4.9 presents an example of concordance lines for ‘surely’ in AusCorp.

Figure 4.9: Concordance lines of “surely” in AusCorp: A default output

N	Concordance	Set	Tag	Word	#Sent	Sent. # Pos	Para	Para # Pos	H. #	H. Pos	Sect	Sect # Pos
1	be released in the next week or two. surely all are part of something very, very special ...				2,4...	632	501	22	03...	6		03...6
2	much salt as to be endangering our lives? If we are , surely it's a question of educating people who				1,5...	3537	3	5	0	1...		0
3	and have a bit of a nibble before you put it away . Surely , homes are the higher risk environment than				293,6315...	8	2	0	2...			0
4	vested interests will always try to have their way. But surely caring for the disabled should outweigh				2,1...	8624	8	3	07...	2		07...2
5	kids go to school and that they eat something, but surely it has to be desirable that they eat stuff that				3,0...	6512	7	24	0	2...		0
6	and antibiotics not only might taste better but surely it's the route of less harm." Although, as a				1,0...	0555	6	36	0	3...		0
7	an organic, biodynamic and gluten-free diet but surely she must have some dietary weaknesses? "I				971,7493...	5	11	0	2...			0
8	a time (and had a thirst you could photograph), but surely there lay in those piles of discarded betting				1,7...	2695	2	20	0	3...		0
9	just launched ML Denim with his brother Moises. But surely there are more than enough denim labels				522,8819...	2	3	0	1...			0
10	things never asked of her male predecessors, but surely this goes too far?" "One for the oldies," offers				2,0...	2695	9	25	0	3...		0
11	these companies yet they do not appear to care . Surely they should be horrified at the way that some				948,5812...	9	2	0	2...			0
12	does it make how unhealthy it appears to children ? Surely it's the parents having the say on whether it				1,9...	3681	0	2	0	2...		0
13	warning me about the dangers of cholesterol ? Surely some photos of diseased arteries from the				1,7...	5625	2	2	0	3...		0
14	. It would do all of this and reduce our health costs . Surely this is more appealing to families in these				1,1...	7277	3	2	0	1...		0
15	partner keeps sniffing, and it is sending me crazy . Surely it is preventable. A: He most likely had a mild				1,2...	3987	4	2	0	1...		0
16	far too much and we are killing ourselves with drink . Surely excluding people in the young and restless				1,5...	6325	2	2	0	1...		0
17	HE CANNOT HAVE BEEN BORN SO effusive ? Surely he cannot have burst from the womb, his				2,4...	1335	5	2	0	3...		0
18	for the future, especially in children and the elderly ? Surely this is something we need to know. Dr King				1,5...	8427	5	2	0	1...		0
19	recipes, which amuses me, as Japanese food surely is the healthiest imaginable. Low in fat and				1,2...	9151	2	22	0	2...		0
20	but quickly dismissed the thought as unworthy, for surely no government, in these times of crisis, would				1,0...	0847	4	32	0	3...		0

Frequent left and right words surrounding node words, i.e., derivatives of SURE, CLEAR, and CERTAIN, are classified according to the Pattern function of WordSmith, as shown in Table 4.11. Only derivatives related to information evidentiality are included. For example, “clearance” is a derivative of CLEAR, however, it is not an evidential marker and is thus omitted from table.

Table 4.11: Language patterns of derivatives of lemmas SURE, CLEAR, and CERTAIN in

AusCorp

Node word	Left pattern	Right pattern
SURE		
Sure	L1-making	R1-you're, there, their R2-would, getting R3-enough, plenty
Surely	None	
CLEAR		
Clear	L1-steer, isn't L3-there	R1-information R2-between
Clearly	None	R1-labelled
CERTAIN		
Certain	L1-against L2-there	R1-foods, cancers, types, times, nutrients, medications, health R2-conditions
Certainly	L1-almost, would	None

Examples (1) to (3) present concordances containing obviousness evidential markers in AusCorp. Through employing these markers, the author implicitly demonstrates there is no

need for evidence for such factual claims.

(1) A School Breakfast Club program **surely** that has to be worth a go.

(2) It's **clear** what a difference a bit of exercise, wholesome food, time out and an open mind can do for the soul.

(3) We are not seeing as much change as we need, **certainly** to achieve the types of reductions that are going to have a health impact.

(Excerpts from the AusCorp)

Subjective evidentiality construction in AusCorp is summarized in section 4.3.1. The dimension of subjectivity is characterized by the self-access to construct bases of information, with the construal of evidence internal. Subjective evidentiality has been conceptualized as comprising four categories: sensory perception evidentiality (3 lemmas, e.g., SEE and LOOK); mental perception evidentiality (18 lemmas, e.g., CAN and WILL); ‘showing’ evidentiality (14 lemmas, e.g., SHOW and MEAN); and obviousness evidentiality (8 lemmas, e.g., SURE and CLEAR). In total, 43 lemmas have been identified as contributing to subjective evidentiality construction in AusCorp. In the corpus, those frequently occurring in news texts have been closely examined.

Subjectivity, which is omnipresent in the news genre, will not detract from news value. In analyzing the empirical data, the construction of subjective IE is found to have both pros and cons. Subjective evidentiality has obvious limitations. By making personal contributions through sensory or mental perception, “showing” or obviousness assertions, authors formulate their factual claims as having a changeable and weak epistemic basis, which may be easily altered by other experiencers. Subjective evidentiality enables self-access for audiences to evidence and news information, and therefore news texts have a stronger sense of subjectivity which may be challenged by audiences. On the other hand, the strength of subjective evidentiality construction is in the communicative functions brought by subjective voices and evaluations. First, subjective evidential markers support unbiased records of a reported event

which presumably represent first-hand information. By recording factual observations or hearings on the spot and further putting forward commentary and reflections on their own behalf, journalists construct facticity as an important news value. Second, audiences expect to inspect and understand journalist opinions through reading news reports. According to this viewpoint, audiences accept subjectivity by default when reading news reports, i.e., news is processed fact that is close to the truth, but cannot be the truth itself.

4.3.2 Neutral and objective evidentiality

As suggested by Formula 2 and 3:

$$\text{Neutral Evidentiality} = \text{Self Source} + \text{External Basis}$$

$$\text{Objective Evidentiality} = \text{Other Source} + \text{External Basis}$$

As previously conceptualized, two variables (source and basis) jointly determine the objectiveness levels of information evidentiality. Subjective evidentiality is particularly characterized by an internal basis of proposition, while for the dimensions of neutral and objective evidentiality the basis and construal of evidence is external. A common feature of neutral and objective evidentiality construction is that external bases comprise general knowledge and proof. General knowledge refers to the marked content as communal knowledge and background, represented by language expressions such as “famously” and “oddly”. Proof implies the marked content is hard evidence such as research findings. The language expressions could be “as reported”, “according to”, and so forth. Further, different sources of proposition make neutral and objective evidentiality to be distinguishable. A “self” source indicates self-access to evidentiality expression contributes to neutral IE construction, since it is the author-self who interprets general knowledge or proof in news texts. In contrast, an “other” source indicates an other-access makes an IE expression to be objective because it is other people who take responsibility for the factual claim of evidentiality.

First, the common features of neutral and objective evidentiality, language evidential markers, identified as showing external basis from AusCorp, are categorized and illustrated in Table 4.12. Evidential markers listed in Table 4.12 are not meant to be exhaustive and to represent English language. In this table, the markers in upper-case indicate that it is a lemma. For example, PROVE is a lemma of evidential marker indicating its derivatives (i.e. “prove”, “proves”, “proved”, “proven”, “proof”, and “proving”). Some markers with very few instances in the corpus were omitted, for example, “famously” (6 instances), “factual” (9 instances), and “oddly” (10 instances). However, it only covers the common occurrences from AusCorp of health news coverage.

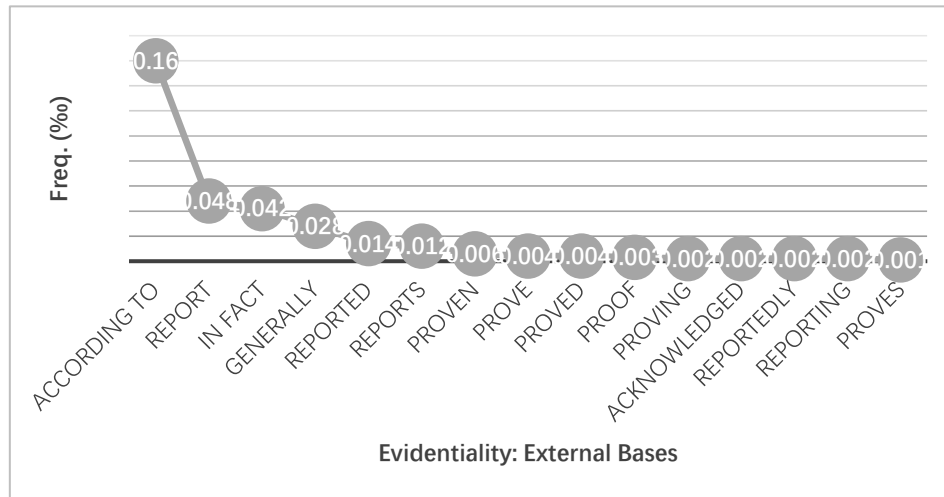
Table 4.12: Category and frequency of external bases of information evidentiality
in AusCorp

Category	Evidential marker	Raw freq.	Freq. in AusCorp (%)	
General knowledge	Acknowledged	38	0.002	
	Generally	529	0.028	
Proof	In fact	398	0.042	
	PROVE	Prove	84	0.004
		Proves	28	0.001
		Proved	79	0.004
		Proven	120	0.006
		Proof	53	0.003
		proving	47	0.002
	REPORT	Report	917	0.048
		Reports	221	0.012
		Reported	261	0.014
		reportedly	35	0.002
		Reporting	34	0.002
		According to	1518	0.16

As a result, 15 English evidential markers are identified to be characterized by external bases. Raw frequency refers to the number of instances in corpus, and frequency in AusCorp (%) indicates the occurrence frequency of each individual markers in the whole corpus data. General knowledge and proof are two categories of external bases, each comprising 2 and 13 evidential markers. Their frequencies are illustrated in Figure 4.10 in descending order. As

shown, “according to” (0.16%) is the most frequent marker indicating external basis of evidentiality, followed by “report” (0.048), “in fact” (0.042) and so forth.

Figure 4.10: Frequencies of evidentiality markers indicating external bases in AusCorp



Linguistic and contextual components are highly interactive in news coverage (Hsieh, 2008), with contextual components very critical to distinguish neutral from objective evidentiality. Because neutral and objective evidentiality have different sources of proposition, with general knowledge, proof, and function as external basis of evidentiality, concordance analysis is conducted for the above 15 evidential markers to investigate the news contexts in which they appear.

The contextual components of external bases are examined with the concordance function facilitated by WordSmith. Sources of these evidential markers are identified by referring to their left or right patterns which are associated with agents of factual claims. If a source is “other”, then the application of a marker is identified as objective evidentiality; whereas, if a source is “self” or not clear, it is deemed as neutral evidentiality.

Table 4.13 provides a summary of the categorization of left and right patterns of these evidential markers. As shown, the applications of three node words have generated salient linguistic patterns in AusCorp, i.e., “generally”, “report”, and “according to”. For other evidential

markers with fewer frequencies, a manual investigation was conducted on news contexts to assess their sources of proposition.

Table 4.13: Language patterns of evidential markers with external basis in AusCorp

Node word	Left pattern	Right pattern
Generally	None	R1-speaking R2-lower
Report	L1-recent, final, health, special, major L2-health, service, recent L3-health, according L4-according, health L5-their, institute	R1-released, found, which, published, shows, states, reveals R2-found R3-Australian, health R4-health, institute, medical R5-found, health, journal
According to	L1-health, foods, obese, disease, years, cancer L2-heart, health, healthy, mental L3-their L4-their, should, those L5-heart	R1-research, their, recent, choice, nutrition, professor, Australian R2-Australian, study, research, Australia, national, survey, report, latest, world, recent, university, heart, health, researchers, experts, expert R3-health, study, report, institute, research, published, Australia, foundation, survey, bureau, Australian, national, recent R4-study, university, Australian, health, survey R5-health, university, study, Australia, statistics, published, medical, nutrition

To summarize, predominant “other” sources which construct objective information evidentiality in AusCorp are (1) statistics or findings released by institutes or universities, and (2) assertion from professors, experts, or researchers. This finding is explained with examples in the news corpus.

If the source of proposition identified from news contexts of an evidential marker is regarded as “self” or not clear, the relevant example is identified as neutral. In contrast, if the source is identified as “other”, then the relevant example is identified as objective. A close investigation of news contexts, suggest that the concordances of each external evidential marker have

undergone a judgment of ‘self’ or ‘other’ source of proposition, the results of which determine the proportions of neutral and objective evidentiality construction. A manual reading, and classification identifies the distributions shown in Table 4.14 below.

Table 4.14: Distributions of neutral and objective evidentiality in AusCorp

Evidential marker	Total freq.	Neutral freq.	Freq. AusCorp (‰)	in Objective freq.	Freq. AusCorp (‰)
Acknowledged	38	8	0.0004	30	0.002
Generally	529	106	0.006	423	0.022
In fact	398	382	0.02	16	0.0008
Prove	84	41	0.002	43	0.002
Proves	28	7	0.0004	21	0.001
Proved	79	34	0.002	45	0.002
Proven	120	69	0.004	51	0.002
Proof	53	43	0.002	10	0.0005
Proving	47	25	0.001	22	0.001
Report	917	129	0.007	788	0.04
Reports	221	36	0.002	185	0.01
Reported	261	78	0.004	183	0.01
Reportedly	35	35	0.002	0	0
Reporting	34	3	0.0002	31	0.002
According to	1518	56	0.003	1462	0.077
Total	4362	1052	0.056	3310	0.172

Evidential markers in different news contexts featured by sources of ‘self’, ‘other’, or not clear are identified as constructing neutral or objective evidentiality. As the distributions show, several evidential markers contribute highly to objective evidentiality construction: ‘‘acknowledged’’, ‘‘generally’’, ‘‘proves’’, ‘‘report’’, ‘‘reports’’, ‘‘reported’’, ‘‘reporting’’, and ‘‘according to’’. Some markers contribute markedly to neutral evidentiality construction, for example, ‘‘in fact’’, ‘‘proof’’, and ‘‘reportedly’’, while other markers show a balanced contribution to both objective and neutral evidentiality construction, such as ‘‘prove’’, ‘‘proved’’, ‘‘proven’’, and ‘‘proving’’. Here, differences are illustrated with several examples from AusCorp:

Proven

(1) Neutral: On a positive note, honey has anti-bacterial qualities which have **proven** helpful

in treating burns and moist wounds.

(2) Objective: Recent studies have **proven** that they can also enhance your health.

According to

(1) Neutral: The doses will be tailored **according to** your needs and your doctor will also teach you how to make adjustments in dosages during times of illness or stress.

(2) Objective: **According to** another survey by AMR: Quantum Harris last year, 31 per cent of adult Australians ate takeaway fast food at least once a week.

In fact

(1) Neutral: **In fact**, an average spread of unsaturated margarine on two slices of toast has about as much saturated fat as two eggs.

(2) Objective: "We know that very strict diets don't work. **In fact**, they can be detrimental to people's health," Kleve says.

Generally

(1) Neutral: Freshly cooked meats, chicken, fish, steamed vegetables or steamed rice are **generally** low in salt.

(2) Objective: Ms Noakes said pasta was a good source of fibre and carbohydrate and **generally** not high in fat.

(Excerpts from the AusCorp)

In summary, news audiences read news texts as a whole rather than understanding each individual evidential marker. In this sense, the identification of evidential markers should be considered within the news context, especially for the judgments of neutral and objective evidentiality. This section reports distributional analyses of neutral and objective evidential markers. Firstly, markers featured by external sources of proposition have been identified; neutral and objective evidential commonly have external sources. Secondly, the Concord function to investigate news contexts further distinguishes neutral or objective evidentiality.

4.3.3 Concluding remarks

Linguistic expressions and contexts both influence the objectiveness levels of evidentiality construction. To sum up, section 4.3 presented the empirical results from the analysis of IE construction in AusCorp from three aspects, i.e., subjective, neutral, and objective, which are shown in Table 4.15. A comparison of three aspects shows that subjective evidential markers (4.48‰) contribute to the most of IE construction in AusCorp, followed by objective evidentials (0.17‰) and neutral evidentials (0.05‰). It can be concluded that the engagement of journalists regarding the discussion on the health impacts of excessive dietary salt-intake is frequent and salient in Australian health news with journalists’ voices and evaluations integrated into health communications.

Table 4.15: Statistical results of subjective, neutral, and objective evidentiality

in AusCorp				
Category	Determinant	Freq. (lemmas)	Component	Total freq. in AusCorp (‰)
Subjective	Self + internal	43	<ul style="list-style-type: none"> ● Sensory perception ● Mental perception ● “Showing” ● Obviousness 	4.48
Neutral	Other + internal	6	<ul style="list-style-type: none"> ● General knowledge ● Proof 	0.05
Objective	Other + external	6	<ul style="list-style-type: none"> ● General knowledge ● Proof 	0.17

4.4 Information evidentiality construction in ChnCorp

This section moves on to the investigation of information evidentiality construction in ChnCorp. In alignment, analyses and discussions are based on the statistical analyses of three aspects of information evidentiality, namely subjective, neutral and objective evidentiality.

4.4.1 Subjective evidentiality

As Formula 1 has suggested:

$$\text{Subjective Evidentiality} = \text{Self Source} + \text{Internal Basis}$$

Journalists are explicitly involved in constructing information evidentiality in news. Four types of internal bases are deemed to contribute to subjective evidentiality, sensory perception, mental perception, “showing”, and obviousness evidentiality. Table 4.16 presents the Chinese evidential markers identified as belonging to each category of subjective evidentiality, accompanied with 拼音 (Chinese Pinyin) and translations. In total, 31 language markers are identified as contributing to subjective evidentiality construction in ChnCorp; some atypical and low-frequency markers are omitted from Table 4.16.

Table 4.16: Category and frequency of subjective information evidentiality
in ChnCorp

Category	Evidential marker	Gloss	Raw freq.	Freq. in ChnCorp (‰)
Sensory perception evidentiality	看到 kandao	see	284	0.03
	看见 kanjian		13	0.001
	听到 tingdao	hear	32	0.003
	听见 tingjian		4	0
Mental perception evidentiality	似乎 sihu	seem	77	0.007
	好像 haoxiang		20	0.001
	好似 haosi		5	0
	显得 xiande	appear	42	0.004
	意识到 yishidao	aware	68	0.006
	相信 xiangxin	believe	116	0.01
	感到 gandao	feel	131	0.01
	认为 renwei	think	1283	0.12
	也许 yexu	perhaps/m	41	0.004
	可能 keneng	ay	1575	0.14
‘Showing’	必须 bixu	must	527	0.05
	应该 yinggai	should	781	0.07
	表明 biaoming	show	414	0.04
	说明 shuoming		219	0.02
	显示 xianshi	reveal	1485	0.14

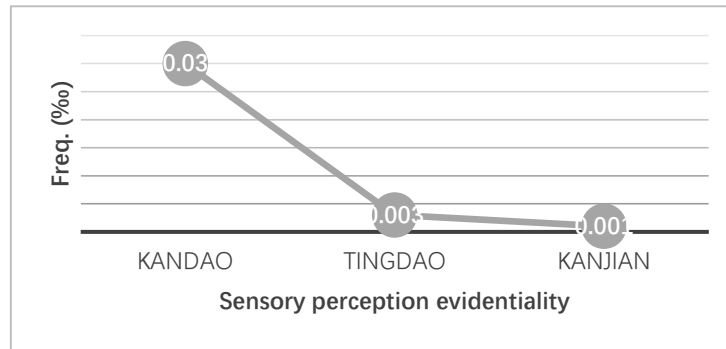
	揭示 jieshi		11	0.001
	提出 tichu	argue	842	0.07
	提议 tiyi	/propose	11	0.001
	展示 zhanshi	demonstra	122	
		te		0.01
	发现 faxian	discover	1650	0.15
Obviousness	显然 xianran	obvious	46	0.004
	显 而 易 见		11	
	xianeryijian			0.001
	确实 queshe	indeed	126	0.01
	肯定 kending	certain	126	0.01
	当然 dangran	sure	161	0.01
Total			10223	0.923

The following sections report the quantitative distributional results and interpretations of each category of subjective evidentiality to depict their characterizations. The frequencies of each marker are arranged in descending order and presented visually in Figures 4.11 to 4.14 with salient evidential markers with high frequency in each category of the corpus news data identified.

4.4.1.1 Sensory perception evidentiality

As previously noted, sensory perception evidentiality refers to the evidence or information acquired through sensory channels, such as visual and auditory perceptions. According to this definition, three sensory perception evidential markers are identified from statistical analysis of ChnCorp data, “看到” (kandao, to see), “看见” (kanjian, to see), and “听到” (tingdao, to hear). Analyses of these markers in the corpus found that “kandao” (0.03‰) occurs most frequently followed by “tingdao” (0.003‰) and “kanjian” (0.001‰). Their frequencies in ChnCorp (‰) are depicted in Figure 4.11 in a descending order.

Figure 4.11: Frequencies of sensory perception evidentiality in ChnCorp



The Concord function of WordSmith was used to detect the news contexts of these markers by applying them as node words. Due to their low frequencies and instable lexical structures of Chinese, no salient language patterns or clusters were found for these sensory perception evidential markers. Therefore, news texts containing these words are extracted from corpus for a close manual investigation. News examples accompanied with Pinyin and translation are shown as follows:

News examples with “**kandao**”:

(1) 记者在北京某大超市看到

Jizhe zai Beijing mou dachaoshi **kandao**

The journalist **saw**... in a big supermarket in Beijing

(2) 记者在市区一些蛋糕房和超市采访时看到

Jizhe zai shiqu yixie dangaofang he chaoshi caifang shi **kandao**

The journalist **saw**... while interviewing in some bakery and supermarket in city

News examples with “**tingdao**”:

(1) 记者随机采访的多位市民听到

Jizhe sui ji caifang de duowei shimin **tingdao**

The journalist **heard from** the many randomly interviewed citizens...

(2) 在听到一些真正有价值的专家建议之后

Zai **tingdao** yixie zhenzheng youjiazhi de zhuanjia jianyi zhihou

After **hearing (zai ting dao)** some really valuable expert’s suggestion

(Excerpts from the ChnCorp)

After examination, the left and right contexts of node words are summarized and categorized to gain further insights into the news discussions, indicate the agents and discussions/topics surrounding evidential markers of “kandao”, “tingdao”, and “kanjian”. The agents of these evidentials and the high frequency topics related to food and health are shown in Table 4.17.

Table 4.17: News context information of sensory perception evidentials

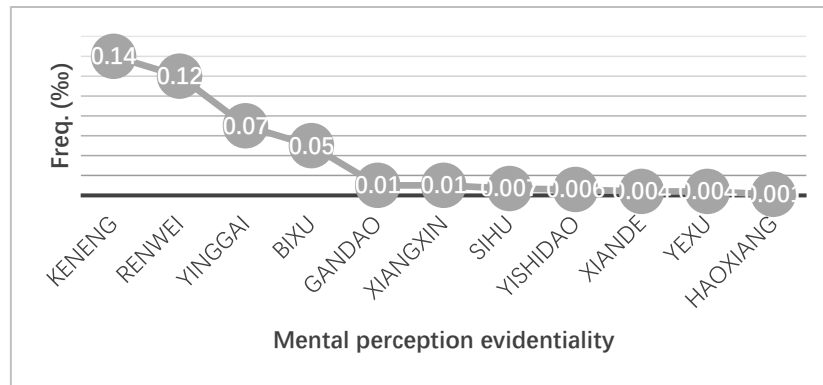
Evidential markers	Agents	Topics
kandao	<p>Occupations: Journalists, inspection groups, doctors, law enforcement officials, merchants</p> <p>People in social relations: People, consumers, citizens, neighborhoods, families, children</p>	<ul style="list-style-type: none"> ● Food manufacturing ● Food sales and retailing ● Food packaging and labelling ● Food regulatory documents
Tingdao	<p>Occupations: Journalists, spokesperson, drivers</p> <p>People in social relations: People, parents, consumers</p>	<ul style="list-style-type: none"> ● Health knowledge and humors
kanjian	<p>Occupations: Journalists</p> <p>People in social relations: Students</p>	<ul style="list-style-type: none"> ● Food sales and retailing ● Food packaging and labelling ● Dietary habits ● Health status

To conclude, first it is found that visual sensory is the most frequently used perception in constructing sensory perception evidentiality in ChnCorp. Second, agents of sensory perception evidentials include journalists, doctors, and people in different social relationships. Third, the topics of sensory perception evidentials are related to food and health.

4.4.1.2 Mental perception evidentiality

Mental perception plays an important role in evidentiality construction in that the author-self mental experiences and evaluations toward some issues reflect the cognition and judgment as a senser or experiencer. By conducting corpus-assisted analysis, 12 Chinese language markers are identified as mental perception evidential markers, with “可能” (keneng, perhaps/may, 0.14‰) the most frequently-occurred marker in ChnCorp, followed by “认为” (renwei, think, 0.12‰), “应该” (yinggai, should, 0.07‰), and so forth. Figure 4.12 shows frequencies of mental perception markers in a descending order.

Figure 4.12: Frequencies of mental perception evidentiality in ChnCorp



When analysing “keneng”, “renwei”, and “yinggai” as node words, no salient language patterns or clusters are identified due to their low frequencies and instable language structures. Therefore, the news context is summarized for further investigation. Table 4.18 below summarizes the news contexts surrounding these mental perception evidentials. More occupations of agents, especially some professional occupations, are associated with these evidentials than with sensory perception evidentials. Discussion topics are macro and overarching health policy and advocacy, and government regulations.

Table 4.18: News context information of mental perception evidentials

Evidential markers	Agents	Topics
keneng	Occupations:	● Dietary habits and

	Journalists, professors, experts, governmental officials, nutritionists, dietitians, researchers, doctors, food manufacturers People in social relations: People, citizens, parents, patients, consumers, children	<ul style="list-style-type: none"> ● structures ● Diseases and treatments ● food packaging and labelling
renwei	Occupations: Journalists, medical experts, epidemiologists, disease control experts, nutritionists, professors, food manufactures, doctors, advisory panels, researchers, government officials, food management, the WHO, chairman, press spokesman, industry insiders, the world bank, traditional Chinese medicine (TCM) doctors People in social relations: People, citizens, pregnant women, parents, students, residents, consumers, interviewees, housewives, respondents	<ul style="list-style-type: none"> ● food packaging and labelling ● health and medical ● Dietary habits and structures ● Health policy and advocacy
yinggai	Occupations: Journalists, doctors, nutritionists, experts, professors, advisory panels, members of Chinese People's Political Consultative Conference, members of legislative council, People in social relations: Citizens, parents, interviewees	<ul style="list-style-type: none"> ● Health and medical ● Dietary habits and structures ● Government regulations related to food

News examples with “**keneng**”:

(1) 北京市成人糖尿病的发病率可能突破 13%

Beijing shi chengren tangniaobing de fabinglv **keneng** tupo 13%

The incidence rate of diabetes for adult in Beijing **may** exceed 13%

(2) 消费者有可能会误堕标签陷阱

Xiaofeizhe you **keneng** hui wuduo biaoqian xianjing

Consumers **may** mistakenly fall into the labelling trap

News examples with “**renwei**”:

(1) 群众认为猪肉是最不让人放心的食品之一

Qunzhong **renwei** zhurou shi zui bu rangren fangxin de shipin zhiyi

People **considered** pork to be one of the least-trustworthy foods

(2) 有 85% 市民认为，政府应该规定预先包装食物附有营养标签

You 85% shimin **renwei**, zhengfu yinggai guiding yuxian baozhuang shiwu fuyou yingyang biaoqian

85% of the citizens **thought** that the government should require nutrition labelling on prepackaged foods

News examples with “**yinggai**”:

(1) 肥胖病人应该了解自己的健康状况

Feipang bingren **yinggai** liaojie ziji de jiankang zhuangkuang

Obese patients **should** be aware of their health status

(2) 家长应该让儿童从婴幼儿时期就养成良好的饮食习惯

Jiazhang **yinggai** rang ertong cong yingyouer shiqi jiu yangcheng lianghao de yinshi xiguan

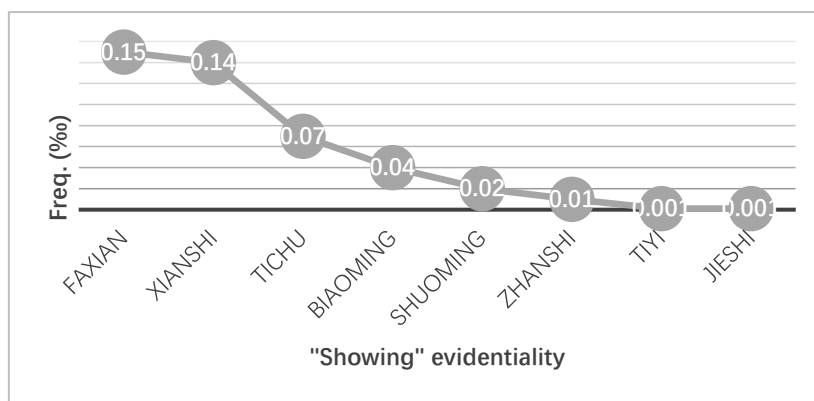
Parents **should** cultivate good dietary habits for children from their infancy

(Excerpts from the ChnCorp)

4.4.1.3 “Showing” evidentiality

‘Showing’ evidentiality in ChnCorp consists of eight language markers, with 发现(faxian, to find, to discover) the most frequent, followed by 显示(xianshi, reveal), 提出(tichu, propose), and so forth, as depicted in Figure 4.13.

Figure 4.13: Frequencies of “showing” evidentiality in ChnCorp



As Table 4.19 shows, more governmental officials are associated with “showing” evidential markers as agents, with the topic of food safety and health mentioned particularly in news texts.

Table 4.19: News context information of “showing” evidentials

Evidential markers	Agents	Topics
faxian	<p>Occupations: Journalists, doctors, scientists, inspection groups, the WHO, experts, professors</p> <p>People in social relations: Consumers, patients, parents, interviewees,</p>	<ul style="list-style-type: none"> ● Diseases and treatments ● Health and medical ● Food manufacturing ● Dietary habits and structures ● Food safety and quality ● Food packaging and labelling
xianshi	<p>Occupations: Journalists, professors, researchers</p> <p>People in social relations:</p>	<ul style="list-style-type: none"> ● Children health ● Food safety and quality ● Diseases and treatments ● Health and medical ● Dietary habits and structures ● Lifestyle and health
tichu	<p>Occupations: Journalists, committee, the WHO, officials, food manufactures, nutritionists, academic, Deputy to the National People’s Congress (NPC), professors, researchers, experts</p> <p>People in social relations: People</p>	<ul style="list-style-type: none"> ● Food safety and quality ● Health and medical ● Dietary habits and structures ● Diseases and treatments

Excerpts of ChnCorp news texts containing “faxian”, “xianshi”, and “tichu” are shown below:

News examples with “**faxian**”:

(1) 记者发现，盐罐子里装的是普普通通的食用盐

Jizhe **faxian**, yanguanzi li zhuangde shi puputongtong de shiyongyan

The journalist **found** that the salt jar was filled with ordinary table salt

(2) 结果发现，五成人有一种或以上的不健康的饮食习惯

Jieguo **faxian**, wucheng ren you yizhong huo yishang de bu jiankang de yinshi xiguan

It is **found** that half of the people have one or more unhealthy dietary habits

News examples with “**xianshi**”:

(1) 一项最新研究显示

Yixiang zuixin yanjiu **xianshi**

A latest research **shows**...

(2) 过往有关盐分的研究显示

Guowang youguan yanfen de yanjiu **xianshi**

Previous research related to salt **shows**...

News examples with “**tichu**”:

(1) 他提出要注意以下几点

Ta **tichu** yao zhuyi yixia jidian

He **suggested** the following points for attention

(2) 绿皮书向公众提出了一系列咨询问题

Lvpishu xiang gongzhong **tichu** le yixilie zixun wenti

The green book **proposed** a series of consultation questions for the public

(Excerpts from the ChnCorp)

4.4.1.4 Obviousness evidentiality

Obviousness evidentiality comprises five language markers in ChnCorp. The most frequent markers are “当然” (dangran, sure), “确实” (queshi, indeed), and “肯定” (kending, certain).

Figure 4.14: Frequencies of obviousness evidentiality in ChnCorp

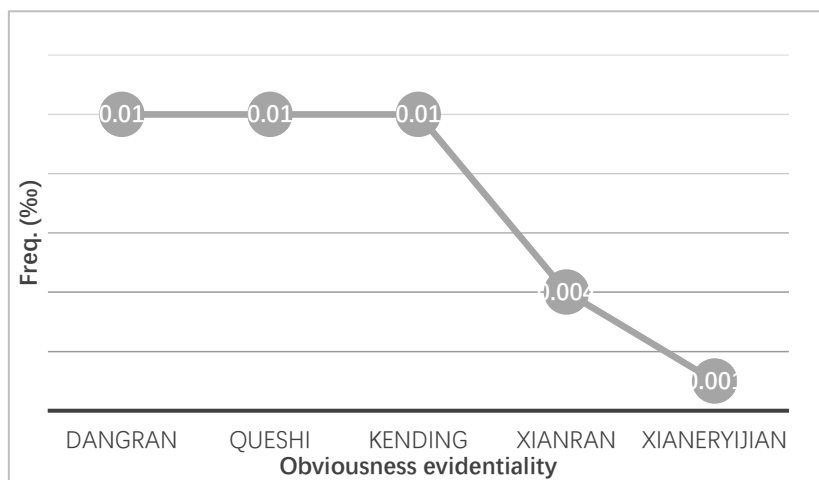


Table 4.20 below shows the news context information of obviousness evidentials. Compared with other three subjective evidentiality, very few agents are associated with these markers of obviousness.

Table 4.20: News context information of obviousness evidentials

Evidential markers	Agents	Topics
dangran	Occupations: Journalists	<ul style="list-style-type: none"> ● Health and medical ● Dietary habits and structures ● Diseases and treatments
queshi	Occupations: Journalists, academics, doctors	<ul style="list-style-type: none"> ● Diseases and treatments ● Health and medical ● Dietary habits and structures ● Food manufacturing
kending	Occupations: Journalists	<ul style="list-style-type: none"> ● Health and medical ● Dietary habits and structures ● Lifestyle and health

News examples with “**dangran**”:

(1)当然糖尿病患者没必要做全素食者

Dangran tangniaobing huanzhe meibiyao zuo quan sushizhe

It is **surely** that diabetics do not have to be vegans

(2)当然数据的得出也与统计口径的差异有一定关系

Dangran shuju de dechu ye yu tongji koujing de chayi you yiding guanxi

It is **surely** that the data is also related to the differences of statistical requirements

News examples with “**queshi**”:

(1)但中国人的寿命确实存在地区差异

Dan zhongguoren de shouming **queshi** cunzai diqu chayi

But there are **indeed** regional differences in life expectancy of Chinese people

(2)食谱与不少慢性病的生成确实息息相关

Shipu yu bushao manxingbing de shengcheng **queshi** xixixiangguan

Diets **do** play a role in the development of many chronic diseases

News examples with “**kending**”:

(1)钠摄入量几乎肯定超标

Na shequliang jihu **kending** chaobiao

Sodium intake is almost **certainly** exceeding the limit

(2)过多的盐肯定对我们的健康不利

Guoduo de yan **kending** dui women de jiankang buli

Too much salt is **certainly** having impact for our health

(Excerpts from the ChnCorp)

4.4.2 Neutral and objective evidentiality

As suggested by Formula 2 and 3:

$$\text{Neutral Evidentiality} = \text{Self Source} + \text{External Basis}$$

$$\text{Objective Evidentiality} = \text{Other Source} + \text{External Basis}$$

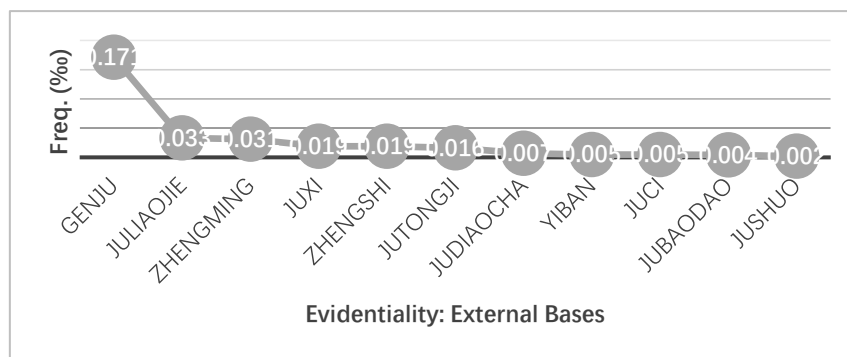
The external basis of proposition is the common feature of neutral and objective evidential markers in a news utterance in this study, although the news context plays an important role in distinguishing them because the source of proposition is determined by the agent of actions. The Chinese evidential markers identified, as formed by external basis, are presented in Table 4.21, annotated with Pinyin and translation. A further examination of their occurrences in news contexts with statistical and qualitative analyses results in grouping into neutral or objective evidentiality.

Table 4.21: Category and frequency of evidential markers formed by external bases
in ChnCorp

Category	Evidential marker	Gloss	Raw freq.	Freq. in ChnCorp (%)
General knowledge	公认 gongren	Acknowledged	1	0
	一般 yiban	Generally	30	0.005
Proof	实际上 shijishang	In fact	5	0
	证明 zhengming	As proved	170	0.031
	证实 zhengshi		102	0.019
	根据 genju	According to	933	0.171
	‘据 x’ 据了解 ju liaojie	It is understood	181	0.033
	‘Ju x’ 据悉 juxi	It is learned	108	0.019
	据说 jushuo	It is said	13	0.002
	据此 juci	Accordingly	28	0.005
	据统计 jutongji	According to statistics	89	0.016
	据调查 judiaocha	According to the survey	39	0.007
据报道 jubaodao	It is reported	20	0.004	

As depicted in the table above, Chinese evidential markers formed by external basis comprise two groups, i.e., general knowledge and proof. General knowledge consists of two markers: “公认” (gongren, acknowledge), and “一般” (yiban, generally), whereas the proof category comprises a larger number of components, four markers and a group of language markers characterized by the structure of “据 x” (ju x, according to x). “Ju x” is a productive Chinese language structure with various collocates. Some typical markers are listed in table, for example, “ju liaojie” means “it is understood”, and “juxi” means “it is learned”.

Figure 4.15: Frequencies of evidential markers formed by external bases in ChnCorp



As illustrated in the figure above, these evidential markers are arranged in descending order as per their frequencies in ChnCorp (‰). “Genju” (0.171‰) is the most frequent marker formed by external basis, followed by “ju liaojie” (0.033‰), “zhengming” (0.031‰) and so forth. “Gongren” and “shiji shang” have low frequencies thus are omitted in the following analysis.

Due to their different sources of proposition, news contexts play an important role in determining whether an evidential marker is neutral or objective. A ‘self’ source contributes to a neutral marker, while an “other” source makes a marker objective. The extracted sentences from news texts, each containing an evidential marker are further judged. If the source of a sentence is identified as “self” or not clear, it is judged to be neutral; if the source is identified as “other”, it is judged to be objective. Through a close manual investigation and analysis, the proportions of neutral/objective evidentiality in ChnCorp are established and reported in the following table.

Table 4.22: Distributions of neutral and objective evidentiality in ChnCorp

Evidential marker	Total freq.	Neutral freq.	Freq. in ChnCorp (%)	Objective freq.	Freq. in ChnCorp (%)
一般 yiban	30	21	0.002	9	0.001
证明 zhengming	170	18	0.002	152	0.016
证实 zhengshi	102	7	0.0007	95	0.01
根据 genju	933	134	0.014	799	0.084
据了解 ju liaojie	181	181	0.028	0	0
据悉 juxi	108	108	0.011	0	0
据说 jushuo	13	13	0.001	0	0
据此 juci	28	28	0.003	0	0
据统计 ju tongji	89	0	0	89	0.014
据调查 ju diaocha	39	0	0	39	0.006
据报道 ju baodao	20	20	0.002	0	0
Total	1713	530	0.065	1183	0.131

The results of the statistical distribution of evidential markers in news contexts are shown in Table 5.22. To sum up, the frequency of neutral evidential markers in ChnCorp is 0.027%, while objective evidential markers show a higher frequency of 0.062%. Markers which indicate objective evidentiality are: (1) “ju liaojie”, (2) “juxi”, (3) “jushuo”, (4) “juci” markers which indicate the neutral evidentiality are: (1) “ju tongji”, (2) “ju diaocha”. Other markers contribute to both objective and neutral evidentiality construction in ChnCorp. Applications of evidential markers as neutral or objective are illustrated with several examples from ChnCorp as follows:

证明(zhengming, as proved)

(1) Neutral: 多年前流行以“反式脂肪”代替“饱和脂肪”，误以为更健康，其后**证明**大错特错。

Duonian qian liuxing yi ‘fanshi zhifang’ daiti ‘baohe zhifang’, wuyiwei geng jiankang, qihou **zhengming** dacuotecuo.

Substituting trans-fat for saturated-fat was popular years ago in the mistaken belief that it was healthier, but it is **proved** to be a big mistake.

(2) Objective: 科学研究和国外管理经验**证明**, 食品营养标签可以指导公众合理选择食品。

Kexue yanjiu he guowai guanli jingyan **zhengming**, shipin yingyang biaoqian keyi zhidao gongzhong heli xuanze shipin.

Scientific research and foreign management experience have **proved** that food nutrition label can guide the public to choose foods reasonably.

根据(genju, according to)

(1) Neutral: 引导市民**根据**自身情况, 选择消费低盐、低脂食品。

Yingdao shimin **genju** zishen qingkuang, xuanze xiaofei diyan, dizhi shipin.

Guide citizens to choose low-salt and low-fat foods **according to** their own conditions.

(2) Objective: **根据**世界卫生组织的统计数字, 全世界 50% 的心血管疾病是高血压引起的。

Genju shijie weisheng zuzhi de tongji shuzi, quanshijie 50% de xinxueguan jibing shi gaoxueya yinqi de.

According to the World Health Organization statistics, 50% of cardiovascular diseases are caused by hypertension worldwide.

(Excerpts from the ChnCorp)

To sum up, this section first identifies Chinese evidential markers formed by external bases, and then distinguishes neutral from objective evidentiality by investigating news contexts. As a result, neutral and objective evidentiality distributions were analyzed and exemplified through news texts.

4.4.3 Concluding remarks

In contrast to the English language, in Chinese there is a lack of fixed and stable word and

syntactic collocations, which makes statistically examining corpora through collocates, clusters or patterns difficult, resulting in a low level of evidential markers. Therefore, evidential markers in news contexts have been analyzed using a flexible manual investigation. To conclude, section 4.4 focused on the evidentiality construction of ChnCorp, which was analyzed from the perspective of subjective, neutral, and objective evidentiality construction. The results of the statistical analyses are shown in Table 4.23. It is apparent that subjective evidential markers (0.923%) contribute most to the IE construction, followed by objective evidentials (0.131%) and neutral evidentials (0.065%). Journalists are predicted to be highly engaged in Chinese health news to communicate the health risks of excessive salt consumption. The comparison and discussion of information evidentiality constructions between AusCorp and ChnCorp are as follows.

Table 4.23: Descriptive statistical analyses of subjective, neutral, and objective evidentiality in ChnCorp

Category	Determinant	Freq. (lemmas)	Component	Total freq. in AusCorp (%)
Subjective	Self + internal	31	<ul style="list-style-type: none"> ● Sensory perception ● Mental perception ● “Showing” ● Obviousness 	0.923
Neutral	Other + internal	9	<ul style="list-style-type: none"> ● General knowledge ● Proof 	0.065
Objective	Other + external	6	<ul style="list-style-type: none"> ● General knowledge ● Proof 	0.131

4.5 Comparison, discussion and summary

In this chapter, a corpus-assisted mixed-method analytical design was employed to explore the expressions and constructions of information evidentiality (IE) in Australian English and Mandarin Chinese health news corpus, respectively. The construction of IE has been examined from three aspects, subjective, neutral and objective evidentiality. As conceptualized, the judgments and evaluations of the objectiveness are determined by sources of proposition and

bases of proposition in an utterance. Therefore, both evidential markers and news contexts are taken into account for the classification of three evidentiality subclasses. This section will compare the IE construction in AusCorp and ChnCorp, followed by a discussion of the results and a summary of findings.

4.5.1 Comparison

Information evidentiality is constructed differently by AusCorp and ChnCorp. The overall distributional contrast is illustrated in Figure 4.16 below revealing the distinction between evidential subclasses. Statistical analysis of evidential subclasses and distributions across two corpora provides the following results.

First, subjective evidentiality is the most frequent subclass, followed by objective and neutral evidentiality in both AusCorp and ChnCorp corpora. The predominance of subjective evidentials in both AusCorp and ChnCorp reflects the marked involvement of journalists' voices when communicating the health impacts of excessive salt consumption in news texts. This results also support the viewpoint that news is the interpretation of information and is based on processed fact (Andersen & Ditonto, 2018; Lodge & Hamill, 1986; Lodge & Stroh 1990).

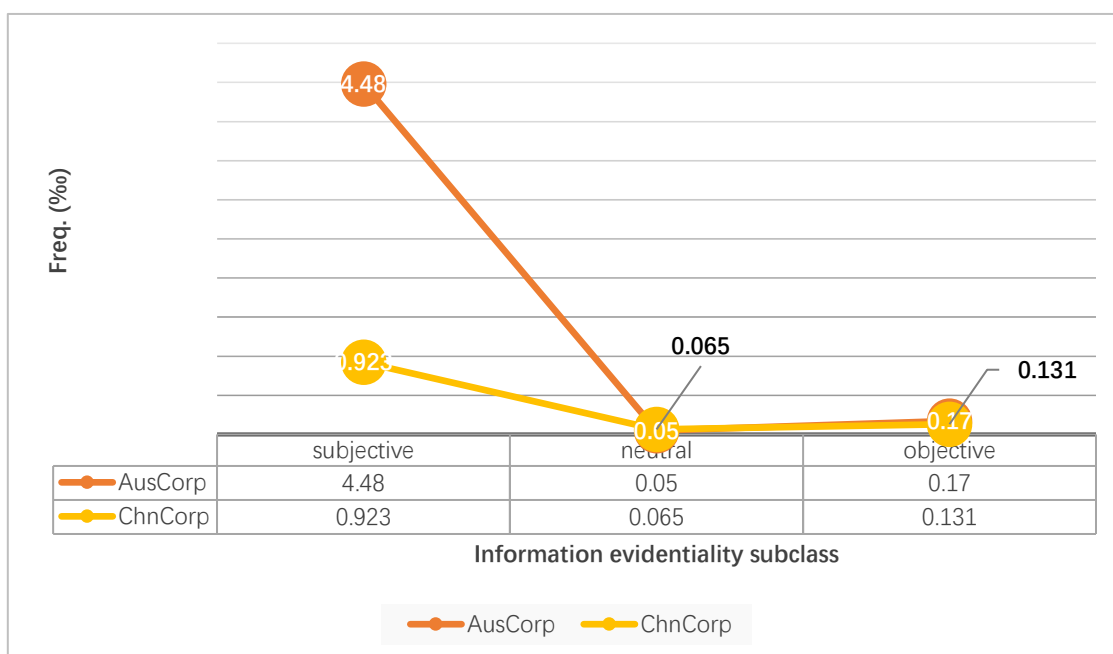
Second, in comparing the frequencies between AusCorp and ChnCorp, it is apparent that the frequency of subjective evidentiality in AusCorp significantly exceeds that of ChnCorp, suggesting that journalists' engagement is more salient in Australian health news. Neutral and objective evidentiality in AusCorp and ChnCorp have similar frequencies which reflect a similar application of these two evidentiality subclasses.

Third, evidential markers in AusCorp have greater variation and a larger distribution than that of ChnCorp. In terms of the collected news data, i.e., news reporting on the topic of excessive salt-intake and health, AusCorp is more persuasive and has better communication skills with

evidence-based opinions expressed in news than ChnCorp.

In conclusion, this chapter argues that journalists' opinions and evaluations make up a substantial portion of both news corpora in comparison to the proportion of neutral and objective evidentiality. The frequency of evidentiality construction, important for constructing health news of persuasiveness, indicates a more frequent application of evidentials in AusCorp. It is critical, therefore, to enhance the awareness of the truth value and expressions of opinions in Chinese health news. A more varied and frequent application of evidentiality should be considered for Chinese health news to be more persuasive.

Figure 4.16: Comparison of frequencies of each evidentiality subclass in AusCorp and ChnCorp



The selection and application of evidential markers is highly functional in news texts. Journalists prefer subjective evidential markers such as mental perception markers when dealing with subjective matters. When it comes to objectivity-oriented matters, neutral and objective evidential markers are preferred to make factual claims. In news communications, the journalist's point of view is integrated with factual allegations, and subjectivity means the journalist's self-expression through linguistic expression. In contrast, objectivity denotes the

use of external sources to make factual claims while journalist involvement is only implicit.

4.5.2 Discussion

Here the importance of the research and the implications suggested by the conduct of empirical news evidentiality analysis are discussed. From an empirical linguistic perspective, this thesis contributes to an improved understanding of the evidentiality construction in news texts. There are implications for conceptual, methodological, and practical aspects as follows. The implications are three-fold.

First, the results of this chapter have significant implications for empirical linguistic research on evidentiality construction. It has implications for ongoing research on health discourse as it provides a path for empirical linguistic analysis of information evidentiality construction, adding to thinking on the role of news in the field of health discourse study. The conceptualization of information evidentiality employs a trichotomy of subjective, neutral and objective evidential markers, mapped onto different subclasses, which has practical implications for empirical research on evidentiality. Second, the chapter has implications for research methodology, since it integrates corpus assisted quantitative analysis and in-depth manual interpretations of information evidentiality construction. The support of a large-scale analysis of evidential markers using corpus linguistic techniques for language analysis, and a granular, as well as detailed analysis of selected texts (subsets from corpus) has generated findings which contribute significantly to this field of research. Lastly, this chapter offers some practical suggestions for health communication. Journalists or health communication professionals are recommended to apply facts in making claims and deploy linguistic sources to ensure news information is more objective and reliable with evidential markers. Furthermore, a wider application of the research findings could be expected in other healthcare provisions and services.

In spite of such implications, this chapter has several limitations. While corpus-assisted

comparative methodology makes a significant contribution to the empirical linguistic analysis of evidentiality, empirical study of evidentiality construction in large-scale language data is inherently challenging. The evidentiality system is complex, and with contexts, other evidential markers, and occasionally extra-contextual elements potential influencing the objectiveness of evidentiality. Due to this, this chapter presents several limitations as follows.

First and foremost, the results and discussion are based on data from the health news corpus used in this research. Since the research is based on relatively small samples of news content, that is news articles reporting on the health impacts of excessive salt consumption, generalization of results is under negotiation and requires verification. Evidential markers found in news corpus cannot represent the exhaustive and systematic evidentiality construction in English or Chinese as a whole. Therefore, the discussion may not be relevant to other text genres, and the concept of evidentiality may need further elaboration and adaptation in other situations. Meanwhile, linguistic presentations of information evidentiality have been evaluated and compared in Australian and Chinese news texts. The findings reported in this chapter may differ from those from other news sources, such as news published in different periods of time and news outlets. Future studies should be sensitive to these factors.

Second, the criterion of evidentiality taxonomy has limitations. Objectiveness is conceptualized as valuable in health news reports; however, future researchers should be aware that this assertion may differ in other domains. In the current research, the distinction drawn between subjective/neutral/objective evidentiality was judged by a researcher based on linguistic expressions and contextual features which may cause bias. Robustness should be enhanced in future studies. It is recommended that future studies design experiments to assess people's attitudes towards a range of news materials with different levels of evidentiality.

Third, the lexical categories of verbs and adverbs for expressing information evidentiality have been used in this chapter because they are functional in constructing evidentiality in both English and Chinese languages. However, other language categories also have the function of

constructing evidentiality. For example, Chinese evidentiality has appeared mainly in the lexical category of auxiliaries (e.g., Li & Thompson, 1983; cited in Hsieh, 2008). While in the English language, interrogations, conditionals, and some specific tense configurations can also express evidence and truth (Verstraete, 2001; cited in Hsieh, 2008). Limitations brought by this reductionist approach applied to information evidentiality analyses will be discussed in the conclusion chapter.

4.5.3 Summary

To conclude, this chapter examined the construction of information evidentiality in Australian and Chinese health news corpora as an effective news format for constructing persuasiveness. The research findings suggest that information evidentiality, with more subjective evidentials, was employed more frequently in news texts of the Australian health news corpus than in the Chinese health news corpus. To summarize, based on the news texts of comparable corpora, it is found that Australian health news seems more persuasive than Chinese health news in reporting on the health impacts of excessive salt-intake. This thesis seeks to complete an analysis of health news communication characteristics. As noted in Chapter 1, information evidentiality is a significant format for health news, and the next chapter will focus on the information relevance of health news discourse.

CHAPTER 5 INFORMATION RELEVANCE CONSTRUCTION IN AUSCORP AND CHNCORP

5.1 Introduction

The health news discourse in this study is conceptualized as a socio-cognitive process that involves three constituencies, namely, sources of information, journalists, and audiences who operate within a shared cultural context, with mass media setting the agenda for public discussion of health issues. The selection and presentation of health information actively contributes to public health issues and influences its audience's perception, intention and even behavior. The sources of information consist of research findings, policies and regulations related to risk events, which may include jargon, technical terms, and formal language. Information about health is difficult to disseminate among the public with limited health literacy because it is not easily readable and is distributed through different media outlets. Mass media campaigns, however, have been evaluated as an effective population-level dietary intervention (Grilli et al., 2002), as media, due to their powerful dissemination of information, are a critical link between health knowledge or information and the general public (Zhao & Lyu, 2021). For sources and the dissemination of information, this study regards information evidentiality and relevance as two critical formats for health news. As noted in Chapter 3, evidentiality and relevance relate to sources and dissemination of health information, and they contribute to the persuasiveness and effectiveness of public health communication. Chapter 4 has dealt with evidentiality which constructs reliable and convincing messages. Throughout this chapter, the importance of information relevance will be discussed as a significant format of health news that packages messages to be appealing and relevant to the public. This chapter conducts analysis between AusCorp and ChnCorp over two decades (from 1995 to 2019), to address the lack of empirical and comparative research in health communication. Additionally, based on empirical linguistic research, it offers recommendations for improving health communication in both countries.

This chapter provides an answer to the Research Question 2, proposed om Chapter 1: How

Australian and Chinese digital news communicate the risks of excessive salt-intake in a culturally relevant way to increase public awareness of the issue? (Chapter 5) This chapter is composed of six sections that analyze the information relevance constructions of the two comparable bilingual health news corpora, AusCorp and ChnCorp, using corpus linguistic approaches. Section 5.1 provides an overview of this chapter. Section 5.2 introduces the conceptualization and operationalization of news information relevance from three aspects, namely, news frames, proximity and personalization. Analytical approaches are described accordingly. Section 5.3 presents the results and discussions of news frame analysis, using novel computational methods and qualitative interpretation. Section 5.4 and 5.5 present the results of proximity and personalization constructions in Australian and Chinese health news corpora. Finally, section 5.6 provides a summary and comparison, and draws a conclusion.

5.2 Conceptualization and operationalization of news information relevance

While audiences are exposed to a plethora of health information, not all will be processed and retained in long-term memory. Relevance is regarded as a factor that determines if information deserves to be processed and stored. In situations where health risks are presented as relevant issues, individuals may experience caution, fear, and awareness, which may lead them to act (Witte & Allen, 2000). Whereas people desire more relevant health information when considering their responses to risks, an irrelevant and confusing health message can lead an audience to discount health messages entirely leading to a “backlash effect” (Patterson et al., 2001). Information relevance, therefore, is a critical issue for health risk communication and, because of its importance in the news format for health communication. This chapter examines the linguistic perspectives of news formats for health communications, and focuses on how relevance is constructed in Australian and Chinese health news.

Section 5.2 examines the use of linguistically-informed discourse analysis to explore relevance in news texts by first conceptualizing it in the news genre, and then elaborating the approaches and stages to apply corpus linguistic techniques for its analysis in three parts. Subsection 5.2.1

explains the conceptualization of information relevance in news, that is the constituents of the concept in this thesis will be defined and elaborated. Subsection 5.2.2 explains the operationalization of information relevance in news by describing how to conduct corpus-assisted and data-driven analysis of information relevance. The analysis and assessment of information relevance quantitatively and qualitatively is described in detail in subsections 5.2.3 and 5.2.4. Since the research objects are bilingual corpora, the analytical procedures are designed meticulously to satisfy the requirements of cross-lingual and cross-cultural comparison.

5.2.1 The conceptualization of information relevance

A conceptualized model is presented here to explain the concept of information relevance used in this thesis. Information relevance denotes the extent to which health news messages are relevant to the lives of the news audiences (i.e., the general public). Information relevance in this study consists of three components, namely news frames, proximity, and personalization. News frames are major discussions in news texts. Proximity and personalization make an event or issue considered to be newsworthy and are the assumed preferences of the expected audience. The concept of information relevance is elaborated from these three parts in the following.

5.2.1.1 News frames

The selection and presentation of information in news articles influences audience perception and even health-related decision making. News text is inherently subjective because of the selection of news information and the opinions and assessments of journalists which then influence attitudes, decisions, and even behaviors of audiences (Chong & Druckman, 2007). While news frame analysis is important for a better understanding of cross-cultural communication characteristics regarding public health, the operation, and measurement, of a “frame” has been debated in multiple research domains. News frames, usually conceptualized as broader news themes, are at the core of news discourse, which is surrounded with narratives

and journalists' assessments. In this research, news frames refer to the foci for discussing a particular event. The major concerns about the health impacts of excessive salt consumption from news frame analysis can provide a macro perspective towards analyzing large text corpora.

5.2.1.2 Proximity

Proximity is considered as a component of the information relevance of news. News presentations should be viewed as social artefacts that are shaped over time by socially and culturally organized communities. Hence, health-related information and recommendations should be interpretable within the cultural and social framework to make messages relevant and meaningful to the audience.

Proximity is commonly used as a news value in journalism studies to explain what is included and excluded in news (Yang & Cannon, 2017), and is identified in van Dijk (1988), Bell (1991), Montgomery (2007), and Bednarek (2016). In these works, geographical and cultural relevance are defined as the components of proximity: van Dijk (1988) views proximity as the local and ideological proximity; Bell (1991) regards proximity as geographical closeness and cultural familiarity and compatibility; and Montgomery (2007) asserts the geographical and cultural distance of reported news events determine proximity (or "cultural relevance"). In the recent work of Bednarek (2016), proximity is defined as geographically or culturally close to reported events of the news publication's targeted audiences. Both definitions take into account contextual factors such as local, geographical, and cultural proximity as well as the target audience, as situational awareness is evident throughout news.

Nevertheless, proximity is an ambiguous journalistic concept that has no established definition. Ahva and Pantti (2014) re-evaluated the notion of proximity as a critical keyword in digital news environments and suggested that proximity is regarded as a multi-dimensional keyword in journalism research. From different perspectives, proximity is considered to have distinct components. For example, as a news selection criterion to connect news events and audiences,

proximity is conceptualized as including geographical proximity, temporal proximity, and cultural proximity: Geographical proximity refers to “how close to home an event is” (2014, p. 325); temporal proximity refers to “how recent the event is” (ibid, p. 325); and cultural proximity refers to “how understandable the event is within the cultural framework of the audience” (ibid, p. 325). The strategic use of geographical and cultural proximity is believed to be significant by offering unprecedented opportunities for contextualization and familiarization of news events.

This study conceptualizes proximity based on these above definitions and by considering the characteristics of health news texts. Proximity is defined as:

The degree to which the news content is geographically or culturally close to the target audiences, and thus geographical closeness and cultural closeness are two components of proximity.

According to this definition, explicit references to nation, community or places and to domestic cultural symbols or concepts that are close to the target audiences in news texts are deemed as contributing to the construct of proximity. Proximity, represented by geographical closeness and cultural closeness, is constructed for readers through references to well-known geographical locations and familiar cultural symbols of an event or issue. For instance, a news story that mentions Sydney constructs geographical closeness in a newspaper published in Australia, but not in a newspaper published in China for a Chinese target audience. Likewise, while a news story that mentions Australian dietary cultures constructs cultural closeness for Australian newspapers and the target audiences, it does not for Chinese audiences. The proximity of news messages helps to construct a relationship with people in the community, thus can potentially attract the attention of audiences and offer them relevant information.

Chaotic reality becomes manageable and meaningful with culture. As the cultural model of communication argues, communication is “the construction of a shared space or map of

meaning within which people coexist” (Grossberg et al., 1998, p. 22). In the scope of the cultural model of communication, the information receiver or audience is not simply a passive target who does what the information says, or just imitates others, such as in a transmission model. Equally, the media is not a mono-directional system with imposed thoughts transferring to individuals. An audience is active in filtering the information, in the process of which, culture is a compensatory medium for information that helps people see how it is relevant.

Media provides opportunities to refresh people's knowledge. The fact is, everyone has their own knowledge banks that store diverse a priori or experienced knowledge about reality. If the media message is incongruent with an individual's knowledge bank, it is possible to be filtered out through reference to their own bank of knowledge. That is, media communication involves a range of different strategies in which culture has a central role in the production of meaning and affects what is seen and practiced. Therefore, health communication professionals need to understand the importance of proximity in the construction of information relevance. Contextual factors should be considered when creating targeted communication materials for public health promotion. It is considered more relevant to the audience to report on news happening in the country, or in domestic areas.

5.2.1.3 Personalization

Personalization has been intensively investigated and applied in information design as an effective news value. Personalization, unlike proximity, constructs information relevance through connecting with ordinary individuals through presenting the “human face” of a news event to enhance a reader's perceived personal relevance. Mass media news has a substantial impact on public health due to its community reach. Thus, establishing personalization is critical for delivering health news to individuals in a community. The persuasiveness and effectiveness of health messages may increase if personal relevance is perceived at a high level (Dijkstra & Ballast, 2012).

Since health is something that affects every person at some point in his or her life, personalizing the content in news is of particular importance. Bell (1991) claims that something which can be pictured in concrete and personal terms is more newsworthy than a generalized concept. Similarly, Montgomery (2007) argues that human reaction creates human interest and has news value. Bednarek (2016), and Bednarek and Caple (2017) also regards personalization as the personal or “human face” in reported news events or issues with special reference to ordinary people, in other words, non-elite actors, opposed to references to elite people of high status or fame, and their experiences, practices, or emotions. Personalization as a news value, is usually regarded to the opposite of eliteness. Recently, research on personalization that focused on certain languages/cultures has been on the rise. For instance, He (2021) examined eliteness/personalization as news value in Chinese social media Weibo network of People’s Daily. Through examining the appraisal devices in news, a divergence was discovered between positive judgment towards personalization and negative affect for eliteness. Mañoso-Pacheco (2020) conducted a comparative study on the constructions of eliteness/personalization news values of news sources in British and Spanish news corpora. It discovered that British news corpus was more inclined to emphasize eliteness by the means of quotes from elites and construed prestige, compared with Spanish news corpus. Márcio Carneiro dos Santos (2020) conducted a data-driven study on journalistic operation, based on communication groups in Brazil. It explored algorithms and artificial intelligence approaches to enhance personalization. However, personalization as a news value has its pros and cons. Schjøtt and Hartley (2021) conducted an ethnographic study based on Denmark to dig in-depth to the development of a personalization algorithm of news product and to figure out its implications for future news journalism. Since personalization risks creating echo-chambers/filter bubbles (Pariser, 2011; Flaxman et al., 2016), the out-of-control personalization of news arrangement and distribution could disassemble the construction of news, and put the “publicist and democratic mission” of news journalism at risk (Schjøtt & Hartley, 2021, p.1).

In view of the above definitions and explorations of personalization as a news value and the characteristics of health news as research objects, this study defines personalization as:

The degree to which health news concerns the experiences, practices, and emotions of ordinary individuals.

Individual narratives, for example, it is argued, are very useful to convey important information about health issues. Personal attitudes and reactions towards a news event or issue, or stories featuring affected individuals, usually are more appealing to audiences in comparison with abstract accounts, generalized concepts or processes (Montgomery, 2007). Whereas reporting events in health news with a personal or human-interest aspect involving ordinary people establishes personalization, health news references to the concepts of health issues do not. For example, how to make healthier choices in food shopping based upon personal experiences can make the story more newsworthy than a description of guidelines.

In this study, personalization as a component of information relevance of news information consists of two aspects connected with ordinary individuals, namely references to population groups and human emotions. Personalized news information can provide customized health information for different groups of the population and can be expected to elicit an emotional response from the audience. The operationalization of information relevance is explained in the following section.

5.2.2 The operationalization of information relevance

The operationalization of news information relevance describes how it was analyzed with corpus-assisted linguistic approaches in this study. This section connects the concept of information relevance with the specific linguistic presentations of news texts. As explained in the last section, information relevance includes news frames (i.e., focus for discussing a particular event), proximity (i.e., references to geographical closeness and cultural closeness) and personalization (i.e., references to population groups and human emotions).

5.2.2.1 The operationalization of news frames

This chapter, particularly, reports on news frame analysis using novel computational methods and qualitative interpretation. This chapter applies Framing Theory (Entman, 1993; Goffman, 1986; Scheufele, 1999) in news frame analysis, which is an important pillar of theoretical framework in this study. As noted in the previous chapter, frame refers to the focus for discussing a particular event, and the constant use of language elements during a period of time.

As reviewed in Chapter 2, various approaches have been adopted to bolster framing research. As manual detection of frames is extremely time-and-labor-intensive, because of the size of research objects, (semi-)automatic detection assisted by computational tools is considered. This research integrates machine learning to significantly speed-up the analysis of big language data. In accordance to framing theory and the clustering logic of frame analysis, this study conceptualizes frames as clusters of topics, and applies theta matrix to construct frame network by calculating the relationships between pairs of topics. The news frame analysis of AusCorp and ChnCorp is keeping alignment with the computational approach proposed by Walter & Ophir (2019), that is the Analysis of Topic Model Networks (hereafter ANTMN), and adopting qualitative discourse analysis. The applicability and efficacy of ANTMN was demonstrated where framing theory was elaborated and developed by Walter & Ophir (2019). The ANTMN, which is an exploratory and inductive mixed method with strong applicability for news frame analysis, consists of three steps combining the unsupervised machine learning approaches of topic modeling and semantic network analysis. The first step, frame elements identification, uses topic modeling to analyze both English and Chinese corpora of news texts, and to qualitatively interpret topic level by labelling each topic. Secondly, the co-occurrence of topics is calculated to detect whether several topics occurred together in the same documents. This step is to construct topic network based on the relationships among topics. The third step is community detection on the topic network for frame identification, since frames are operationalized as communities in topic network. These three steps, in this study, were conducted with comparable corpora in languages of Australian English and simplified Chinese, to automate partially the analysis of big language data. Applying unsupervised machine

learning and semantic network analysis, news frames and groups of topics that share the same latent meanings are modelled as thematic communities.

5.2.2.2 The operationalization of proximity

Proximity, as noted previously, refers to the extent to which the news content is geographically or culturally close to the target audiences. Health news, therefore, ensures newsworthiness by presenting messages with geographical or cultural cues. Proximity of news helps to build relationships with people in a community, through attracting their attention by offering them practical health-related recommendations. The operationalization of proximity connects with two dimensional linguistic characteristics as follows. The first component is geographical closeness, represented by the names of local or domestic places and residents. By construction of proximity, a story from within the nation is more appealing than one from abroad, and this fosters the information relevance of news to the target audiences. The second component, cultural closeness, is exemplified by dietary cultural terms and other local cultural concepts in this study. For example, improving traditional home cooking recipes with less salt content encourages cultural closeness, as recommended at the end of some news coverage. The provision of culturally oriented news messages related to individuals' daily practices can enhance information relevance.

5.2.2.3 The operationalization of personalization

Personalization refers to the extent to which health news concerning ordinary individuals as well as their experiences, practices, and emotions, with reference to the health needs and interests of different population groups and human emotions. The operationalization of informational personalization connects with two dimensions of linguistic features of health news as follows. The first component is reference to population groups. Different groups of population require customized health information. For example, news offering health recommendations for children to consume healthy snacks is an example of personalization

through the reference to the specific population group with a targeted health message. The second component is reference to human emotions, represented in news texts by emotional expressions. Emotion is not the opposite of rationality, yet people cannot escape emotions. Therefore, the "human face" in news, for example, encourages an emotional reaction by ordinary people to a health issue which can ensure personalization and enhance information relevance for the target audience.

The conceptualization and operationalization of information relevance of news is summarized in Table 5.1, which describes the concepts of news frame, proximity and personalization, as well as the components of information relevance and how it is operationalized in this study.

Table 5.1: Conceptualization, component, and operationalization of information relevance

Informational relevance (IR)			
	Conceptualization	Component	Operationalization
News frame	The focus for discussing a particular event	Several frames identified by topic networks	Frame elements identification; co-occurrence of topics; community detection
Proximity	The degree to which the news content is geographically or culturally close to the target audiences	Geographical closeness Cultural closeness	Local/domestic places and residents Dietary cultural terms and other local cultural concepts
Personalization	The degree to which health news concerning about the ordinary individuals as well as their experiences, practices, and emotions	Population groups Human emotions	Customized health information for different groups of population Human emotional expressions

5.2.3 The analytical procedure of news frames

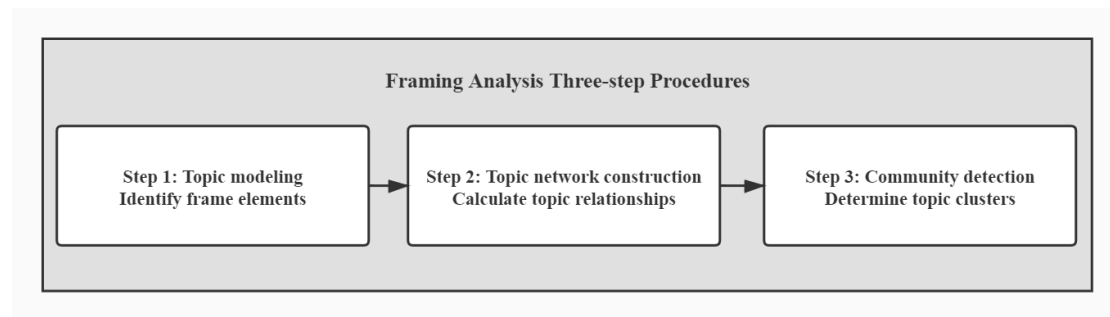
Two sets of searching syntax are applied on database Factiva, in English and simplified Chinese, respectively. Similar to the process of literature searching, searching syntax, which is meticulously designed, includes a combination of terms related to salt-intake and health impacts. As a result, 4533 Australian news articles (from 1996 to 2019) and 1949 Chinese news articles (from 1997 to 2019) were identified as news items reporting on the topic of salt-intake and health impacts. Data collection includes the first relevant news articles in the database until 2019 (the collection date). The first eligible Australian news article was published in 1996, and the first Chinese news article was published in 1997. These news articles were then exported and stored into txt format, and each news article was stored in separated txt files. Two datasets of health news articles were built with 4533 English txt files and 1949 Chinese txt files. The examination of news frames was conducted in these news articles.

The purpose of text pre-process is twofold. First, it aims to refine texts by removing words that have weak information-laden capacity to avoid redundant information affecting topic accuracy. Second, it is to arrange texts into the required format for Latent Dirichlet Allocation (hereafter LDA) topic modeling. Considering the characteristics of research objects, different pre-process steps were undertaken for English and Chinese texts. For AusCorp, first, in keeping with the guidelines advised by Maier et al. (2018), texts were pre-processed to refrain from lemmatization or stemming to avoid negative influences on topic modeling; stop-words were removed (including punctuation, numbers and function words, etc.); and capital letters were converted to lowercase. For ChnCorp, JiebaR built in Python was used to segment Chinese texts into word-unit, stop-words (including punctuation, numbers, and function words, etc.) were removed, for an appropriate text arrangement for the subsequent analysis procedures. It is worth mentioning that although numbers are informational loaded to some extent, they are removed in this study for a better focusing on linguistic presentations of news.

Following the ANTMN three-step approach and taking the research design into account, topic modeling is conducted to identify frame elements; topic network construction by calculating

relationships among topics; community detection by determining topic clusters network. Figure 5.1 presents this three-step approach.

Figure 5.1: ANTMN three-step approach for framing analysis, proposed by Walter & Ophir (2019)



Step I is topic modeling. This step aims to extract a set of topics from which the two comparable corpora of health news can be created. By applying topic modeling, texts are analyzed inductively without prior research assumptions or manual coding. Topic modeling is an unsupervised machine learning method that is essentially a form of text mining (Walter & Ophir, 2019). Topics are statistical entities, representing the probability that particular words tend to belong to the same framework based on co-occurrence linguistic assumptions; they are conceptualized as the frequency distributions of words. The purpose of topic modeling is to find latent “topics” from the observed document collections automatically and to summarize the thematic content of corpus. The process of topic modeling takes only words into account, groups words into clusters and identify topics, but do not take syntax or narrative in texts into account. This is termed as a “bag-of-words” approach that only considers whether a word appears, not the order in which it appears (Wallach, 2006), which is proper for word co-occurrence identification.

After pre-processing the comparable corpora, texts were converted into vectors to facilitate a topic modeling operation. Then, the texts were arranged into the format required for LDA packages which were structured using word ID and frequency. By calculating perplexity (hereafter PPL), a way to measure the quality of language models in the field of natural

language processing (hereafter NLP; Walter & Ophir, 2019), the optimal solutions (no redundancy or shortage) were obtained for the quantity of topics. By automatic word clustering, several word groups or phrase patterns that characterized the corpus were detected. Each topic was represented with a list of words in order of frequency. Figure 5.2 shows the screenshots of word groups of each topic identified from AusCorp and ChnCorp respectively. Before giving each topic a label, the most frequent words and the most words of the wordlists of each topic were reviewed, consulted the documents of each topic, and ascertained the background knowledge of health communication in mass media news in the two countries. This is a necessary and crucial qualitative step in topic modeling work. Also, it is integral for machine produced data rendering and requires researchers to have deep understanding of research data.

Figure 5.2: Screenshots of words groups of each topic identified from AusCorp and ChnCorp

T0: ['fat', 6496.76829287011], ('food', 5513.603274967443), ('foods', 4077.9171547983096), ('cent', 3188.5550228419074), ('healthy', 2995.61940124236)
T1: ['blood', 4825.7471195230864], ('pressure', 2966.896302028065), ('high', 1106.1406182383382), ('stroke', 1060.8146559096665), ('heart', 862.975577)
T2: ['salt', 7739.34052704526], ('food', 1724.6326131378285), ('intake', 1459.5260098590605), ('health', 1438.056470935665), ('sodium', 1358.515848344)
T3: ['people', 210.7168023013752], ('foods', 210.0131682071434), ('spices', 169.32744568584286), ('blood', 162.19683602127807), ('food', 156.791063639)
T4: ['risk', 3333.3457689250595], ('heart', 3258.153871220338), ('cancer', 3167.0163234734277), ('disease', 3045.933913818276), ('study', 2978.9489044)
T5: ['food', 3357.1322544921727], ('tick', 1293.1123145197016), ('mcdonald', 1244.8872079045614), ('foundation', 1116.3431480033476), ('products', 907)
T6: ['food', 2279.915259520489], ('family', 740.1533489973089), ('cooking', 694.3944284979865), ('eat', 645.5914275202337), ('eating', 615.22964156354)
T7: ['fat', 1179.155072322997], ('burger', 733.1482833262851), ('hungry', 423.9240971746014), ('food', 420.47125823622486), ('salad', 419.991215283018)
T8: ['health', 1137.235037001257], ('water', 719.9587088913419), ('body', 713.0259115305066), ('people', 642.7290631012581), ('salt', 610.940016823999)
T9: ['detox', 304.67312062441175], ('diet', 203.19308348793643), ('eating', 160.42513783061122), ('liver', 135.6766767315686), ('weight', 123.6402855)
T10: ['diet', 2132.9405952917764], ('foods', 1928.0910950972852), ('body', 1843.6639917851248), ('eat', 1816.9862419124643), ('good', 1546.964754441817)
T11: ['time', 1315.7695617955383], ('life', 1062.2090015236402), ('year', 1037.4857688088245), ('don', 931.3397801092286), ('people', 883.307933236436)
T12: ['water', 4017.3712169599403], ('drink', 1343.8195671954727), ('body', 1035.6566487080297), ('drinks', 922.3378382468661), ('day', 820.6883434946)
T13: ['bread', 1319.3508202854186], ('foods', 904.5100399080975), ('milk', 823.2147837039356), ('high', 819.8372653302868), ('diet', 806.5662790896773)
T14: ['food', 7502.664251441935], ('health', 3999.8155893463563), ('people', 3014.848415813397), ('fat', 2569.981900583461), ('foods', 2372.5974417892)
T15: ['heart', 2966.0551333373014], ('disease', 1487.4438253764366), ('diabetes', 1297.6152687768617), ('risk', 888.0776966107685), ('people', 745.483)
T16: ['water', 221.42130073710203], ('river', 170.01347527462107), ('murray', 150.87225580766383), ('cancer', 112.0466062228103), ('salt', 99.14876176)
T17: ['food', 2202.126825552275], ('good', 1348.3688398670051), ('meat', 1168.93561654199), ('fresh', 1112.92479389144), ('healthy', 1047.374053929076)
T18: ['beer', 151.16436249219802], ('food', 132.7397099975776), ('msg', 110.51933060425482), ('foods', 105.7135064649651), ('alcohol', 77.960195345211)
T19: ['food', 1242.7433658925568], ('light', 892.7462686157613), ('labelling', 887.0449930790476), ('traffic', 718.6920605959966), ('labels', 683.7222)
T20: ['oil', 1632.667986344527], ('fat', 1612.122222870853), ('minutes', 1513.1876821209137), ('add', 1452.9977855765817), ('cup', 1425.1002002595158)
T21: ['sugar', 1539.6547658617326], ('salt', 1309.0016916450525), ('cereals', 1140.7027303764962), ('sodium', 983.56446047454), ('breakfast', 887.476)
T22: ['bread', 318.4491005717964], ('gluten', 263.28909541301203), ('flour', 244.85720419785008), ('free', 209.6480955178295), ('sugar', 165.218667746)
T23: ['fast', 1023.6917126602565], ('pizza', 694.7174841204701), ('food', 560.5898810303025), ('salt', 264.41246605112934), ('healthy', 257.6047879968)
T24: ['weight', 3147.858715987016], ('fat', 2717.3188395074812), ('eat', 2147.598352324869), ('diet', 1772.5306167944455), ('sugar', 1538.739041154336)
T25: ['foods', 1374.4312564795855], ('food', 1201.9462093471036), ('high', 1141.8440943624223), ('vitamin', 1017.6739452489142), ('fibre', 971.7561909)
T26: ['children', 5900.988708924578], ('food', 5039.51129474247), ('junk', 1869.274776672334), ('parents', 1846.6661178924878), ('obesity', 1730.31588)
T27: ['health', 2087.770368155316], ('people', 973.2835316035575), ('australia', 968.4408878072159), ('government', 796.7658836785095), ('year', 777.5)
T28: ['health', 2356.3639384375083], ('food', 2291.7005624793924), ('star', 1104.5173328377516), ('system', 1102.3051263959867), ('rating', 934.125546)
T29: ['salt', 1461.6823682307374], ('organic', 588.0719476368805), ('meat', 578.8492175591831), ('food', 445.9613433782999), ('flavour', 353.859685599)

T0: ['食品', 2855.9929443876877], ('营养', 1575.0291671041352), ('健康', 1503.2972276498049), ('食物', 1045.1158396970152), ('中国', 983.6454913604174),
T1: ['食盐', 584.8275921097164], ('月饼', 420.80893144195767), ('盐业', 380.58366032596143), ('老人', 378.6033865193762), ('价格', 263.3452627969909), ('
T2: ['食用菌', 166.16842273228832], ('中国', 154.77946946655013), ('合作', 140.2676189080202), ('研究', 112.45147947691261), ('医生', 87.49051106284377),
T3: ['食品安全', 516.1272926129207], ('胃癌', 341.6490065329168), ('食盐', 298.3113457348409), ('碘盐', 281.8283584322875), ('加碘', 268.39337556578056),
T4: ['食物', 3738.4413531018055], ('饮食', 1817.4235900189901), ('摄入', 1397.6485482112452), ('健康', 1282.2594159498062), ('蔬菜', 1183.9670540304119),
T5: ['发展', 1571.4129509555657], ('食品', 1483.1984806417315), ('食物', 1257.513825579384), ('营养', 1229.4969297083305), ('生产', 962.64617950409928), ('
T6: ['健康', 8990.382732124775], ('营养', 4480.936156112812), ('工作', 2584.1429416651963), ('慢性病', 2330.024203634036), ('开展', 2329.405675253005), ('
T7: ['莱克', 483.9683673743715], ('脂肪', 421.0165333473974), ('含量', 402.73264403008625), ('摄取', 375.48384302562994), ('营养', 316.30669416237447), ('
T8: ['中国', 1449.727244958968], ('市场', 1253.727630037709), ('健康', 1150.3250002887196), ('消费者', 1134.4673456018475), ('食品', 1096.14707850937536),
T9: ['食品', 869.2053390080889], ('肉制品', 376.3712728852731), ('方便面', 370.71517889872), ('含量', 334.93133749553436), ('食用', 297.69290580394236), ('
T10: ['健康', 2156.8195829892807], ('疾病', 931.5144267988338), ('高血压', 917.700513245846), ('食品', 575.876360532075), ('中国', 540.4311925802532), ('进
T11: ['图片', 105.8386375040549], ('gi', 97.82236907076278), ('孕妇', 90.50248224953255), ('李期', 53.52164794494059), ('人民', 44.88875915061734), ('进
T12: ['食品', 3479.5295893174616], ('中国', 2231.3705246629565), ('企业', 1457.3504776847906), ('发展', 1436.0297433734528), ('健康', 1194.506224407094),
T13: ['产品', 1706.8948062146956], ('食品', 1548.3964470229348), ('方便面', 1455.2626348987415), ('行业', 1398.9353178944725), ('中国', 1322.65422600863),
T14: ['食品', 3049.068444566767], ('毛五', 718.8730639510311), ('生产', 671.7511385230541), ('食品安全', 591.4778935251408), ('零食', 464.4572198227139),
T15: ['高血压', 2285.3744255850424], ('血压', 1708.7095432776941), ('患者', 1684.0218836354557), ('运动', 1354.5190665190253), ('疾病', 1213.736979178774),
T16: ['高血压', 2285.3744255850424], ('糖尿病', 1006.868975329646), ('疾病', 675.7994379148796), ('中国', 641.6063822271598), ('患病率', 579.4485190672814)
T17: ['儿童', 3080.403041207025], ('食品', 1920.5618151959238), ('饮料', 1276.3169675833158), ('孩子', 1125.8393736345643), ('标准', 562.1269790252818),
T18: ['食品', 782.5392930570805], ('标签', 602.5169162958995), ('消费者', 497.15788451515317), ('产品', 392.7453175381998), ('营养', 374.99766756885043),
T19: ['营养', 2962.9952455008965], ('膳食', 2506.0319996045278), ('健康', 2180.5815969124856), ('中国', 2067.161318911162), ('居民', 1391.0472101712076),
T20: ['食盐', 1908.4116859733979], ('摄入量', 1527.0436618351248), ('中国', 1408.5879698976205), ('减盐', 1299.5794861199997), ('摄入', 973.1856069845948)
T21: ['健康', 1593.5601388561745], ('中国', 1350.8848690560815), ('营养', 1144.1594002192785), ('食品', 456.40152792967024), ('餐饮', 456.0110962347461),
T22: ['患者', 377.2521412500521], ('肾脏', 264.25001651652497), ('胆固醇', 207.7914667521336), ('脑卒中', 200.3772586253461), ('导致', 170.70884707511507),
T23: ['健康', 2479.05913750921], ('食物', 1409.9638260650336), ('饮食', 1020.3461702677279), ('食品', 569.1551479239123), ('肥胖', 492.5611457803925),
T24: ['榨菜', 311.9641778002115], ('生活', 289.042731968495), ('工作', 269.37078914429803), ('中国', 262.32104364024553), ('问题', 249.83666397053835),

For the purpose of news frame analysis in this research, topic modeling, a semi-automated and unsupervised method to analyze textual content, was used to identify frame elements (Walter & Ophir, 2019). The identified topics were conceptualized as frame elements, which could be classified into frame packages using community detection techniques applied to the topic network (ibid.). In this unsupervised machine learning approach, several models are commonly used to conduct topic modeling for different amounts of texts and different research purposes. In this study, LDA and Gibbs Sampling, and the *topicmodels* package for R are used. The code is available for R on Github page (Walter & Ophir, 2019; <https://github.com/DrorWalt/ANTMN>).

Step 2 is topic network construction. The purpose of Step 2 is to create the topic network with the identified topics situated in the network. As addressed in Step 1, the PPL calculation was applied to determine the optimal quantity of topics to present in a topic network. It ensured that the most discussed topics were selected which could represent the entire corpus. Figure 5.3 shows the formula of PPL. As a result of PPL calculation, 30 and 25 topics were identified in AusCorp and ChnCorp, respectively.

Figure 5.3: The PPL formula

$$\begin{aligned}
 \text{Perplexity}(W) &= 2^{H(W)} \\
 &= P(w_1 w_2 \dots w_N)^{-\frac{1}{N}} \\
 &= \sqrt[N]{\frac{1}{P(w_1 w_2 \dots w_N)}} \\
 &= \sqrt[N]{\prod_{i=1}^N \frac{1}{P(w_i | w_1 \dots w_{i-1})}}
 \end{aligned}$$

To construct a network to elaborate the relationships among topics, the pairwise cosine similarity calculation was conducted between the topics, to measure the differences between topics. Cosine similarity (or distance) ranges from 0 to 1, the closer the value is to 1, which means the angle is 0, the higher similarity the two vectors share, and the high correlation of the

two topics provides an appropriate threshold for the subsequent community detection algorithm process (Walter & Ophir, 2019). Based on the results of similarity calculations, two topic networks were constructed, in which nodes represent topics, and the edges represent relationships between topics (co-occurrence calculation) in corpus. The closer the topics, the higher correlations they share. As a result of this step, topics were organized into networks which make it possible to turn large quantities of topics into manageable and efficient graphical representations. The visualization software Gephi was used to develop topic networks (Bastian et al., 2009).

Step 3 is community detection. As suggested by Walter & Ophir (2019), “news frames could be conceptualized as communities in a network of topics” (p. 248), based on interrelationships among news topics. Community detection is used for the identification of dimensions in topic modeling solutions. After topic-relationship calculations and topic network creation, as addressed in Step 2, the community detection method is used to additionally investigate the inter-topic relationships. The purpose of this step is to cluster the initially identified topics into several distinctive groups that share intra-community topics with high similarities, whereas inter-community topics are heterogeneous. The principle of community detection is to maximize within-group links while minimizing between-group links, and to determine the distinction between communities (Walter & Ophir, 2019). As a result of community detection, nodes representing topics in the network were clustered into different communities.

Based on the similarities of topics, community detection could be analyzed by a variety of algorithms. The hierarchical clustering algorithm (Pons & Latapy, 2005) also called “Walktrap” is used, which is efficient and offers a reasonable and smaller number of coherent communities. The topic network presentation was conducted by Force Atlas 2 layout algorithm. This algorithm supports the data import of nodes and edges, sets the graph shape, and configures node’s colors and sizes according to the “betweenness centrality” and “modularity class” parameters. As a result of the layout, the influential nodes for higher values were bigger in size, with different communities colored differently. The next section will report the results of topics,

frame communities, and network visualizations.

5.2.4 The analytical procedure of proximity and personalization

A quantitative corpus linguistic analysis of information relevance in news employing WordSmith 7.0 tools (Scott, 2014a) was conducted in this study. This chapter reports an analysis of the information relevance construction in AusCorp and ChnCorp; this section provides the three-step analytical procedure shown below. The quantitative results and descriptive explanations of information relevance constructions in AusCorp and ChnCorp is in the following.

Step 1. Preparation.

Step 2. The self-compilation of information relevance lexicons.

Step 3. Analysis and comparison based on linguistic characteristics.

For Step 1, the comparable corpora, i.e., AusCorp and ChnCorp, comprising 3833 Australian English news articles and 1949 simplified Chinese news articles, reporting on the health impacts of excessive salt-intake, are prepared with each item of news stored in separate txt files to organize the corpora into a tool-friendly format. Chinese texts were further segmented into word units as there is no space between words in Chinese texts. The Wordlist tool of WordSmith was used to process the two corpora; two wordlists were produced in descending frequency with standardized percentages. Please refer to Appendix D and E respectively for information relevance wordlists of AusCorp and ChnCorp. As in most corpora, function words such as “the”, “in” and “a” are the most frequent words (Scott & Tribble, 2006).

For Step 2, the information relevance lexicons were compiled based on the operationalization of information relevance. Eight lexicons were compiled by manual word selection through referring to the two wordlists of corpus words in a descending frequency order. Four lexicons were designed for AusCorp, and four lexicons were designed for ChnCorp. These eight

lexicons were accompanied by word frequencies and percentages of running words. Table 5.2 lists the categories of lexicons as follows.

As demonstrated in Table 5.2, L1 and L2 are lexicons of Australian and Chinese local places. Mentioning local places is regarded as contributing to the geographical closeness of health news texts. L3 and L4 are lexicons of Australian and Chinese dietary cultural terms which construct cultural closeness of health news for target audiences. L5 and L6 are lexicons of Australian and Chinese population groups terms. These two lexicons comprise: (1) the words that describe different groups of populations, such as male, female, and children; (2) personal pronouns such as we, us, and they; and (3) words of occupations, such as students, dietitians, and athletes. News texts presenting personalized and customized messages are believed to construct information relevance for audiences. L7 and L8 are lexicons consisting of terms of emotional expressions in AusCorp and ChnCorp. These emotional expressions include positive and negative sentiment words which reflect human emotions and could thus ensure personalization, and further, information relevance to audiences.

Table 5.2: The eight lexicons of proximity and personalization (L1 to L8)

	Dimension	English lexicon	Chinese lexicon
Proximity	Geographical closeness	L1 Australian local places	L2 Chinese local places
		L3 Australian dietary cultural terms	L4 Chinese dietary cultural terms
Personalization	Population groups	L5 Australian population groups terms	L6 Chinese population groups terms
	Human emotions	L7 Australian Emotional expressions terms	L8 Chinese Emotional expressions terms

In Step 3, the construction of information relevance in AusCorp and ChnCorp was analyzed and compared. First, an analysis and comparison on these eight lexicons to portray their overall features was conducted. For example, the similarities and differences of the features of

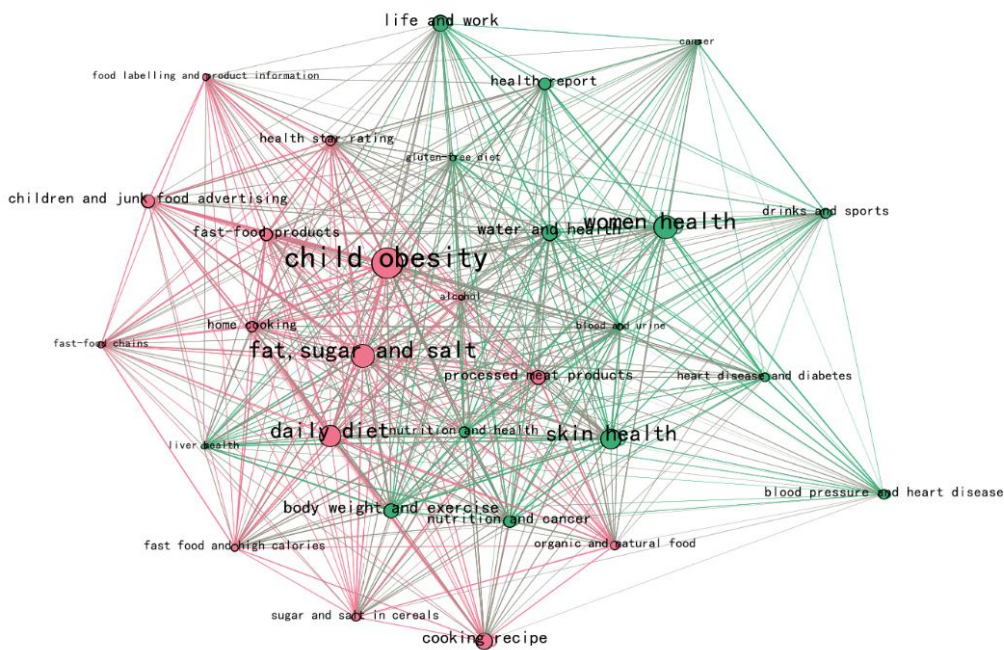
geographical closeness construction between L1 and L2 were compared. Next the Co-occurrence Analysis (COA) of high-frequency words in each lexicon was examined. Major discussions can be obtained through key clusters identified for these high-frequency words. The following sections will present the quantitative results of information relevance construction in AusCorp and ChnCorp, that is, the construction of proximity and personalization, and followed by descriptive interpretations of results.

5.3 The construction of news frames

This section presents the results of news frame analysis on the comparable bilingual corpora from Australian and Chinese news. After topic modeling, the 4533 Australian health news articles consisted of 30 topics. These topic labels were established by consulting a wordlist of each topic (especially most frequently used words and unique words), top documents of each topic, and background knowledge about the associated topics on the health communication of salt-intake. Although these 30 topics cover a variety of aspects about the health impacts of excess salt-intake, the discussion has been focused largely on dietary habits, health and diseases, and lifestyle. To classify further these topics into distinct groups (i.e., news frames), community detection is conducted, by Walktrap algorithm in Step 3 which resulted in two news frames. The topics marked by the same modularity class belong to the same community and were clustered together. The Force Atlas 2 layout algorithm and the visualization software Gephi are used to present visually the results of topic clustering. As can be seen in Figure 5.4, the first community on the left (modularity class 0, in red) focuses on child obesity, fat, sugar and salt, and daily diet, and so forth. The second community on the right (modularity class 1, in green) focuses on female health, dietary nutrition and skin health, and food nutrition. A more detailed interpretation of the news frames is presented in the next section.

Figure 5.4: The topic network³ drawn from AusCorp between the years 1995-2019

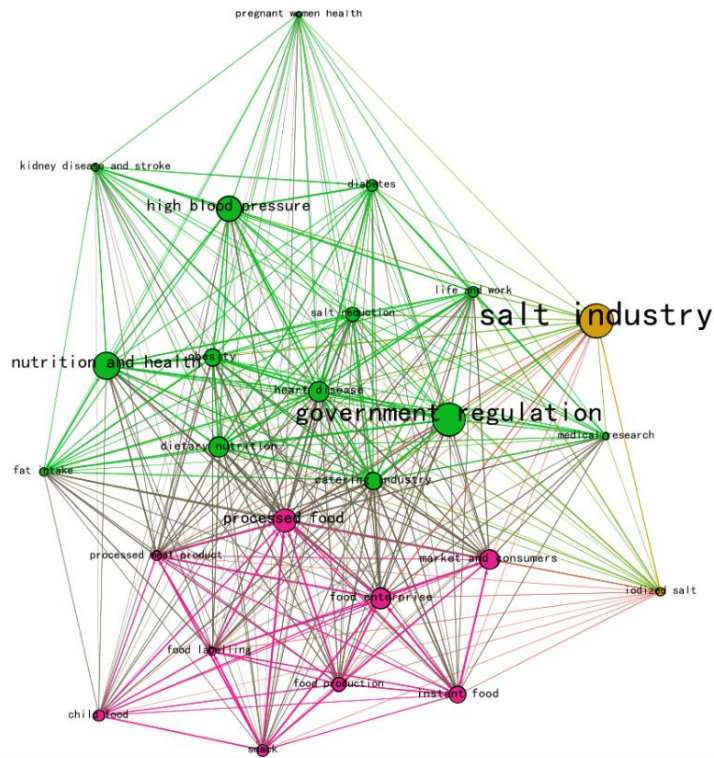
³ In Figure 5.4 and 5.5, nodes represent topics; edges represent cosine similarity in document co-occurrence between topics; size represents the prominence of each topic in the corpus; node color represents community



The topic model for the 1949 Chinese health news articles consisted of 25 topics. The Walktrap clustering algorithm resulted in three news frames. As can be seen in Figure 5.5, the first community on the top (modularity class 2, in green) focused on government regulation, nutrition intake and high blood pressure. The second community on the bottom (modularity class 0, in red) focused on processed food, food industry, and market and consumers. The third community on the right (modularity class 1, in yellow) focused on the salt itself and only consisted of two topics, namely salt industry and iodized salt.

Figure 5.5: The topic network drawn from Chinese corpus of health news texts between the years 1996-2019.

membership; edge color represents the color of community for intra-community edges, and gray for inter-community edges; layout created using the Force Atlas 2 algorithm. Network is weighted, fully connected and undirected (the interpretation is adapted from: Ophir et al., 2020; Walter & Ophir, 2019).



To summarize the news frames detected by ANTMN approach presented above, Australian health news corpus consisted of 30 news topics and 2 news frames, while Chinese health news corpus consisted of 25 news topics and 3 news frames. The topic networks were shown in the above two figures. These figures represent visually the relationship among news topics in networks, based on the prominence of topics in corpus, the pairwise relation between topics, and the partition of distinct communities.

Through topic modeling and community detection, the news topics were situated in networks for their relationship visualization. However, it is necessary to mention that the visual distance in the figure should be regarded as an approximation of topic distance rather than an exact one (Walter & Ophir, 2019), since it is a projection of a multidimensional object into two-dimensional space. Before the detailed analysis of news frames, three meaningful metrics are provided to interpret the topic network. These metrics are designed according to the principles of analytical methods. The subsequent interpretations of frames and topics are based on these metrics as follows.

First and foremost, as per the PPL calculation results in Step 1, the included topics, shown on

the nodes of networks, are sufficient to represent the topics of the entire corpus. This is to say that the presented news topics were frequently discussed in news articles under the overarching theme of the health effects of excessive salt intake. Although topics differ in their prominence (the frequencies of discussion), they are both critical to the overall news corpus. Second, topics with different node sizes denote different levels of prominence. Topics are more prominent when the nodes are larger. The most prominent topic will certainly be much more emphasized in interpretation. Third, via community detection, nodes were colored as per different communities: topics in the same color belong to the same news frame, and each topic is interpreted as a frame element. Meanwhile, the boundaries between frames may not be so clear, but there are areas of transition or even overlap. The blurring of frame boundaries indicates that there are connections between frames. The following sections will interpret these news frames and the associated frame elements further and qualitatively based on the three metrics for a more detailed news frame analysis of AusCorp and ChnCorp.

5.3.1 News frames of AusCorp

Based on the results demonstrated above, the topic network of AusCorp was constructed as shown in Figure 4.4. A qualitative inspection is then conducted to interpret the news frames and the associated frame elements (i.e., topics) described in this section. First, it discusses the entire and episodic frame structure, followed by an interpretation of individual frames and the associated topics with the assistance of news corpus.

An overview of Australian health news frames and topics is provided using the above metrics. As demonstrated in Figure 1, the Australian health news topic network consisted of 30 topics (nodes $N=30$) and 2 news frames (colors $N=2$). Each frame consisted of 15 topics that together made up 50% of the whole corpus, so both frames represented the Australian health news corpus equally. The left cluster of topics was labelled as Frame 1 – food, diet and child health, and the right cluster was labelled as Frame 2 – health, disease, and lifestyle.

The core topics of Frame 1 were “child obesity”, “fat, sugar and salt”, and “daily diet”, while “female health” and “skin health” were the core topics of Frame 2. Nodes with larger sizes denote higher prominence indicating they were more frequently discussed in AusCorp. Topics that were smaller in size and located at the periphery were less frequent and loosely related to the other topics. Although these topics were usually subordinate concepts to core topics, some emerged as new ideas in recent years, which are also important.

While the quantity of included topics in the network has been calculated by PPL, all the included topics in the network were of high frequency in the entire corpus. It is necessary to emphasize, however, that topics which are of less frequency are no less critical to the whole corpus. For example, the topics of “food labelling and product information” and “health star rating” are in smaller nodes on the left-top of the whole network as they are two new concepts, which are prominent topics for public health improvement, associated with the efforts of Australian government and food manufacturers. These two frames and their topics are summarized as follows.

Table 5.3: Two frames and their topics identified in AusCorp

Frame	Frame 1: food, diet and child health	Frame 2: health, disease and lifestyle
Topic	Fat, sugar, and salt	Blood pressure and heart disease
	Processed meat products	Blood and urine
	Fast-food products	Women health
	Home cooking	Water and health
	Fast food and high calories	Liver health
	Child obesity	Skin health
	Daily diet	Life and work
	Alcohol	Drinks and sports
	Food labelling and product information	Nutrition and health
	Cooking recipe	Heart disease and diabetes
	Sugar and salt in cereals	Cancer
	Fast-food chains	Gluten-free and health
	Children and junk food advertising	Body weight and exercise
	Health star rating	Nutrition and cancer
	Organic and natural food	Health report

5.3.1.1 Frame 1: food, diet and child health

Frame labelling was determined by prominent topics in the frame community. Prominent topics were those with larger nodes in the network. In Frame 1, the prominent topics were “child obesity”, “fat, sugar and salt”, “daily diet”, “cooking recipe”, “children and junk food advertising”, and “fast-food products”, that is they were frequently discussed in news corpus. After consideration of the labels of these prominent topics and the represented news texts of each topic, Frame 1 was labelled as “food, diet, and child health”. News articles constructed by Frame 1 focused on food consumption and dietary habits connected with an individual’s food choice and particularly children’s dietary choice. Table 5.4 describes topics of Frame 1 and explained with news examples.

Table 5.4: Topics and examples of Frame 1 in AusCorp

Description	Example⁴
Fat, sugar, and salt	
The news texts state the health impacts of excessive fat, sugar, and salt intake, and recommend reducing the consumption of food products high in fat, sugar and salt, particularly ultra-processed foods.	“Too much sugar, salt and fat: convenience food manufacturers use this trio to create products with maximum appeal for the cheapest price”
Processed meat products	
The news texts focus on the major type of processed foods, namely processed meat products. The fact that processed meat contains excess salt content (sometimes fat and sugar as well) is usually revealed with concrete figures. It is recommended to limit the consumption of processed meat products for health benefit.	“New research analysing the salt content of more than 1000 processed meat products has found a sausage in bread with tomato sauce could contain 2.35 grams of salt”
Fast-food products	
The news texts discuss the health impacts of fast-food products, and recommend reducing the consumption of fast foods.	“Online coverage of the study was riddled with reader replies that those who eat fast food deserve what's coming to them”
Home cooking	

4 Examples are news texts from the AusCorp, which is the dataset of health news articles from Australian newspapers (1996-2019).

The news texts mention home cooking is usually compared with dine-out, and its health risks.	“The signs are that we're losing food skills that make home cooking easier - and it's not good for our health”
Fast food and high calories	
The news texts that discuss fast food usually emphasize unhealthy aspects, for example, high calories, which is associated with overweight and obesity.	“Critics struggle to see the benefit in meat substitutes which they say are actually unhealthy because they are highly processed with high calorie and salt content”
Child obesity	
The news texts focus on the child obesity, which is a serious health problem in Australia. Child obesity is usually discussed with the dietary habits of high calories, high salt, and high sugar intake.	“Taking calories, salt and sugar out of the food we eat is one part of the Government's child obesity plan and is strongly supported by parents”
Daily diet	
The news texts focus on daily diet and the dietary habits of the Australian population. The different levels of salt-intake in daily diets are discussed.	“they warned that modern lifestyles meant up to 60 per cent of daily energy intake was now coming from factory-produced foods”
Alcohol	
The news texts discuss unhealthy dietary habits, of which alcohol is one.	“A better diet is a given, he says, and as good as any place to start is avoiding a few old enemies: sugar, alcohol, too much meat, sweeteners”
Food labelling and product information	
The news texts focus on the Australian national voluntary front-of-pack labelling system which profiles the nutritional information of packaged food products.	“Professor Peters urged ministers responsible for food labelling to ensure the health star ratings aligned”
Cooking recipe	
The news texts provide cooking recipes, particularly for home cooking that encourage a healthy diet.	“Children of almost any age can help with this recipe, stirring or adding chopped pieces of fruit”
Sugar and salt in cereals	
The news texts discuss sugar and salt in cereals and remind consumers to be aware of the sugar and salt content in cereals and make a healthy choice for breakfast food.	“Manufacturers have agreed to reduce salt in bread, cereals, simmer sauces and processed meats through a Food and Health Dialogue pact between industry”
Fast-food chains	
The news texts mention fast-food chains,	“Choice sampled heavyweights Hungry

particularly the Australian story for fast-food giants and stores.	Jack's, McDonald's, KFC, Pizza Hut, Domino's, Subway, Red Rooster and Oporto”
Children and junk food advertising	
The news texts focus on the promotion of junk food on children’s TV and recommend junk food consumption should be limited and advertising should be banned to stop the childhood obesity boom in Australia.	“The study showed a voluntary bid to cut all junk-food advertising during C-rated TV shows and G-rated shows commonly watched by children has been a waste of time”
Health star rating	
The news texts focus on health star rating, the measure from the food industry to grade the health level of packaged food, which helps consumers to make healthier choices.	“They agreed on a health star rating system for the front of packaging, which will include a salt rating of between half a star and five stars, the more stars -- and less salt -- the better for you”
Organic and natural food	
The news texts discuss organic and natural food as a healthy dietary choice.	“Increasing pride in using the good fats: butter (often house-churned, organic and/or from a small-batch dairy), olive oil, cream, duck fat, even lard’

Child health, especially child obesity, is emphasized in news Frame 1. As an adverse health consequence, which has detrimental effects on various aspects of human health, it has become a serious health problem in Australian society. Child obesity, it has been intensively argued (e.g., Ng et al., 2014; Skinner & Skelton, 2016), is caused by excessive intake of fat and sugar. However, the association between obesity and dietary salt intake, and that high salt-intake as an independent risk factor for obesity, has long been overlooked. According to medical research findings (e.g., Lampuré et al., 2016; Stocker & Syed, 2017), excessive salt intake modifies the metabolism function of the human body, which alters the way the body absorbs fat. The over-consumption of salt may raise the risk of obesity, especially for children. The health condition of children, who are a very susceptible population group, has been highlighted in news media, as the news excerpt from the Daily Telegraph below shows.

Salt consumption by Aussie kids is slowly falling but almost 8 per cent still eat too much, increasing their risk of heart disease and obesity later in life.

(Daily Telegraph, 2018)

Childhood is a crucial period for developing one's taste. If the salt taste receptors are suppressed, people are more likely to eat highly salted foods in the future. As recommended, children and teenagers are more sensitive to excessive salt intake and should eat less salt than adults. As claimed by WHO (2016, 2020), that the over consumption of salt is associated with hypertension, and there is a link between hypertension in childhood and hypertension in adulthood, which contributes to the higher risks of cardiovascular diseases. Additionally, a high-salt diet increases the risk of obesity, which is linked to many types of cancer. Therefore, lowering the salt intake of children and teenagers may help lower the risks of hypertension and cardiovascular diseases in their adulthood, which is of extraordinary significance for public health at the national level. The high correlation is shown in the network of Figure 4.2, that “child obesity” and “fat, sugar and salt” are tightly connected. Meanwhile, “fat, sugar and salt” is connected with the topics “daily diet”, “home cooking”, and “fast-food products”, which are all strongly related to dietary habits. The advertising of junk food, or fast food, is a major source of high-salt food for children, and has been banned on children’s TV.

To conclude, Frame 1 of AusCorp emphasizes child obesity as a prominent topic, and demonstrates the interrelationship between child obesity and dietary habits. Reducing the consumption of high-salt food, such as junk food, is recommended to lower the risk of child obesity and other attributable diseases and cancers later in life.

In addition to the prominent topic of child health, Frame 1 includes food products (such as “processed meat products” and “fast-food products”) and dietary habits (such as “daily diet” and “home cooking”) at the same time. Suggestions and measures have been proposed to address the health impacts of fast food, for example, “health-star rating” and “food labelling and product information” are measures from the food industry, news examples of which are noted below. The Australian national voluntary front-of-pack (FOP) labelling system uses stars to indicate the healthy level, while food labelling shows the nutritional profile of packaged

food products to help consumers to make healthier choices. Topics such as “organic and natural food”, “sugar and salt in cereals” and “cooking recipe” also recommend healthier daily food choices.

While McCain didn't participate because it was involved in another global health initiative, the company said it had strategies to reduce salt, saturated fat and sugar; had recently updated its Global Advertising to Children Policy and would roll out Health Star Ratings this year.

(The Sydney Morning Herald, 2018)

The City of Cockburn has adopted a “traffic light” system that will force all food trucks at its events to restrict their product range to a maximum of 30 per cent “red” items that are high in fat, sugar, or salt.

(The West Australian, 2019)

5.3.1.2 Frame 2: health, disease, and lifestyle

Whereas Frame 1 focuses mainly on child health and dietary habits, news Frame 2 comprises 15 topics which are more abstract health concepts. The topics of Frame 2 focus on symptoms and diseases caused by excessive salt-intake. With the prominent topics “female health” and “skin health”, followed by “water and health”, “life and work”, “body weight and exercise”, news Frame 2 was labelled as “health, disease and lifestyle”. For example, the topics associated with health and disease include “female health”, “skin health”, “heart disease and diabetes”, “blood pressure and heart disease”. The topics associated with lifestyle include “body weight and exercise”, “drinks and sports”, “life and work”. Table 5.5 presents descriptions and examples of Frame 2 of AusCorp.

Table 5.5: Topics and examples of Frame 2 in AusCorp

Description	Example
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Blood pressure and heart disease	
The news texts focus on the relationship between blood pressure and the risks of heart disease.	“We know that too much salt in some people can cause high blood pressure, putting them at risk of heart disease and stroke”
Blood and urine	
The news texts discuss the health indicators of blood and urine, or the health problem indicated by blood in urine.	“But if the problem persists - particularly if there's blood in the urine - see your doctor as a priority”
Women health	
The news texts focus on female health from many perspectives, especially women health and dietary habits.	“Women should also include regular exercises aimed at tightening the butt in their work-outs”
Water and health	
The news texts discuss the relationship between water and health, for example, the health problem associated with excess water intake and inadequate salt intake, and safe drinking water and health.	“Excessive water intake, particularly in the presence of inadequate salt intake, laxatives and diuretics can lead to dangerously low levels of sodium in the blood that can lead to seizures or coma”
Liver health	
The news texts focus on liver health, and the health risks associated with dietary habits.	“Hinch was diagnosed with cirrhosis of the liver three years ago and told that if he kept drinking he would die”
Skin health	
The news texts focus on the skin health risks, especially the risks associated with dietary habits.	“Keeping out of the sun is the number one most important thing you can do for your skin”
Life and work	
The news texts discuss life and work, and focus on the relationship between life, work, and health.	“They are more likely to spend long periods commuting to work, giving less time and inclination to exercise”
Drinks and sports	
The news texts discuss how to drink properly while working out.	“Drink eight glasses of water (about 250ml each) a day, but you may need more if you're working out a lot”
Nutrition and health	
The news texts discuss the relationship between dietary nutrition and health.	“But a century of better nutrition and medicine, as well as general health awareness (currently an obsession), means that not only are we living longer but we expect to have a higher quality of

	life for longer as well”
Heart disease and diabetes	
The news texts focus on the health risks of heart disease and diabetes, especially the risks associated with dietary habits.	“A brisk walk before eating speeds the removal of fats from the blood. This almost certainly helps reduce the risk of heart disease and diabetes”
Cancer	
The news texts focus on the health risks of different kinds of cancers, especially the cancer risks associated with dietary habits.	“Lung cancer is the biggest cancer killer in men and the second biggest cancer killer in women, according to the Australian Institute Of Health and Welfare”
Gluten-free and health	
The news texts discuss gluten-free diets as healthy lifestyle and a fad for people with health concerns. However, different voices say that gluten-free diets are only necessary for people diagnosed with either coeliac disease or gluten intolerance.	“Rice is also gluten-free, making it ideal for people with coeliac disease. Try to go for brown rather than white rice”
Body weight and exercise	
The news texts discuss the relationship between body weight and exercise and recommend a healthy lifestyle to keep physically active.	“But there is no reason from this study to change the previous advice that suggests a healthy diet, being physically active and maintaining a healthy body weight is still the best formula for minimising cancer risk”
Nutrition and cancer	
The news texts discuss the relationship between nutrition intake and risks of cancer.	“Eat that barbecue last Saturday? Everyone knows that gives you cancer. On the one hand, it makes perfect sense to focus on mindful eating: diet clearly plays an important role in many degenerative diseases such as diabetes and heart disease”
Health report	
The news texts present findings of health reports that are usually published by the Australian Institute of Health and Welfare or Australian Health and Medical Research Institute. The health reports mainly focus on districts in Australia or mention the opinions of	“Health Reporter Most ACT adults rate their health as good, but suffer the highest rate in Australia of long-term conditions such as hayfever, allergies and migraines, a report reveals”

health reporters. The content of health reports relates to the health status of the Australian population over a long period of time, thus providing a macro perspective from which to understand the overall health status of Australians.

Female health is emphasized more in news Frame 2 as it has been an important issue of concern, based on the examination of news corpus, when discussing the health impact of excessive salt intake in Australian news since 2009. As the two news excerpts show below, the relationship between salt-intake and female health has been of concern, particularly for women in indigenous areas and during pregnancy and lactation.

Dietary practices reflected a high awareness of salt-related health issues and a good knowledge of food sources of sodium. These findings from a sample of healthy women in the Illawarra indicate that dietary sodium intakes are lower in this group than previously reported in Australia.

(Food Weekly News, 2010)

Sufficient iodine intake by pregnant and lactating women is crucial to their offspring's cognitive development. The aim of the present study was to explore the impact of iodized salt intake on the iodine status of pregnant and lactating women.

(Health & Medicine Week, 2015)

In addition, “water and health” and “gluten-free diet” have also been intensively discussed in relation to female health. Gender difference, as a socio-economic factor, has caused social disparities in health (Link & Phelan, 1995). An Australian health report argues that although females usually have longer life expectancy, healthy life expectancy is shorter than males and is more susceptible to pain. In this regard, as well as dietary health, other public health domains have witnessed a feminist turn that emphasizes female health conditions to reduce health

inequality. To conclude, female health is emphasized in Frame 2 as a prominent topic associated with the health impacts of excessive salt-intake. The interrelationship between female health, water and health, gluten-free diet, and kinds of diseases has been identified in the network.

Furthermore, besides the concern for female health, Frame 2 focuses on other more detailed health topics, for example, “liver health”, “heart disease and diabetes”, “blood pressure and heart disease”. Hypertension, or elevated blood pressure, is a serious risk factor which significantly increases the risks of cardiovascular diseases and other diseases. The modifiable risk factors of this “silent killer” include unhealthy diet (excessive salt-intake, saturated fat, and trans-fat), physical inactivity and obesity, and the consumption of alcohol and tobacco. Dietary habits, as modifiable risk factors of hypertension and cardiovascular diseases, have attracted increasing attention from news media with a large number of news articles associated with the relationship of excess salt intake and cardiovascular diseases. An example is shown below.

The Global Burden of Disease study found almost one in 20 deaths in Australia was attributable to high salt intake. Excessive salt consumption increases the risk of high blood pressure and cardiovascular disease..... Cutting back on salt is a cost-effective way to improve our health.

(Monash Leader, 2017)

5.3.1.3 Concluding remarks

All thirty topics and two news frames were identified in Australian health news through quantitative identification and qualitative examination of news corpus. News Frame 1 comprised 15 topics and was labelled as food, diet, and child health, while Frame 2 comprised 15 topics and was labelled as health, disease, and lifestyle.

Different concerns, under the overarching news theme of “salt-intake and health”, were identified in the two frames respectively. Frame 1 paid more attention to food products, dietary habits, and human health. Child health, particularly child obesity, was of much concern in this frame, with a relationship between child health and dietary habits established. It was noted that childhood is a critical time for children to establish healthy eating habits with less salt consumption, which can reduce the risk of obesity and some associated diseases later in life.

Frame 2 consisted of more abstract health concerns which focused on symptoms and diseases caused by excessive salt consumption. Female health, particularly the relationship between salt-intake and indigenous women during pregnancy and lactation, was a dominant topic of this frame. This frame also discusses adverse health impacts, such as hypertension, heart disease, and diabetes.

Overall, section 5.3.1 provides a qualitative interpretation of Australian health news frames and the prominent topics of each frame. As reflected in the demographic preferences of Australian news media, child health and female health are two crucial topics when discussing the health impacts of excess salt-intake in news media.

5.3.2 News frames of ChnCorp

This section qualitatively interprets the results of Chinese health news frames. First, the entire and episodic frame structures are explained, followed by the interpretations of sub-frames and the associated news topics in conjunction with specific news texts. In the next section, a comparison of news frames is made between AusCorp and ChnCorp.

Based on the topic network demonstrated in Figure 4.5, and the interpretation metrics, an overview of news frames of ChnCorp is provided. The largest community on the top was the most prominent frame with 14 topics (Frame 1 in green nodes), followed by the frame on the bottom with 9 topics (Frame 2 in red nodes), and the smallest frame on the right with 2 topics

(Frame 3 in yellow nodes). In reference to the prominent topics of each frame and the most representative news articles of each topic, each frame was labelled. Frame 1 – government regulation, health and disease, Frame 2 – food and consumers, Frame 3 – salt industry and iodized salt.

In the topic network, topics in larger nodes were more frequently discussed in news corpus than those in smaller nodes. For example, Frame 1 concerned mostly “government regulation”, “nutrition and health”, “high blood pressure”, while the issues of “processed food”, “market and consumers”, “food enterprise” were concerned mostly in Frame 2. Although topics on the periphery received less attention than the central topics, they were important components of the entire topic network which received news media attention and are included in the following sections. Table 5.6 summarized these three frames and their topics.

Table 5.6: Three frames and their topics identified in ChnCorp

Frame	Frame 1: government regulation, health and disease	Frame 2: food and consumers	Frame 3: salt industry and iodized salt
Topic	medical research	processed food	iodized salt
	nutrition and health	food production	salt industry
	government regulation	market and consumers	
	fat intake	processed meat product	
	heart disease	food enterprise	
	pregnant women health	instant food	
	high blood pressure	snack	
	diabetes	child food	
	dietary nutrition	food labelling	
	salt reduction		
	catering industry		
	kidney disease and stroke		
	obesity		
	life and work		

5.3.2.1 Frame 1: government regulation, health and disease

As the topic network shows, Frame 1 has the largest number of topics and is thus the most prominent frame of ChnCorp. Frame 1 of Chinese news corpus was labelled as “government regulation, health and disease” based on the included topics. Health news articles constructed by Frame 1 were focused mostly on government regulation of salt-intake control, and the attributable symptoms and diseases of excess salt-intake. The relationship between diseases and salt-intake was intensively discussed, for example, “kidney disease and stroke”, “high blood pressure”, “diabetes”, “obesity”, and “heart disease”, as the topics shown in Figure 5.4. Topics and news examples of Frame 1 are presented in Table as follows.

Table 5.7: Topics and examples of Frame 1 in ChnCorp

Description	Example⁵
Medical research	
The news texts present and discuss the findings of medical research associated with the relationship between salt or sodium intake and health.	Modern medical research has found that the sodium ion can inhibit the activity of respiratory tract cells when the concentration of sodium chloride is too high in human body.
Nutrition and health	
The news texts discuss the relationship between dietary nutrition and health, especially salt-intake and health.	Experts suggest reading nutrition facts labels when shopping at the Supermarket.
Government regulation	
The news texts discuss government regulations on food, nutrition, and health.	To research and formulate regional programs on food and nutrition development and incorporate food and nutrition development goals into regional plans for national economic and social development
Fat intake	
The news texts discuss the health impacts of excess fat intake, as another dietary risk factor which is usually mentioned together with excess salt intake.	An increase in breast cancer and colon disease is associated with high fat intake.
Heart disease	

⁵ Examples are news texts from the ChnCorp, and are translated into English by the author.

The news texts focus on heart disease, as one of the health risks of excess salt intake.	Children who eat too much salt have a higher risk of heart disease
Pregnant women health	
The news texts concentrate on pregnant women health, and the relationship between health and dietary habits.	Pregnant women who are over-weight, and consume too much salt and sugar are prone to develop hypertensive disorders in pregnancy
High blood pressure	
The news texts focus on the adverse health status of high blood pressure or hypertension, the attributable factors and diseases to which it may lead.	Factors that contribute to high blood pressure include age, genetics, excessive salt and fat intake, overweight or obesity, excessive working pressure, smoking and alcohol abuse, etc.
Diabetes	
The news texts focus on the disease of diabetes, especially type-2 diabetes, which is strongly associated with dietary habits.	Dietary nutrition is closely related to the occurrence of chronic diseases, and an inappropriate diet is an important risk factor for obesity, hypertension, diabetes, dyslipidemia, and other diseases
Dietary nutrition	
The news texts discuss the relationship between dietary nutrition and health, and emphasize diseases caused by malnutrition.	The new food labels will be able to reflect the latest scientific information and reflect the connection between nutrition and chronic diseases such as obesity and heart disease.
Salt reduction	
The news texts advocate salt reduction for individual health benefits and medical pressure reduction.	Reducing the amount of sugar and salt consumed by the citizens will indirectly reduce the pressure on medical system
Catering industry	
The news texts mention the Chinese catering industry and population health.	Consumers gradually increased their awareness of healthy diet, and the shift soon had a noticeable effect on the catering industry
Kidney disease and stroke	
The news texts focus on the relationship between kidney disease, stroke and dietary habits, especially high salt consumption.	High salt intake is not only closely related to hypertension, but also associated with myocardial infarction, heart failure, stroke, chronic kidney disease, tumor, etc.
Obesity	
The news texts discuss the relationship	The incidence of nutrition-related

between obesity and nutrition.	chronic diseases such as obesity, cancer, metabolic syndrome, and cardiovascular diseases has risen sharply in China
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Life and work

The news texts focus on daily life, work, and health. For example, the health impacts of physical inactivity lifestyle, dine-out and excess salt intake.	To reduce the frequency of dining out is conducive to the control of oil, salt, and sugar intake. Don't be sedentary at work. Stand up and take a walk every 40 minutes.
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The most prominent topic of Frame 1 is government regulation which refers to the national surveillance of salt consumption. It is argued that government regulation plays a significant role in salt-intake control. As proposed by the WHO, the SHAKE Technical Package for Salt reduction (2016) argues that surveillance could be practiced with three interventions: measuring and monitoring population salt consumption patterns, the sodium content of food, and the impact of salt reduction program (refer to the Appendix A). The Chinese news excerpt below discusses a document issued by the China State Council which acts as an intervention of health behaviors.

The China State Council issued the Opinions on implementing the Healthy China Action this year which contains 15 specific actions aimed at Chinese people's health behavior, including implementing the appropriate diet action and encouraging the whole society to participate in reducing salt, oil, and sugar. The reason why we should encourage salt reduction, oil reduction and sugar reduction is that a large number of research results have proved that diets high in salt, oil and sugar are not only the culprits of obesity, but also an important cause of cardiovascular and cerebrovascular diseases, diabetes, cancers and so on.

(Yangcheng Evening Newspaper, 2019)

A more specific monitor of sodium content of food was initiated by the State Administration for Market Regulation to supervise the safety and quality of packaged food products.

On December 10, the state administration for market regulation issued an announcement on strengthening the supervision over the quality and safety of flavored flour products, which put forward requirements for strengthening the supervision over the quality and safety of flavored flour products from six aspects, including unifying the classification of spicy flour foods, strengthening the control of raw materials and auxiliary materials and production process, and advocating reducing salt, oil and sugar.

(China Economic Information network, 2019)

Policy and regulation act as an important part of integrated strategies for salt intake reduction. As an effective measure to control salt-intake, government surveillance has been frequently discussed in news articles. For example, front-of-package nutrition labelling, which is used as a guidance of food selection, is usually taken as an intervention tool among salt reduction strategies. However, due to the different contexts, policy and regulation varies among different countries and cultures. WHO has played a bridging role of between health knowledge and specialized policy actions to assist countries in understanding what works and how to develop rational and appropriate policy actions. Policy coherence and political support maintenance, however, are more significant than policy actions. As well as government regulation, topics related to nutrition, health, and diseases, for example, “nutrition and health”, “high blood pressure” and “heart disease”, are included in Frame 1. The discussion on the attributable diseases of excess salt-intake is particularly intensive, as the topics of “kidney disease and stroke”, “high blood pressure”, “diabetes”, “obesity”, “heart disease” in Figure 2 shows. Please see the following is an example of news on the issue of attributable diseases.

Sodium is an essential nutrient, and too much of it can increase the risk of cardiovascular and cerebrovascular diseases such as hypertension and stroke, as well as stomach cancer. Data show that the average daily salt intake of Chinese residents is 10.5 grams....

(China Industry and Economic Information Database, 2019)

5.3.2.2 Frame 2: food and consumers

Frame 2 comprises 9 topics and is the second largest frame of the Chinese health news corpus, which is labelled as “food and consumers” based on the topics included. As can be seen in the figure, the components of Frame 2 primarily related to food products and consumers. For example, “processed food” is the most prominent topic, followed by “processed meat product”, “instant food”, “child food” and “snack” which are all related to food. Table 5.7 shows topics and examples of Frame 2.

Table 5.8: Topics and examples of Frame 2 in ChnCorp

Description	Example
Processed food	
The news texts discuss the health risks of processed food.	More than 75% of sodium in daily diet comes from processed food.
Food production	
The news texts discuss the health concern of food production.	The reduction of sugar and salt in snack foods is also following.
Market and consumers	
The news texts discuss the development of the Chinese food market and consumer health.	Therefore, condiment enterprises should follow the general direction of sugar and salt reduction, to bring better products to cater the health needs of the market and consumers steadily.
Processed meat product	
The news texts concentrate on processed meat products as a major processed food. The health impacts caused by the over consumption of it are discussed in the news.	It is recommended that patients with hypertension, the elderly, children should have more fresh meat than processed meat product.
Food enterprise	
The news texts focus on Chinese food enterprise development and the promotion of salt reduction in food products to produce healthy packaged food.	Food enterprises are encouraged to invest more in research and development and develop new products.

Instant food	
The news texts focus on the health impacts of the over consumption of instant food.	We are also getting more sodium from processed food, especially from instant food, baked goods and puffed foods.
Snack	
The news texts focus on the health risks of snacks, particularly emphasizing the “hidden salt” in snacks.	Some snacks also contain a lot of ‘invisible salt’, and some of them do not even seem to have salt.
Child food	
The news texts focus on the quality and health problems of child food.	Unhealthy high oil and high salt leisure food still has a market that ‘fifty-cent foods’ has also partly occupied the market of child food.
Food labelling	
The news texts discuss the measure of food labelling, by which the nutrition facts of packaged food are presented in food packing. It is a development of food industry.	<i>Baicaowei, Nongfu Spring, and Mengniu</i> have Joined FOP (front-of-Package) system since 2017 which gradually satisfy the condition of ‘three reductions’ by developing a series of nutrition standard rules to reduce oil, salt and sugar in food.

“Processed food” is a point of concern in the news, as the over-consumption of high-salt “processed food” or “instant food” is known to be harmful to human health. As the Global Health Observatory suggests, an unhealthy diet, which is largely responsible for the spread of non-communicable diseases, is represented by the high consumption of salt and fat, and lack of fruit and vegetables. Low-quality foods and malnutrition have been suggested as modifiable health risk factors that can influence the physical and mental health of human beings. While high-salt food is a modifiable health risk factor connected with an individual’s daily life scenarios, explanations of the health impacts of high-salt food in news media can attract the attention of the public and influence food choices and consumption habits. As an example, the following news quote illustrates the concern about food choices and offers suggestions.

Experts suggest reading nutrition facts labels when shopping at the supermarket, choosing packaged foods with low sodium content and foods labeled "lower salt," "less salt" or "no salt". When dining out, ask restaurants

to use less salt.

(China News Daily, 2017)

At the same time, “hidden salt” in food is of great concern when discussing high-salt food in Chinese news texts. As well as limiting salt-intake, it is important to care about the sodium content in food. As the following news text shows, condiments are high in sodium, which people should be aware of while cooking.

“Hidden salt” is easier to sneak into the body unconsciously than it is to see. Experts especially remind that to pay attention to condiments while cooking, the salt content in the condiments such as soy sauce, oyster sauce, bean paste, monosodium glutamate, chicken essence, salad sauce and seasoning pack is high, so people should choose low sodium salt, low salt soy sauce, reduce the amount of MSG, chicken essence, and bean paste as much as possible.

(China Youth Daily, 2017)

Besides the focus on food choices, Frame 2 also pays attention to “market and consumers” associated with the goal of salt reduction. The use of salt or condiments, and the consumption of ultra-processed foods are two major sources contributing to excessive salt intake in daily life. Working with the food industry and the market to reduce salt, therefore, provides strong support for an agenda of salt reduction. The United Kingdom’s salt reduction program, for example, has shown to be successful in working with the food industry to ensure foods contain less sodium. China also has started working with the food industry and markets as a strategy to lower salt consumption.

Some experts said that the salty food industry should work hard on developing natural food ingredients, adding fresh and reducing salt, and developing new compound seasonings to promote the supply-side reform of the industry and practice the "healthy China" concept.

5.3.2.3 Frame 3: salt industry and iodized salt

Frame 3 is a unique frame of Chinese health news comprising only two topics, the salt industry and iodized salt, indicating a special concern about the salt and salt industry. This frame was an individual frame for two reasons: (1) the specificity of topics as the meanings of each topic in this frame are exclusive and different from other frames; (2) the prominence of topics which can be seen in Figure 2 with large nodes indicating that these two topics were frequently discussed in health news articles. Table 5.9 shows topics and examples of Frame 3.

Table 5.9: Topics and examples of Frame 3 in ChnCorp

Description	Example
Iodized salt	
The news texts discuss iodized salt which is recognized as an intervention for Iodine deficiency disorder (IDD) control, and meanwhile, the side effect is also discussed.	After years of iodized salt intervention, the incidence of thyroid disease in China has been significantly reduced
Salt industry	
The news texts discuss the history and reform of the salt industry.	Restrictions on the regions where salt can be produced and sold have been removed, and companies can adjust the prices of salt products according to market demand, according to a <i>Plan on the Reform of the Salt Industry System</i> released by The State Council of China.

The news articles discuss the market-oriented reform of the Chinese salt industry. With iodized salt, the heterogeneity of iodine intake among regions and populations has attracted the attention of the news media as it can prevent and control iodine deficiency among Chinese residents. As the over-consumption of iodine can cause health hazards, news media has also discussed the health impacts of excessive iodine intake and the importance of differentiated iodine intervention measures and accurate iodine supplementation.

5.3.2.4 Concluding remarks

The Chinese health news corpus identified 25 topics and three news frames due to their heterogeneity of topic communities. News Frame 1 consisted of 14 topics and was labelled as government regulation, health and disease. Frame 2 consisted of nine topics and was labelled as food and consumers. Frame 3 comprised only two topics and was labelled as salt industry and iodized salt.

According to the descriptions of each topic, different features were detected in the three news frames. Frame 1 showed special concerns about government regulation for salt-intake control, and the attributable symptoms and diseases of excess salt-intake. Relevant political actions and government regulation measures for salt reduction were advocated in news texts as well as topics related to health and diseases. Identification of the relationship between malnutrition, unreasonable dietary habits and diseases was paid much attention in this frame. Frame 2 discussed food products and consumers, with processed food a particular issue of concern as a dietary risk factor for some diseases. For example, the health risks of instant food, snacks, and processed meat products were intensively discussed. Frame 3 was a unique frame that focused on iodized salt, the development of the Chinese salt industry and health concerns about iodized salt.

To summarize, section 3.4 introduced and elaborated three news frames detected in Chinese health news. Government regulation on salt consumption and the health impacts of processed food were the focus when discussing the relationship between excess salt intake and health. Frame analysis identified the importance of government policy advocacy, processed food production, and the health concerns about consumers in Chinese news media.

5.4 The construction of proximity

This section focuses on the construction of information proximity, and analyzes the constructions of geographical closeness and cultural closeness in AusCorp and ChnCorp respectively. In this study, information relevance is defined as the extent to which health news messages are relevant to the lives of the news audiences, which comprises news frames, proximity, and personalization. Proximity comprises geographical closeness and cultural closeness, and personalization comprises population groups and human emotions.

5.4.1 Geographical closeness construction in AusCorp and ChnCorp

Communication Infrastructure Theory (CIT) research argues that both place and ethnicity matter in health communication. Populations habituated in different geographical communities' experience health disparities. Even the same ethnic group living in different places may have different health conditions, and vice versa (Kim & Ball-Rokeach, 2006; Wilkin, 2013).

The relationship between geography and health disparities has been extensively examined in different cultural contexts, and diverse regions in regards to the influence of dietary habits. A good example to illustrate the regional health disparity is the North-South gradient of Italy. Regional socio-economic health disparities in Italy result from the differences between health care systems, accompanied by living conditions, in North and South regions of Italy (Franzini & Giannoni, 2010; Toth, 2014). In China, there are significant differences in dietary habits and cultures among different geographical areas in China. For example, the average salt-intake level increases from South China to North China. As reported by People's Daily (22 May 2019), the average daily salt intake is about eight grams in the South while 12 to 13 grams in Beijing and 14 to 16 grams, are consumed in North-east China. In relation to this, populations living in North China may have a higher incidence of diseases attributable to excess salt-intake.

Since salt consumption level is sensitive to geography, proximity through geographic closeness in news texts could attract increased attention from target audiences and contribute to

information relevance. For example, news reporting on a health event that happened in Sydney will attract more attention from populations living in Sydney, through creating geographic closeness, than news without geographical markers.

In this section, the concept of geographical closeness is operationalized by using local place names in news texts or words that indicate relevant place connections, potentially constructing proximity, and the relevance of news content. By mentioning local places, the expected targeted audiences are more likely to be attracted and make a connection between news messages and their own life scenarios.

First, the construction of geographical closeness in AusCorp, was analyzed with words that are relevant to local places compiled into lexicon 1, Australian local places (hereafter L1), according to the extracted wordlist of AusCorp facilitated by WordSmith. L1 comprises 44 words, with the most frequent word being Australia (3848 instances). Table 5.10 lists the top-ten most frequent words of L1 with Sydney is the most mentioned city, followed by Melbourne, Adelaide, Brisbane, and Hobart. NSW (New South Wales) is the most frequently mentioned Australian state (or territory), followed by Queensland, Tasmania, and North Territory.

Table 5.10: The most frequent ten words of L1

Word	Freq.	%	Word	Freq.	%
1 Australia	3848	0.12	6 Adelaide	215	< 0.01
2 Sydney	976	0.03	7 Tasmania	215	< 0.01
3 NSW	664	0.02	8 Brisbane	200	< 0.01
4 Melbourne	653	0.02	9 Northern Territory	117	< 0.01
5 Queensland	465	0.01	10 Hobart	62	< 0.01

As demonstrated in Table 6.3, “Sydney” and “Melbourne”, and “NSW” and “Queensland” are the most frequently mentioned geographic areas in AusCorp. The words with low frequencies (less than 0.01%) will not be examined further. The significant collocates of these four areas (i.e., “Sydney”, “Melbourne”, “NSW” and “Queensland”) were examined as node words to

establish the focus of discussions in these areas. Table 5.11 shows the most frequent collocates of the mentioned city names and their six semantic categories: geographical places, public places, research and organizations, people, food, and health and diseases. These collocates suggest that: (1) the major cities and states are usually mentioned as geographic places; and (2) places, organizations and people associated with research, medical and nutrition therapy are the common collocates, “university”, “hospital”, and “nutritionist”. Some collocates such as: (1) function words e.g., “from”, “that”, “also”; (2) adjectives, e.g., “international”, “global”, “best” and (3) verbs, e.g., “have”, “says”, “change” are categorized as “miscellaneous” and omitted from the table as they could not be categorized into any group.

Table 5.11: Frequent geographic areas: significant collocates categories in AusCorp

	Sydney	Melbourne	NSW	Queensland
Category	Collocates	Collocates	Collocates	Collocates
Geographic places	Melbourne, Brisbane, Australia	Sydney	Sydney, Queensland, Australia, Victoria	Australia, Victoria
Public places	Hospital, restaurant, school	Hospital, restaurant	School, canteen	School
Research and organizations	University, institute, research, center, conference, clinical, medicine	University, institute, research, study, center	Council, government, university, department, association, center, clinical, study, survey, education	University, technology, government, research, council, association, medical
People	Professor, chef, researchers, people, dietitian, nutritionist, Australian, expert, public	Dietitian, chef, baker, professor, children, people, public, researchers	Children, public, executive, manager, people, Australian, minister	Children, professor, Australian, spokeswoman, parents, people
Food	Fish, salt	Salt	-	Sugar
Health and diseases	Obesity, nutrition	-	Cancer, obesity, nutrition	Nutrition, cancer, diabetes, obesity

Geographic closeness was constructed from the wordlist derived from the Chinese health news corpus with words relevant to local places and compiled into lexicon 2 (hereafter L2). L2 comprises 28 words with the most frequent being Beijing (55 instances). Table 5.12 lists the most frequent ten words with the cities “Beijing”, “Shanghai”, “Guangzhou”, and “Chengdu”, and the provinces “Shandong”, “He’nan”, “Jiangsu”, “Fujian”, and “Guangdong” the most frequently mentioned in the news. However, except Beijing, Shanghai, and China, other words are in very low frequencies (less than 0.01% of running words) and will not be examined. Beijing and Shanghai were examined further to obtain more information about the discussion around these two Chinese metropolises.

Table 5.12: The most frequent ten words of L2

Word	Gloss	Freq.	%	Word	Gloss	Freq.	%
1 北京	Beijing	55	0.02	6 河南	He’nan	16	< 0.01
2 上海	Shanghai	48	0.02	7 江苏	Jiangsu	16	< 0.01
3 中国	China	45	0.01	8 成都	Chengdu	15	< 0.01
4 广州	Guangzhou	29	< 0.01	9 福建	Fujian	15	< 0.01
5 山东	Shandong	20	< 0.01	10 广东	Canton	15	< 0.01

Examination of the collocates of these words identifies geographic places as the only semantic category for Beijing and Shanghai. Table 5.13 presents the significant collocates of Beijing as Shanghai and Guangzhou, the significant collocates for Shanghai as Beijing, Guangzhou, and Shenzhen. As Beijing, Shanghai, Guangzhou, and Shenzhen are frequently mentioned contiguously, sentence examples of these two node words were examined and the dietary habits and health conditions of populations in Beijing and Shanghai discussed.

Table 5.13: Frequent geographic areas: significant collocates categories in ChnCorp

	Beijing	Shanghai
Category	Collocates	Collocates
Geographic places	Shanghai, Guangzhou	Beijing, Guangzhou, Shenzhen
Examples	(1) The results showed that salt intake per person in Sichuan restaurants in Beijing, Shanghai and Guangzhou was 5.479 grams per meal.	

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- (2) 43 % of urban residents said they had experienced heart palpitations, fatigue, dizziness, breathing difficulties and other abnormal symptoms of the cardiovascular system. Compared with the survey results in 2009, Beijing, Shanghai and Guangzhou showed a significant upward trend.
- (3) Cervical spine abnormality, dyslipidemia, hyperplasia of female breast and obesity were the abnormal items with the highest rates of detection; the detection rate of at least one index abnormality in the sample population of Beijing, Shanghai and Guangzhou is above 90%.
-

The analyses of frequently occurring local place names reveal several findings. First, the major cities received more attention, for example, Sydney, Melbourne, Beijing, Shanghai, are the famous metropolises of Australia and China were frequently discussed in the health news corpora which suggests that news geographical closeness is constructed based on well-known places (i.e., major cities, economically developed and densely populated places).

Comparison of the frequencies of two pairs of words, i.e., “Sydney” and “Beijing” (most well-known cities), “Australia” and “China” identify that whereas “Sydney” and “Beijing” have similar frequencies, and are frequently discussed in health news texts, the frequency of “China” is significantly lower than “Australia”. It may indicate Australian media are more likely to frame issues in a national context than Chinese media.

Second, from the analysis of collocates for Australian places, the construction of geographical closeness is represented by mentioning the public places such as hospitals, restaurants, and schools, or the people of specialized occupations, for example, professor, chef, and dietitian. Collocates for Chinese places reveal that the discussion of the dietary habits and health conditions of populations, public places or people of specialized occupations are not mentioned.

5.4.2 Cultural closeness construction in AusCorp and ChnCorp

Systemic functional linguistics (SFL, Halliday & Matthiessen, 2004) is an approach to linguistics that considers language as a social semiotic system (Fomin, 2020). Social semiotic theory of communication assumes that environments always have effects, through many factors

that make up the environment. SFL regards systems of meaning as fluid, contingent and changing in relation to context, history and culture (Halliday & Matthiessen, 2004). From this perspective, news as an artefact in given cultural contexts, should be considered as a social artefact that is shaped over time by culturally organized communities, and evaluated in a macro-scope of culture (Bednarek et al., 2011).

As has been noted previously, there is a discrepancy in public health communication between the knowledge of experts and the knowledge of amateur audiences (Zhao & Lyu, 2021). The public health promotion materials are usually packed with complex jargon and professional terminology, which constrains a general readership's understanding of information about health and to make informed decisions. This discrepancy calls for an urgent transformation of public health communication materials from "write for literates" to "write for all" (ibid). The construction of cultural closeness in health news, in this study, is believed to be critically important to form the news style of 'write for all', to reconcile this discrepancy. In the professional literature, cultural closeness is also termed as cultural accessibility, cultural proximity, or cultural consonance (Ahva & Pantti, 2014; Dressler, 2018), denoting the degree to which the news texts are culturally close to the target audiences. Since this study focuses on the news reporting on dietary health impacts caused by excessive salt-intake, cultural closeness is conceptualized as discussion of dietary cultures in news corpus, and operationalized as terms related to dietary cultures in AusCorp. Lexicon 3 (hereafter L3) comprises 351 words which related to Australian dietary cultures were examined first. The most frequent word is "salt" (11549 instances) which accounts for 0.36% of running words in the AusCorp. As Table 5.14 presents, the most frequent words are common condiments and food such as "salt", "sugar", and "fruit". To obtain a further insight into the frequent discussions of these dietary cultural words in AusCorp, clusters of the two groups of frequent words were further investigated: (1) condiments, that is, salt and sugar; and (2) common foods, that is, fruit, vegetables, meat, bread, milk, and fish.

Table 5.14: The most frequent ten words of L3

	Word	Freq.	%		word	Freq.	%
1	salt	11549	0.36	6	vegetables	3481	0.11
2	foods	9072	0.28	7	meat	3116	0.10
3	sugar	6755	0.21	8	bread	2485	0.08
4	diet	5913	0.18	9	milk	2261	0.07
5	fruit	4230	0.13	10	fish	2176	0.07

Table 5.15 shows the clusters of two node words, “salt” and “sugar” listed in descending order of frequency. As can be seen, “salt”, “sugar”, and “fat” are closely placed in the clusters, with frequent descriptions of “high” and “too much”. It is concluded that excessive salt-intake is often discussed contiguously with the excessive sugar and fat intake in the Australian news.

Table 5.15: List of frequent clusters of “salt” and “sugar”

	Clusters of “salt”	Freq.	Clusters of “sugar”	Freq.
1	Sugar and salt	556	Sugar and salt	556
2	Fat and salt	345	Fat, sugar and	370
3	Salt and sugar	336	Salt and sugar	336
4	Fat, sugar and	324	Fat and sugar	188
5	High in salt	260	Sugar, salt and	180
6	Fat, salt and	227	Salt, sugar and	180
7	Too much salt	221	Sugar and fat	167
8	Salt and fat	200	Blood sugar level	142
9	High in fat	194	In fat sugar	138
10	Sugar, salt and	180	Sugar, fat and	124

The high-frequency clusters of common foods words were further examined with the lists presented in Table 5.16. As revealed, first, that daily food consumption, particularly fresh fruit, green leafy vegetables, lean meat, white bread, and low-fat/full-cream milk, received considerable attention. Secondly, the portion sizes of food intakes and choices were discussed. For example, discussion of servings of fruit and slices of bread indicate a focus on the amount of food intakes, while red meat/lean meat suggests the concern for food choices.

Table 5.16: List of frequent clusters of “fruit”, “vegetables”, “meat”, “bread”, “milk” and “fish”

Clusters of fruit		Freq	Clusters of vegetables		Freq.	Clusters of meat		Freq.
1	Fruit and vegetables	818	Fruit and vegetables	818	Lean red meat	69		
2	Of fruit and	263	Fruits and vegetables	186	Of red meat	68		
3	Fresh fruit and	242	And vegetables and	106	Red meat and	61		
4	Fruit and veg	204	Green leafy vegetables	90	Lean meat and	55		
5	Serves of fruit	118	Of vegetables and	89	Lean meat fish	45		
Clusters of bread		Freq	Clusters of milk		Freq.	Clusters of fish		Freq.
1	Such as bread	52	Low fat milk	144	Fish and chips	83		
2	Slices of bread	49	Full cream milk	60	Fish such as	59		
3	White bread and	44	Fat milk and	49	Lean meat fish	50		
4	Salt in bread	42	Glass of milk	47	Such as fish	32		
5	Two slices of	38	Such as milk	33	Meat and fish	30		

An investigation of dietary cultural terms in Chinese news corpus reveals a distinctly different pattern of words showing unhealthy foods frequently mentioned in Lexicon 4 (hereafter L4). L4 comprises 185 words. There is a high frequency of “Fifty-cent foods” (248 instances), and its synonym “fifty-cent snack” (126 instances), which are both highly cultural contextual words. “Fifty-cent foods” (or “snack”) refer to the kind of cheap foods which cost about fifty cents such as puffed foods, flour products (for example spicy breadsticks), candies and drinks, which are sold usually on or around educational campus and in rural areas in China. Children are the targeted consumers because of the low prices and easy accessibility. Over consumption of “fifty-cent foods” (or “snack”) leads to health impacts because they are high in salt, sugar and oil, and the overuse of sweeteners and preservatives. In addition, words representing unhealthy foods, fruits, vegetables, child food, and light meal are also of high frequency.

Table 5.17: The most frequent ten words of L4

Word	Gloss	Freq.	%	Word	Gloss	Freq.	%
1 五毛食品 wumao shipin	Fifty-cent foods	248	0.08	6 蔬菜 shucai	Vegetab les	100	0.03
2 盐 yan	Salt	217	0.07	7 儿童食品 Ertong shipin	Child food	94	0.03
3 五毛零食 wumao lingshi	Fifty-cent snack	126	0.04	8 辣条 latiao	Spicy breadsti cks	94	0.03

4	水果 shuiguo	Fruits	122	0.04	9	垃圾食品 shipin	laji Junk food	83	0.03
5	糖 tang	Sugar	110	0.04	10	轻食 qingshi	Light meal	79	0.03

The key clusters of unhealthy foods, represented by “fifty-cent foods”, “fifty-cent snacks” and “spicy breadsticks”, were further investigated to identify the frequent discussions. As shown in Table 5.18, the clusters of “fifty-cent foods”, “fifty-cent snacks” and “spicy breadsticks” are investigated as they are synonyms in many cases. As can be seen from these high frequency clusters, the health and safety issues of cheap snacks has received considerable media attention, especially for children’s health.

Table 5.18: High-frequency clusters of “fifty-cent foods”,
“fifty-cent snacks” and “spicy breadsticks”

Clusters	Translation	Freq.
Fifty-cent foods		
五毛食品即单价为五毛 Wumao shipin ji danjia wei wumao	The price of fifty-cent food is fifty cents	13
五毛左右的调味面制品 Wumao zuoyou de tiaowei mianzhipin	Seasoned flour products of about fifty cents	12
五毛食品的黑窝点 Wumao shipin de heiwodian	The “black” workshops of fifty-cent food	11
Fifty-cent snacks		
流行于学校周边小杂食店的五毛零食 Liuxing yu xuexiao zhoubian xiao zashidian de wumao lingshi	The fifty-cent snack which is popular in the small grocery stores around schools	6
五毛零食样本的脂肪 Wumao lingshi yangben de zhifang	The fat content of fifty-cent snack samples	6
五毛零食呈现油盐甜三高 Wumao lingshi chengxian you yan tian san’gao	Fifty-cent snacks present to be high in oil, salt and sugar	5
Spicy breadsticks		
调味面制品，辣条，豆制品 Tiaowei mianzhipin, latiao, douzhipin	Seasoned flour products, spicy breadsticks, soy products	13
辣条，豆制品，肉制品	Spicy breadsticks, soy products, meat	13

Latiao, douzhipin, rouzhipin	products
五毛左右的调味面制品辣条	About fifty-cent seasoned flour
Wumao zuoyou de tiaowei mianzhipin latiao	product spicy breadsticks

To conclude, analyses of the construction of cultural closeness in AusCorp and ChnCorp produced several results. First, comparison of the frequency percentages of the top ten words identified dietary cultural terms more frequently in Australian media news than in the Chinese media news. Secondly, whereas AusCorp mentions basic and common foods frequently for example, fruit, vegetables, and meat, Chinese health news prioritizes discussion of unhealthy foods (especially speaking, high-salt foods) such as “fifty-cent foods/snacks”, “spicy breadsticks”, and “junk food”. This difference may indicate a tendency to give warnings of unhealthy dietary habits when discussing health impacts of excessive salt-intake in Chinese news. It also suggests there are concerns about the dietary health of children who are the target consumers of cheap snacks and are increasingly affected by health problems.

5.4.3 Concluding remarks

Section 5.4 examined proximity, as one component of information relevance in AusCorp and ChnCorp, respectively. This study conceptualizes proximity linguistically as a reflection of geographical and cultural closeness. Geographical closeness is represented by words related to local places and cultural closeness is represented by dietary cultural terms through which news texts build a close relationship with readers. Based on self-built specialized lexicons and corpus linguistic analyses, the language patterns prevalent in news discourse identified by linguistic saliency have been revealed. These examinations revealed a number of pertinent findings regarding proximity construction.

First, the proximity construction of AusCorp includes: (1) the major states and cities (i.e. Sydney, Melbourne, NSW and Queensland) are the most frequently mentioned local places to

construct geographical closeness in health news; (2) the organizations and people associated with medical research and nutrition therapy in these major states and cities are frequently discussed; (3) daily food consumption, particularly the intake and preference of common food, for instance, serves of fruit, and the choice of low-fat or full-cream milk, are extensively discussed.

The proximity construction in the ChnCorp includes: (1) the major cities (i.e., Beijing and Shanghai) are frequently mentioned place names creating geographical closeness; (2) news media are interested in the dietary habits and health conditions of people in the major cities; (3) the emphasis on unhealthy foods in news discussion, especially the relationship between children's health and unhealthy food consumption creates cultural closeness.

Investigation into the construction of proximity in Australian and Chinese health news corpora has identified preferences prevalent in health news discourse and similarities and differences between them are highlighted. First, geographical closeness in the news is constructed based on well-known places in both corpora. However, while organizations, public places, and professionals in major places have been frequently mentioned in AusCorp, the dietary habits and health concerns of people in major cities have been frequently discussed in ChnCorp. Furthermore, whereas the discussion of common and daily food consumption in AusCorp is used to create cultural closeness, Chinese news focuses on the health impacts of unhealthy food consumption.

5.5 The construction of information personalization

As previously reported, the concept of information relevance comprises news frames, proximity, and personalization. This section reports the results of personalization constructions in AusCorp and ChnCorp.

5.5.1 Population groups construction in AusCorp and ChnCorp

The entire population must be informed of dietary health risks in order to improve the health and wellbeing of communities. People who are concerned about the impacts of dietary health risks are able to manage the risks. It is well recognized that effective health communication should acknowledge that because individuals have different levels of risk perception, their understandings of risk will need different risk-management plans. Although targeting population groups with specific health messages is inevitably a huge project, the design of health messages should consider the variety and diversity of target population groups. Demographics or population segments are based on social and cultural contexts which involve various parameters and are generally constantly shifting.

The gender and age as socio-demographic parameters of segmentation are both crucial influences on health disparities. Although the social roles of men and women converge to some extent, there are still differences in social practices around food issues such as food consumption and dietary behaviors. Physiological factors can result in different levels of vulnerability to dietary health risks for male and female. For example, the diet is influenced by hormonal changes and micronutrient deficiencies for women during different stages of their lives such as pregnancy. Likewise, ages differences can influence dietary preferences and demands.

As population segments have different dietary habits tailored health messages are required. First, because population groups have different approaches to a common goal of reducing salt in their diets, the recommendation for children might be less consumption of fast food, while for adults it is perhaps to alter their cooking recipes to include more spices instead of salt. Second, population groups have different preferences for the presentation of health messages. For example, while the elderly may be less willing to change their behaviors, they might be more responsive to suggestions associated with their life scenarios.

This research focuses on the news expressions of different segments of the population in relation to different preferences for health messages; it explores the conditions which induce individuals to look for information relating to dietary health risks. The research applies gender and age as two socio-demographic parameters of population segmentation and tries to eliminate cultural and even ideological biases toward population groups. The findings are compared and discussed between AusCorp and ChnCorp of health news texts to understand how specific messages to population segments should be tailored.

First, the terms associated with population segments in Australian news corpus were compiled into L5, which comprises 81 words, the most frequent of which is “you” (18994 instances) accounting for 0.59% of running words. The words that are markers of gender, age or socio-economic status, for example, “she” and “children” are summarized in Table 5.19 to establish the expressions of population segments. Words without gender, age or socio-economic status markers, for example, “you”, “they”, and “we”, are omitted from the table.

Table 5.19: The top-ten high-frequency words in L5 with gender, age or socio-economic status markers

	Word	Freq.	%		Word	Freq.	%
1	she	5934	0.18	6	kids	2061	0.06
2	children	5386	0.17	7	men	1337	0.04
3	his	3065	0.10	8	adults	1093	0.03
4	her	2943	0.09	9	child	1087	0.03
5	women	2763	0.09	10	baby	716	0.02

Table 5.19 shows that “she” (5934 instances) is the most frequent gender marker word accounting for 0.18% of running words; “children” (5386 instances) is the most frequent age marker word accounting for 0.17% of running words in the AusCorp. An examination of the key clusters of following pairs of words with corresponding relationships was also undertaken to identify the types of words occurring with these node words: “men” and “women”, “children”, and “adults” (Table 5.20). The examination of clusters of “men” and “women”, “children”, and “adults” found several instances connected to health, for example, “middle

aged men”, “for pregnant women”, “children are overweight”, and “adults are overweight”. Frequent topics of discussions included: (1) the relationship between men’s health and age; (2) the relationship between women’s health and physiological stages (i.e., pregnancy, breastfeeding, post-menopause); (3) children and adults’ health status and overweight problem.

Table 5.20: Key clusters of “men” and “women”, “children” and “adults” in AusCorp

	Clusters of men	Freq.	Clusters of women	Freq.
1	Men and women	163	Men and women	163
2	For men and	76	Percent of women	107
3	Percent of men	64	For women and	45
4	Of men and	52	Women who are	41
5	Both men and	28	And women aged	33
6	Women and men	21	Women who have	32
7	Day for men	20	And breastfeeding women	27
8	Middle aged men	17	For pregnant women	25
9	Women than men	17	Post-menopausal women	25
10	In older men	15	Of Australian women	24
	Clusters of children	Freq.	Clusters of adults	Freq.
1	Percent of children	109	Percent of adults	73
2	Aimed at children	98	Of Australian adults	49
3	Advertising to children	93	Adults and children	38
4	Of Australian children	77	Adults are overweight	36
5	Children to eat	61	Children and adults	33
6	Children are overweight	59	Of adults and	32
7	Australian children are	59	Australian adults are	27
8	Food to children	56	Of adults are	26
9	Children and adolescents	55	Intake for adults	26
10	To children and	55	Australian adults and	25

Secondly, terms associated with population segments in Chinese health news corpus, 33 words with “他” (ta, lemma HE) the most frequent word (93 instances) accounting for 0.03% of running words in the corpus, were identified and compiled in L6. Using the same word selection procedures, the words associated with gender, age or socio-economic status markers are included and listed in Table 5.21. As presented, the frequencies of six words account for more than (or equal to) 0.01% of running words, namely “他” (ta, lemma HE), “儿童” (ertong, children), “专家” (zhuanjia, experts), “记者” (jizhe, journalists), “她” (ta, lemma

SHE), and “院士” (yuanshi, academician). The frequencies and types of words related to population segments show that the important roles professionals play in Chinese health news differ.

Table 5.21: The most frequent ten words of L6

	Word	Gloss	Freq.	%		Word	Gloss	Freq.	%
1	他 ta	he	93	0.03	6	院士 yuanshi	fellow of an academic institution	41	0.01
2	儿童 ertong	children	70	0.02	7	老年人 laonianren	the elderly	27	< 0.01
3	专家 zhuanjia	experts	63	0.02	8	中国人 zhongguoren	Chinese people	18	< 0.01
4	记者 jizhe	journalists	58	0.01	9	孕妇 yunfu	pregnant women	17	< 0.01
5	她 ta	she	55	0.01	10	业内人士 yeneirenshi	industry insiders	16	< 0.01

No key cluster was identified for the node words through a WordSmith examination because of low frequencies. An investigation of the concordances of these words, however, provided an insight into what is discussed with these population related words in Chinese health news. As the concordances of “他” (ta, lemma HE), “她” (ta, lemma SHE) and “记者” (jizhe, journalists) delivered limited information, the concordances of “儿童” (ertong, children), “专家” (zhuanjia, experts) and “院士” (yuanshi, fellow of an academic institution) from the entire Chinese news corpus, were examined. Table 5.22 lists several extracted concordances of these words, accompanied by translations.

Table 5.22: Concordances of “儿童” (ertong, children), “专家” (zhuanjia, experts) and “院士” (yuanshi, fellow of an academic institution) in ChnCorp

Chinese source text	English translation
Concordances of “儿童” (ertong, children)	

<p>1 给孩子买食品, 需要注意啥? 不要只盯着“儿童”字样, 更要关注食品的营养配比和成分结构。 Gei haizi mai shipin, xuyao zhuyi sha? Buyao zhi dingzhe “ertong” Ziyang, geng yao guanzhu shipin de yingyang peibi he chengfen jiegou.</p>	<p>What should I pay attention to when buying food for my children? Don't just focus on the word “children”, but also focus on the nutritional ratio and composition of the food.</p>
<p>2 儿童已成为零食的主要消费群体, 但大部分零食并不适宜儿童整包食用, 高频消费的休闲食品和饮料将直接导致儿童肥胖。 Ertong yi chengwei lingshi de zhuyao xiaofei qunti, dan dabufen lingshi bingbu shiyi ertong zhengbao shiyong, gaopin xiaofei de xiuxian shipin he yinliao jiang zhijie dao zhi ertong feipang.</p>	<p>Children have become the main consumer group of snacks, but most of the snacks are not suitable for children to eat the whole package, and the frequent consumption of snack food and beverage will directly lead to childhood obesity.</p>
<p><i>Concordance of “专家” (zhuanjia - experts)</i></p>	
<p>1 专家建议, 居民除了减少吃盐量, 还可选用低钠盐。与普通钠盐相比, 低钠盐含钠低(氯化钠含量为70%左右)、富含钾(氯化钾含量30%左右), 可降低心血管疾病风险。 Zhuanjia jianyi, jumin chule jianshao chiyan liang, haike xuanyong dina yan. Yu putong nayan xiangbi, dina yan hanna di (lvhuana hanliang wei 70% zuoyou), fuhan jia (lvhuajia hanliang 30% zuoyou), ke jiangdi xinxueguan jibing fengxian.</p>	<p>In addition to eating less salt, experts suggest that residents opt for low-sodium salt. Compared with regular sodium salts, low sodium (about 70 percent sodium chloride) and high potassium (about 30 percent potassium chloride) may reduce the risk of cardiovascular disease.</p>
<p>2 专家建议, 在超市购买食品时要学会阅读营养成分表, 尽可能选择钠盐含量较低的包装食品, 和具有“低盐”“少盐”或“无盐”标识的食品。 Zhuanjia jianyi, zai chaochi goumai shipin shi yao xuehui yuedu yingyang chengfenbiao, jinkeneng xuanze nayan hanliang jiaodi de baozhuang shipin, he juyou “diyan” “shaoyan” huo “wuyan” biaoshi de shipin.</p>	<p>Experts recommend reading nutrition labels at the supermarket, choosing packaged foods that are low in sodium and labeled “low in salt”, “little in salt” or “no salt”.</p>
<p><i>Concordance of “院士” (yuanshi - fellow of an academic institution)</i></p>	
<p>1 中国工程院院士、北京工商大学校长孙宝国说, 有些企业标榜‘零添加’, 加深了消费者对食品添加剂的误解。 Zhongguo gongchengyuan yuanshi, Beijing gongshang daxue xiaozhang</p>	<p>Sun Baoguo, an academician of the Chinese Academy of Engineering and president of Beijing Technology and Business University, said that some companies' claims of “zero additives” have</p>

	sunbaoguo shuo, youxie qiye biaobang “lingtianjia”, jiashen le xiaofeizhe dui shipin tianjiaji de wujie.	deepened consumers' misunderstanding of food additives.
2	中国工程院院士、中国健康科普专家李连达说，慢性病很大程度上是由于人们的不良生活方式和行为引起的。 Zhongguo gongchengyuan yuanshi, zhongguo jiankang kepu zhuanjia lilianda shuo, manxingbing henda chengdu shang shi youyu renmen de buliang shenghuo fangshi he xingwei yinqi de.	Li Lianda, an academician of the Chinese Academy of Engineering and one of China's leading experts on health science, said chronic diseases are largely caused by people's bad lifestyles and behaviors.

An examination of the above concordances found that the health issues of food/snack consumption of “儿童” (ertong, children) have received particular attention. “专家” (zhuanjia, experts) and “院士” (yuanshi, fellow of an academic institution) are usually the agents of health which emphasizes the source of health messages is professional and authoritative. The term “专家” (zhuanjia, experts) is usually used in general terms, without a definite name, while “院士” (yuanshi, fellow of an academic institution) usually appears before or after names as an introductory title.

5.5.2 Human emotions construction in AusCorp and ChnCorp

Media communication of health risks is a critical link between risk assessment and risk management, and should go beyond the identification of technical risks to address people's emotional concerns and responses. Emotional responses are one of the significant differences between experts and public perceptions of health risks. The emotions the public feel commonly drive their attitudes to risk and influence their perception of risk, whereas experts rely more on scientific argumentation. From the perspective of psychological cognition, human emotion expressions may serve as mental shortcuts that influence information processing and guide the audiences' general risk perception (Wong et al., 2021). As research suggests, the public tends to rely on discrete emotions to interpret and assign significance to health risk information, rather than information based on probabilities or actuaries. Discrete emotions are categorical feeling states which influence people's attitudes and behaviors and provide efficient pathways

for audiences to navigate an uncertain and risky event (Slovic & Peters, 2006). In health news reports, referring to human emotions and responses, the “human face” of news events or issues helps to bridge a connection between news information and targeted audiences (Bednarek, 2015; Montgomery, 2007). This close connection between emotional expressions and risk perception, therefore, advocates for the expression of “human interest” in health risk related news coverage. In this research, the expressions of emotionality in news texts are considered to have potential for emotional arousal, with audiences, thus, more likely to generate emotional reactions to risk perceptions which may affect their judgments.

Natural language processing (hereafter NLP) has diverse applications, including affective computing and emotion recognition, machine translation and so forth. NLP has shown great potential for both academic research and industrial applications. Sentiment analysis or emotional polarity analysis is a core research branch of NLP, computational linguistics, and text mining. It refers to the method of extracting the positive, negative, and neutral polarities of expressed opinions and usually uses high-level features for recognizing and uncovering human emotions at the word-level in news texts (Cobos et al., 2019). If an emotional state is linked to a positive experience, it is categorized as positive, and the opposite is negative and other cases are neutral. For example, the emotion of “surprise” could be neutral, “defy” could be negative, and “admiration” could be positive.

In the research literature, many approaches and techniques have been proposed for emotional polarity analysis, for example, Linguistic Inquiry and Word Count (LIWC), as applied by McDonnell et al. (2020). In this research, the English-Chinese semantic dictionary of HowNet was used as the conceptual knowledge base on which to conduct the analysis of emotional polarity due to its high applicability to discriminate features for word classification. Through analysis, the polarity and intensity of emotions presented by AusCorp and ChnCorp are described.

This section reports on a quantitative to qualitative emotional polarity analysis of the health

news corpus to investigate the polarity of emotional expressions in news texts. First, based on the English-Chinese emotional words dictionaries, the frequencies of emotional words that occurred in AusCorp and ChnCorp respectively were summarized. In total, 1308 Chinese emotional words and 1217 English emotional words were identified. The most ten frequent emotional words are listed: in Table 5.23. respectively, with, “high” (5518 instances) is the most frequent emotional word in AusCorp and “要” (yao, need/want) is the most frequent emotional word in ChnCorp. Several news examples excerpted from AusCorp and ChnCorp are shown below. The emotional states of journalists were significantly expressed with emotional words to audiences. Subsequently, I conducted a manual investigation to dig depth into the news contexts of these frequent emotional words. Through searching these frequent emotional words as keywords in AusCorp and ChnCorp, respectively, news content and discussions where these emotional words occur are summarized and categorized. In general, news contexts where these frequent emotional words occur have mainly discussed two issues, i.e., descriptions of dietary habits and recommendations for dietary improvements.

Table 5.23: The most frequent emotional words of AusCorp and ChnCorp

	English emotional words	Freq.	Chinese emotional words	Gloss	Freq.
1	High	5518	要 yao	Need/want	3132
2	Like	3762	说 shuo	Say	1590
3	Need	3374	需要 xuyao	Need/want	1586
4	Low	2122	通过 tongguo	Pass/by means of	1505
5	Used	1860	注意 zhuyi	Attention	878
6	Want	1641	向 xiang	Towards	877
7	Keep	1512	关注 guanzhu	Concern	763
8	Back	1491	好 hao	Well	739
9	Small	1444	用 yong	Use	697
10	Lower	1412	支持 zhichi	Support	491

News examples with “**high**” and “**low**”:

(1) “Some of the best cereals will have a mix of **high** fibre, wholegrains, and **low** sodium and sugar,” he advised

(2) It's about selecting your **low**-salt option, choosing vegetable dishes and salads which are not **high** in sauce or asking for sauce on the side

(Excerpts from the AusCorp)

News examples with “**zhuyi**” and “**xuyao**”:

(1) 养脾胃要注意饮食有节，饥饱适度

Yang piwei yao **zhuyi** yinshiyoujie, jibaoshidu

Take care of the spleen and stomach system should pay attention to diet, which should be regular and moderate

(2) 需要尽快建立完整的食育体系，探索公众科普教育模式

Xuyao jinkuai jianli wanzheng de shiyu tixi, tansuo gongzhong kepu jiaoyu moshi

It is necessary to establish a comprehensive food education system as soon as possible, and explore the public science popularization model

(Excerpts from the ChnCorp)

Secondly, the emotional polarity based on the sentence level was analyzed by marking every sentence in the corpus from a range of 20 points (-10 to 10). The more negative the sentence, the closer the value is to -10, whereas the more positive the sentence is, the closer the value is to 10. The machine calculation of each sentence's value is the sum of the value of each word in the sentence. The results are presented in Table 6.17: positive (%) refers to the number of positive sentences; the percentage is of the whole corpus; the mean refers to the average score of positive/negative sentences; and variance refers to the degree of data fluctuation. As Table 5.24 demonstrates, the sentence scores in ChnCorp (overall mean is 2.6 with a variance score of 4.9) show a greater fluctuation than AusCorp (overall mean is 0 with a variance score of 0.2), and the overall mean for Australian corpus. In summary, emotional polarity analysis reveals that the Chinese corpus presents as positive, while the Australian corpus presents as neutral.

Table 5.24: Results of emotional polarity analysis in AusCorp and ChnCorp

	Positive (%)	Mean	Variance	Negative (%)	Mean	Variance	Neutral (%)
ChnCorp	18585 (59%)	5.4	6.2	7000 (22%)	-2.6	6.8	6170 (19%)
AusCorp	10174 (9%)	1.2	0.3	5799 (5%)	-1.1	0.2	95653 (86%)

Sentiments are classified as positive, negative, or neutral for polarity assessment. The results of AusCorp and ChnCorp for emotional polarity analysis are shown in Table 6.17. The percentage of positive cases in ChnCorp is much higher than the percentage in AusCorp, indicating positive emotional polarity dominated ChnCorp, while Chinese health news presented a positive attitude towards excessive salt intake as a health risk. Secondly, in AusCorp, neutral cases were most prominent, demonstrating a neutral view of excessive salt intake as a health risk factor.

5.5.3 Concluding remarks

Section 5.5 examined the construction of personalization in AusCorp and ChnCorp. In this research, personalization of news information refers to expressions related to population groups and human emotions. Population groups, or population segments, refer to the terms associated with populations in news, particularly terms with linguistic marks of gender, age or socio-economic status. The analysis of population groups' expressions was based on self-built specialized lexicons and corpus linguistic techniques. Using concordances and clusters, the main discussions related to populations have been identified. Human emotion refers to the emotional expressions associated with news texts, specifically the polarity of emotion, i.e., positive, neutral, or negative. Emotional polarity analysis utilizing the English-Chinese semantic dictionary of HowNet was undertaken to examine the emotional polarity of the Australian and Chinese health news corpus.

First, analysis of the personalization construction in AusCorp has generated several findings:

(1) Australian news emphasizes men's health at different ages, women's health in different physiological stages, and children and adults' overweight problem in news concerning health issues of population segments; (2) Australian news corpus is neutral in terms of emotional polarity. Second, the research findings of personalization construction in ChnCorp include: (1) an emphasis on the food consumption of children in health-related news; (2) Positive emotional expressions in Chinese health news presentations.

The differences between Australian and Chinese health news corpus suggest that Australian news includes more fine-grained and customized health messages for different population segments with neutral emotional expressions. Chinese news, however, has an imbalanced health concern in that children's health is more frequently discussed. Moreover, in terms of the construction of human emotions in news texts, which is regarded as a booster of personalization, differences have been discovered between AusCorp and ChnCorp. Overall speaking, AusCorp has been dominated by neutral emotional expressions, which means it has shown a neutral attitude towards the topic of excessive salt-intake and health in news coverage, on the whole. In comparison, ChnCorp has demonstrated a cline toward positive attitudes regarding excessive salt intake and health in Chinese news articles.

5.6 Comparison, discussion and summary

“In all countries, the public should be informed of, or educated about the health risks of excessive salt consumption” (WHO, 2016). There is no doubt that mass media have a significant and huge power to influence perceptions and behaviors regarding health-related issues (e.g., Dorey & McCool, 2009; Hsieh, 2008; WHO, 2018). Various forms of mass media provide audiences with unparalleled reach as a communication mechanism. This study focuses on the powerful Internet channel to investigate the mainstream digital health news reporting on the health risks of excessive salt consumption. The online health news articles published in Australia and China have been compiled into comparable corpora for investigation. This chapter has analyzed and compared the construction of information relevance (IR) in the

AusCorp and ChnCorp of health news texts. Information relevance comprises three components, namely news frames, information proximity (geographical closeness and cultural closeness), and information personalization (population groups and human emotions). These constituents have been linguistically analyzed via corpus linguistic techniques, computational linguistic tools and qualitative interpretations and comparisons. This section compares the results derived from the information relevance analyses of AusCorp and ChnCorp; discusses the methodological significance of the results, as well as limitations. Finally, it provides a summary of this chapter.

5.6.1 Comparison

This chapter examines the constructions of information relevance in Australian and Chinese health news corpora. The comparison is organized around news frames, proximity construction, and personalization construction. Firstly, this chapter examines the frames of health news articles and how the issues are focused in news to explore what type of information is selected and presented to become "news messages" that are relevant to audiences. In comparing the results of Australian and Chinese health news frames, different news frame structures were found, suggesting different concerns in the media communication of excess salt-intake on health. In the two topic networks, two overarching frames with thirty topics in the Australian news and three overarching frames with twenty-five topics in Chinese news were identified.

There is first and foremost a balanced frame system in the Australian health news, with both frames, containing fifteen topics, equally important, indicating equal attention has been paid by news media to health news. Meanwhile, the blurring border line between these two frames shows the intertwining of topic components, which denotes a close relationship between the two frames. In comparison, a hierarchical frame structure is found in Chinese health news indicating different concerns on these three frames. Greater media attention has been given to government regulation, health, and disease for salt consumption control.

Second, the results suggest that online news coverage in Australia is characterized largely by a special focus on children's and female health, while the uniqueness of Chinese news, when advocating salt control, is media attention on government regulation and the salt industry. Although the Chinese news also discusses children's food and pregnant women's health, these topics receive less attention. Comparatively, government regulation is an important aspect of Chinese news articles in health communication, but not in Australian news. Meanwhile, children and female health are well concerned in Australian news while not in Chinese news articles. Cultural differences could be considered as a factor in patterns of health communication and government trust. Collectivism and individualism are two typical cultural concepts. People believe more in government and official organizations in China when it comes to public health issues, as Chinese populations are members of collectivistic cultures. Whereas in an individualistic nation (e.g., Australia), people may show more skepticism about the trustworthiness of government or organizations. In a similar vein, members of individualistic culture tend to attach importance to companionship within community and social groups such as population groups of women and children, while collectivistic culture highlights relationships among families and intimate peers.

Despite the major differences, some similarities are found in Australian and Chinese health news frames. Topics associated with health, disease and food have attracted media attention in both countries, with the focus of health concerns on attributable diseases and high-salt processed food consumption. Diseases such as high blood pressure, heart disease, diabetes, and obesity have been discussed in both countries' news, while food-related topics like processed meat products have been discussed as well. As explained by Hong et al (2020), there are significant interaction effects on associations between behavioral causal beliefs and health risk perceptions. By establishing a clear and effective causal relationship between dietary habits and the attributable diseases, it could alert news recipients about health risks and promote health.

Results drawn from proximity and personalization constructions have yielded several

important findings. The absolute frequencies of proximity and personalization are low due to the fact that they are inherently minor linguistic devices. Comparison between the corpora shows both similarities and differences. ChnCorp and AusCorp share similarities in their construction. First, well-known places (or major cities) serve as a basis for building geographical closeness. For example, Sydney and Melbourne in Australian news and Beijing and Shanghai in Chinese news are the most frequently mentioned places. Secondly, children's health issues, for instance, children's overweight problems and food consumption have received considerable attention in both news corpora.

In spite of these similarities, AusCorp and ChnCorp have many differences. First, to construct geographical closeness, Australian news tends to mention organizations, public places, and professionals (such as researchers and dietitians) accompanying with place names, while Chinese news focuses on dietary habits and population health. Secondly, to construct cultural closeness, whereas Australian news focuses on the consumption and choices of common daily food, in Chinese health news texts much of the emphasis is on the health impacts of unhealthy food consumption. Thirdly, the focus of health concerns for population segments in Australian news balances the health issues of male, female, and children, while Chinese health news give priority to children's health concerns. Finally, emotional expressions in Australian news tend to be neutral, indicating a neutral emotional attitude towards the dietary health risk, while Chinese news presents a more positive emotional attitude.

The similarities of proximity and personalization construction in both corpora show that health concerns for metropolitan areas and children are a common news focus. The differences found between AusCorp and ChnCorp suggest first that Chinese health news should expand the scope of concern from children's health to the health of diverse population segments with targeted health guidance, and second, that dietary health suggestions should focus more on daily dietary behaviors required for disease prevention and health promotion of communities.

5.6.2 Discussion

This chapter reports analyses of, and compared the health news frames on, nearly 6500 news articles using an unsupervised machine learning method and corpus-assisted qualitative analysis. To my knowledge, this is the first comparative analysis of health news frames in the field of health communication. The current study identifies the importance of theoretical, methodological, theoretical and practical aspects, while the conceptualization and operationalization of framing has been debated in the communication research field. In the current study, the news frame is conceptualized as the focus with major discussions in news texts, which is a notion of “topic cluster” or “topic community”.

The meaning of frames has been largely vague in prior research, leading to the possibility that frames may have different theoretical meanings depending on the situation (Maier et al., 2018). It is unclear whether frames should be interpreted as topics or packages of topics. This study conceptualized news frames as broad thematic emphases which were represented by information selection in communication. The ANTMN method regards frames as clusters of topics because it believes that a frame is an overarching idea that goes beyond individual topics, and operationalizes it by inductively identifying frame components and using corpus-assisted interpretation. To compare, the concept of frame is more stable than topic, since topics could be very context-specific and may easily change for different readers or researchers. From a theoretical conceptualization perspective, this new type of news frame analysis contributes to a deeper understanding of framing theory and what a frame is in the news genre.

Inductive computational approach and corpus-assisted method are applied to examine news frames. The application of quantitative methods to qualitative analysis to assist computational tools, which has been used in the current study, has methodological significance and contributes to the operationalization of news frames in large-scale corpus. The ANTMN three-step approach was successfully applied to the corpora under comparison to analyze the news content reporting on the health impacts of excessive salt-intake in Australia and China. Initially, the applicability of ANTMN was introduced as an approach for frame analysis. Using

unsupervised machine learning and topic modeling, this inductive and explorative approach enables effective large text analysis without assumptions. Inductive analysis of news frame components, together with computational tools that automatically cluster components into frame groups depending on linguistic patterns, was suggested as a promising solution for empirical news frame analysis (Walter & Ophir, 2019). In this way, the results of distinct and coherent topic communities can be qualitatively interpreted based on news corpus. Based on the results of the computational linguistic analysis, a corpus-based qualitative analysis followed for a deeper interpretation and understanding of the health news frames and topics.

Future studies would benefit from a comparative perspective for the health communication frame analysis that employs similar analytical approaches across languages and cultures and over time. The computational approach to “topic” and “community” detection of ANTMN has an inferential advantage, as it enables studies with similar concepts to be undertaken. Furthermore, the approaches applied in this research have the potential to become one of the standard methods, especially for the thematic analysis or frame detection of English and Chinese texts, for the quantitative and qualitative content analysis of large-scale language data.

Besides news frames, this chapter analyzed and compared the proximity and personalization constructions of Australian and Chinese health news corpora via corpus linguistics, computational linguistics techniques and qualitative interpretations. The cross-lingual and cross-cultural analysis in this research has significant methodological and implication. The methodological significance is that the qualitative analysis of results in this chapter has provided substantial in-depth insights to enhance interpretation. Quantitative and qualitative approaches complement each other to provide a more reliable analytical procedure. Moreover, these findings generated through corpus linguistic techniques and computational linguistic techniques, highlight analytical issues.

Despite such significance, the research design and analytical procedures reported in this chapter have several limitations. Firstly, the limitations of proximity and personalization in

representing information relevance. New insights from other perspectives could offer a focus for future research. This study however, limits the scope of the investigation to these two concepts because they have been identified in news value research and their importance to newsworthiness has been advocated.

Second, the operationalization of proximity and personalization has limitations. Whether the identified linguistic features accurately represent proximity and personalization requires further testing and verification. In future studies, researchers could explore alternative linguistic features and approaches to address this limitation. Moreover, the main limitation of the analysis of human emotion is that emotion identification is restricted to the representative emotional word. In news presentation, emotional expressions could be implicit without linguistic markers. Limited by the large-scale language data, it is not realistic to dig deeply into the implicit emotions of each news article. Future research, therefore, should consider identification of emotion beyond explicit linguistic markings to overcome this limitation and increase accuracy.

Lastly, the significance of relevance to construct news content which is appealing to audiences needs to be revisited. There are distinct voices about information relevance. For instance, as suggested by “echo chambers” (Hershey, 2009) or “filter bubbles” (Pariser, 2011), audiences tend to select and interpret information which is consistent with their prior beliefs, and will filter out lots of news information and narrow their information diets. This is particularly true of people’s online actions on vertical social networking sites. On the other hand, supporters (e.g., Betsch et al., 2016) of cultural-sensitive health communication believe that deliberate adaptation of health communication could improve health promotion practices, which suggest information relevance construction in health-related news. This presents a dilemma between “news voices” and “familiar contexts”, and encourages revisits of information relevance in future investigations.

5.6.3 Conclusion

Media advocacy in mainstream online news remains the most influential tool employed by public health communicators. Although the scientific accuracy of health information in news articles is dubious, compared with medical sources, reporters' voices and attitudes toward health issues as well as the recommendations and aspirations in news texts could resonate with the audience's own experiences. This chapter presents many findings of news information relevance construction in Australian and Chinese health news corpora. The similarities and differences in the construction of news frames, proximity, and personalization were analyzed and compared. While mass media have strong effects on information processing, these effects are contingent on individual characteristics (McQuail, 2005). Health communication professionals should tailor their communication to fit the needs of different groups as perceptions of dietary health risks vary widely across cultures and demographics. It is very crucial to ensure a consistent message across different groups.

CHAPTER 6 SUMMARY, DISCUSSION AND CONCLUSION

6.1 Introduction

With the burgeoning and rapidly expanding field of corpus linguistics, new avenues have opened up for discourse analysis and exploration. The innovative and systematic techniques for large-scale language data compilation and investigation have facilitated this research to “read”, “diagnose” and delve into health news texts. A proactive approach to health risk intervention, media communication plays a vital role in disseminating risk information, promoting public health awareness, and ultimately, preventing health risks. Since health risk communication is more effective than reactive risk event response, this research investigated the health news communication of news reporting on salt consumption in Australia and China as a case study. The investigation was undertaken by applying corpus-assisted and data-driven discourse analysis which combines corpus linguistics, computational linguistics, discourse analysis, and qualitative interpretation. In order to gain insights into the persuasiveness and effectiveness of health communication, this study compared health communication in the news media from both countries. This research serves to answer two overarching research questions (Section 1.4) of:

RQ1: How Australian and Chinese digital news present and validate evidence of the risks of excessive salt-intake to improve public awareness of the issue? (Chapter 4)

RQ2: How Australian and Chinese digital news communicate the risks of excessive salt-intake in a culturally relevant way to increase public awareness of the issue? (Chapter 5)

A summary of key findings, discussions, implications, and future directions concludes this chapter. It first provides a recapitulation of each chapter and discusses the key findings by answering the research questions. Next, it discusses the contributions and implications of research findings for theory, methodology, and practice. It identifies the limitations and recommends directions for future research. This chapter concludes with a comment on health

communication in the news genre.

6.2 Summary of the thesis

This section summarizes the content of each chapter of the thesis. Chapter 1 introduced the social background of the research topic, the aims and rationale of the study, and presented the research questions and thesis structure. Chapter 2 reviewed the extant literature on health risk communication from two perspectives: research objectives (health risk communication) and research methodologies (discourse analysis). Health risk communication literature has been examined from the perspective of news channels, and the challenges of health risk communication within the news genre. Discourse analysis methods have been reviewed from news information evidentiality and relevance, followed by a review of the latest advances.

Chapter 3 described relevant theories supporting this research. These theories are Framing Theory, Communication Infrastructure Theory, News Value Theory, and Culture Theory. This chapter also proposed an analytical framework which included the analytical procedures of information evidentiality and relevance. In the last section of Chapter 3, the whole research design was presented.

Analyses started from Chapter 4 with information evidentiality. Evidentiality is important for health news as it has the potential to influence a reader's cognition of health risk issues through using knowledge, evidence, and argumentation to construct persuasive news. As conceptualized, linguistic devices and news contexts contribute differently to subjective, neutral, or objective evidentiality. Through examining the sources and bases of proposition, categories, and components for each subclass of evidentiality were identified. Subjective evidentiality comprises four categories: (1) sensory perception evidentiality, (2) mental perception evidentiality, (3) "showing" evidentiality, and (4) obviousness evidentiality. Neutral and objective evidentiality comprises two categories: (1) general knowledge, and (2) proof. In comparing news corpus frequencies, AusCorp had a higher frequency of evidentials, with

greater variation and distribution, than ChnCorp. Moreover, in AusCorp, journalists were more explicitly and frequently involved than in ChnCorp. However, there were no significant differences in the construction of neutral and objective evidentiality.

Chapter 5 focused on information relevance construction. Relevance denotes the extent to which health news messages are relevant to the lives of the news readers; thus, health news with higher levels of relevance will be more appealing and accessible for readers. Information relevance was conceptualized to comprise news frames, proximity, and personalization. First, news frames have been examined with an exploratory and innovative analytical framework. The frames of nearly 6500 news articles, utilizing an unsupervised machine learning method and qualitative analysis, were examined. This analysis was based on the computational approach, Analysis of Topic Model Networks (ANTMN), proposed by Walter and Ophir (2019). Semi-automated detection assisted by computational tools was conducted for the frame analysis. Through the analytical procedures of topic modeling, topic relationship calculation and community detection, distinctive frames and components were identified for AusCorp and ChnCorp: AusCorp with two frames and ChnCorp with three frames. A comparison of the two corpora revealed that the overall frame structure of AusCorp reflected a balanced system focusing on both dietary health, lifestyles and attributable health impacts, or diseases. Analysis of the ChnCorp suggested a hierarchical frame system which emphasized government regulations and health impacts or diseases, caused by excessive salt consumption.

Second, proximity denotes the degree to which the news content is geographically or culturally close to the target audiences; it comprises geographical closeness and cultural closeness. Personalization denotes the degree to which health news influences ordinary individuals, including their experiences, practices and emotions; it comprises population groups, and human emotions. These subclasses of relevance were mapped onto lexicons constructed based on the corpora. The similarities and differences between the two were that they both referred to well-known places, while differences arose in their concerns about dietary cultures, population groups, and emotional expressions. The next section summarizes the research

findings by answering the two overarching research questions.

6.3 Key findings

This research has investigated the health news reporting on salt consumption in Australia and China. Specialized English-Chinese bilingual comparable corpora of news texts, i.e., AusCorp and ChnCorp, were compiled as research objects. In this study, information evidentiality and relevance were analyzed and compared. There are different ways of operationalizing the linguistic characteristics of health news communication. Using relevant theories and analytic frameworks, this thesis conducted a corpus linguistic study of health news communication from the perspective of two dimensions, namely information evidentiality and relevance, which contribute to the persuasiveness and effectiveness of health communication.

This study tailored the operationalization of linguistic characteristics of health news as friendly to corpus-assisted news discourse investigations due to the large-scale of research data. One component of the linguistic characteristics of health news was information evidentiality. It was further categorized into subjective, neutral, and objective evidentiality as three different levels. Information relevance is another component which comprises news frames, proximity, and personalization. News frames were operationalized as thematic communities in which groups of topics, with the same latent theme, were identified as news frames. The study employs the exploratory inductive-mixed approach known as ANTMN Three-step approach (Walter & Ophir, 2019) to detect emphases in Australian and Chinese health news corpora in accordance with framing theory. The three steps were topic modeling, topic relationship calculation, and community detection. For proximity and personalization, specialized lexicons were built based on the comparable health news corpora for each format, followed by manual classification, and quantitative-to-qualitative analyses and interpretations of results. The summary of research findings is presented by responding to the research questions as follows, which matches the key findings in Chapter 4 and Chapter 5.

RQ1: How Australian and Chinese digital news present and validate evidence of the risks of excessive salt-intake to improve public awareness of the issue? (Chapter 4)

Chapter 4 investigated information evidentiality construction of health news articles. A trichotomy taxonomy was applied for evidential categorization. Linguistic expressions and news contextual factors both influenced the objectiveness levels of IE construction as different “sources” and “bases” of proposition of an utterance. Therefore, they determined the classification of subjective, neutral, or objective evidentiality, respectively. The statistical results of distributions of each evidential category in AusCorp and ChnCorp are shown in Table 6.1 which reveals the contrasts in distributions. With the overall amounts and frequencies of evidential markers, the most notable difference was that AusCorp had a more frequent application of evidentials than ChnCorp, particularly for the subjective evidentiality category. This finding may suggest that AusCorp was more effective in the communication of health-related issues by including greater persuasive language. Second, the large proportion of subjective evidentiality applications in AusCorp demonstrate that journalists' voices were very involved in health news communication. To conclude the distinctions between AusCorp and ChnCorp in evidentiality constructions, AusCorp showed a high level of evidentials, particularly subjective evidentials, which implied that AusCorp was more likely to be persuasive and journalists' engagement was more salient than that of ChnCorp.

Table 6.1: Distributions of information evidentiality in AusCorp and ChnCorp

Evidentiality category	Subjective (freq./‰)	Neutral (freq./‰)	Objective (freq./‰)
AusCorp	43/4.48	6/0.05	6/0.17
ChnCorp	31/0.92	9/0.07	6/0.13

RQ2: How Australian and Chinese digital news communicate the risks of excessive salt-intake in a culturally relevant way to increase public awareness of the issue? (Chapter 5)

Chapter 5 investigated information relevance construction of health news articles. The findings

for relevance constructions identified that IR was conceptualized as including three components: (1) news frames, which refer to major discussions in news; (2) proximity, namely geographical closeness and cultural closeness; and (3) personalization, namely, population groups and human emotions. News frames investigation on Australian and Chinese health news revealed several findings with the corpus-assisted analyses and interpretations. News frames characterized by different groups of topics were identified through adopting the ANTMN three-step approach, of topic modeling, topic relationship calculation, and community detection resulting in topic networks for AusCorp and ChnCorp. The structures of frame systems indicated the news concerns in AusCorp and ChnCorp differed. AusCorp consisted of two overarching frames with 30 topics, while ChnCorp consisted of three overarching frames with 25 topics, as shown in Table 6.2. The overall structures suggested that AusCorp had a balanced frame system which emphasized both two frames similarly. ChnCorp, in contrast, showed a hierarchical frame structure in which more emphasis was put on Frame 1. Moreover, another marked difference of news frames was that in AusCorp the main focus was on children and women's health, whereas ChnCorp emphasized governmental regulations as a distinguished focus. Despite such differences, AusCorp and ChnCorp were similar in their attentions to the attributable diseases and dietary habits.

For analyses of proximity and personalization constructions, specialized lexicons were built based on the corpora. The analyses of the data and comparisons of the findings showed common features of geographical closeness, well-known places, and attention to children's health issues. Differences, however, were greater than the similarities. Comparisons of AusCorp and ChnCorp in relevance constructions revealed that: (1) in AusCorp cultural closeness was evident in the discussions on daily food and dietary habits, whereas ChnCorp identified unhealthy dietary habits; (2) AusCorp demonstrated a balanced concern for various population groups, while in the news discourse ChnCorp gave greater priority to children's health; and (3) emotional expressions inclined to be neutral in AusCorp while ChnCorp expressed an overall positive emotional approach.

Table 6.2: News frames of AusCorp and ChnCorp

Frame (Number of topics)	Frame 1	Frame 2	Frame 3
AusCorp (30)	Food, diet and child health (15)	Health, disease and lifestyle (15)	
ChnCorp (25)	Government regulation, health and disease (14)	Food and consumers (9)	Salt industry and iodized salt (2)

Sociocultural factors were considered to contribute to the differences in news information evidentiality and relevance of the Australian and Chinese health news corpus. (1) Individualism vs. collectivism (e.g., Gelfand et al., 2011; Oyserman et al., 2002; Triandis, 1995). Populations in these two typical syndromes of cultures usually have distinct attitudes toward “authority” such as government or official organizations. In a collectivistic society (e.g., China), people show more beliefs in authority, while in an individualistic society (e.g., Australia), people are more connected with various population groups. This could explain one of the research findings, i.e., why ChnCorp had a distinguished news frame, namely governmental regulation. It could also explain why AusCorp had a balanced focus on the health situations of different population groups. (2) Independent vs. interdependent (e.g., Gelfand et al., 2011; Oyserman et al., 2002; Triandis, 1995). The above individualism and collectivism as two culture syndromes usually indicate different organizations of “self”, namely independent and interdependent, respectively. People in individualistic cultures pursue more independent personal expressions, personal goals, and personal achievements over whole societies. By contrast, in collectivistic cultures, populations tend to give greater priority to social goals over personal goals. This could account for the findings that AusCorp demonstrated a balanced concern for various populations' health, whereas ChnCorp prioritized children's health, since children are considered China's future. (3) Gain-frame vs. loss-frame (e.g., Elliot et al., 2001). Independent and interdependent internal attributes lead to different self-regulatory tendencies. In individualistic cultures, people are more motivated to pursue opportunities and positively achieve goals and desires, while in collectivistic cultures, people tend to be conservative and focus on negative outcomes which could be avoided. This could explain why AusCorp focused more on daily dietary habits and

lifestyle which implied promotion and approach to positive outcomes, while ChnCorp paid more attention to unhealthy dietary habits, which implied prevention and avoidance of negative outcomes.

6.4 Broader implications and contributions

This thesis has conducted exploratory and comparative analyses on written digital health news communication, namely information evidentiality and relevance between nations (Australia and China) and cultures. This study combined unsupervised machine learning methods, corpus-assisted discourse analysis, and contrastive analysis across languages and cultures. The contributions and implications of this research are for theory, research methodology and practice, as explained in the following. This section is divided into three parts: subsection 6.4.1 assesses the theoretical implications of the study; subsection 6.4.2 discusses the methodological implications; and subsection 6.4.3 discusses the practical implication for health risk communication professionals and journalists. Finally, Section 6.5 discusses the limitations of this study and future directions.

6.4.1 Theoretical implications for news communication studies

The research conducted in this thesis makes use of four major theories, including Framing Theory, News Value Theory, Communication Infrastructure Theory, and Culture Theory. The development and enrichment of these theories demonstrated in this study have theoretical implications for cross-cultural and cross-national comparative research on health communication. First, Framing Theory has been applied as a central theory in this study. Framing Theory has been debated and contested a lot in the empirical research field (Cacciatore et al., 2016; Entman, 1993; Matthes & Kohring, 2008), and this research as a case study has provided a possibility of conceptualization and operationalization of news frames as broad thematic emphases represented by information selection in communication, whereas frame analysis is operationalized by inductive identification of frame components, corpus-assisted

computational approaches to community detection, and subsequent manual qualitative interpretations.

Second, this study has demonstrated original development and application of News Value Theory, Communication Infrastructure Theory, and Culture Theory. Based on the conceptualizations of News Value Theory and Communication Infrastructure Theory, information evidentiality and information relevance have been determined as two relevant and critical formats of health news. Information evidentiality has been conceptualized as the linguistic presentation of information sources and evidence to enhance news reliability. A trichotomy taxonomy has been applied to operationalize information evidentiality analysis into three levels, namely subjective, neutral, and objective evidentiality. The features of different linguistic devices and news contexts have determined the objectiveness level of evidentiality. Information relevance has been conceptualized as the extent to which health messages were relevant to the lives of news audiences. Ensuring the presentation of relevant issues was to the resonance of the message with targeted audiences, proximity and personalization have been conceptualized as two components of information relevance, with the analysis of information relevance conducted on the basis of lexicons compiled for proximity and personalization. In terms of information evidentiality and information relevance analyses, qualitative interpretations of quantitative results have been conducted based on the Culture Theory, which shows the enrichment of Culture Theory application in pancultural health news communication. In conclusion, the theoretical application in this research has contributed to the development and enrichment of these four theories, expanded their research domains, and validated the feasibility of them in cooperation of corpus-assisted empirical analyses.

6.4.2 Methodological implications for news discourse analysis

The research design has methodological implications for corpus-assisted and data-driven empirical discourse analysis. This research did not delve into “corpus-based” or “corpus-driven” labels as both limit the flexibility of corpus linguistic analysis. “Corpus-assisted” and “data-

driven” were fully employed for the application of news corpus without any limitations or contestable issues brought by research paradigms. By applying this method, insights revealed into news discourse by corpus analysis have been integrated for the investigation of the news communication model that underpins the analysis. Computational linguistic techniques and qualitative interpretations also facilitate the explanations of results.

First, data collection procedures were meticulously designed. When selecting news items reporting on the health impacts of excessive salt-intake in Australia and China from the Factiva database, data collection had three steps. The first step was a fuzzy search, followed by news themes categorization and searching syntax design, and finally, searching syntax containing a group of keywords for news data retrieval. This data collection procedure ensured that relevant news texts were collected as exhaustively and accurately as possible.

Second, this study included quantitative as well as qualitative analysis of data with the assistance of computational tools for corpus-assisted news discourse analysis. Corpus-assisted quantitative analysis and in-depth manual interpretations were integrated to maximize effective large-scale language data analysis. The ANTMN approach, an inductive and exploring approach combining unsupervised machine learning and topic modeling, was adopted for news frame analysis. Since the analysis was conducted on data without any assumptions, potential bias caused by manual analysis was minimized. This approach has an inferential advantage for news frame identification and is appropriate for thematic analysis. As a conclusion, quantitative and qualitative analyses complement each other and, through their integration, ensure a more reliable analytical procedure for the analysis of information evidentiality and relevance with convincing statistical outcomes and detailed insights.

6.4.3 Practical implications for public health communication

This thesis not only offered insights into theoretical and methodological aspects, but also had practical implications for health communication. The cross-cultural and cross-lingual

comparison of health news communication between Australian and Chinese health news texts has made an original contribution. This research contributes to the sparse comparative body of cross-national and cross-cultural news model analyses, and specifically for health-related news. The results indicate that it is important to strengthen the evidentiality and relevance of news messages in order to improve persuasiveness and effectiveness.

First, the research findings of news frame analysis had practical implications. As many public health news audiences are not health knowledge literate, and often struggle to distinguish appropriate health advice from that which is biased, they are very susceptible to biased anecdotal narratives. It is important to make news communication compelling for ordinary citizens, and to make health messages personalized. This may help health issues attract much needed public attention because networked health information is critical to provide background knowledge, supply stories and recommendations. In some situations, illustration with cases may simplify knowledge and make knowledge intuitive and relevant to the audience. Relevant cases may include cooking recipes for a healthy diet, and supermarket shopping guidelines for less salty food items.

Second, the research findings of information evidentiality construction may encourage journalists or health communication professionals to construct objective and evidence-based health news messages. The value of applying facts in making claims and deploying linguistic sources to make news information convincing with evidential markers is recommended. As a result of this study, a wider application of the research findings could be expected in other healthcare provisions and services. In addition, the research findings of proximity and personalization construction send important messages to journalists or health communication professionals that health messages have potential to influence risk perception. Information relevance should act as a link to construct networked health information which makes health news compelling and accessible to the general readers.

Third, from a cultural perspective, there are different recommendations for Australian and

Chinese health communication respectively. According to cultural theory and culture-sensitive communication, an empirical and practical understanding of culture is essential for persuasive and effective health communication in different cultural contexts. Australia and China are under distinct cultural and political circumstances. Analyses and comparisons demonstrated that ChnCorp has a distinctive news frame which emphasizes government and regulation in news articles, while AusCorp does not. Therefore, this study recommends that media can facilitate people's trust in government and authority to craft effective health communication in a collectivistic culture (e.g., China). Meanwhile, loss-frame could be considered in health communication to emphasize what can be avoided and prevented. As a comparison, media in individualistic cultures (e.g., Australia) could give more importance to individual rights and goals in order to promote and achieve health persuasion.

6.5 Limitations and future directions

Despite the implications and contributions of this thesis as outlined above, some factors have limited the generalization and application of the research findings. There are a number of possibilities for future research to explore that are beyond the scope of this study. This section discusses its limitations, particularly regarding research objects and methodology, and provides an overall evaluation of the study as well as recommendations for future directions.

General limitations include the question of whether findings based on relatively small-scale corpora with data-driven analytical approaches can represent mass media health communication in Australia and China. The first aspect that impacted on the findings were the constraints on the research data which was restricted to two sets of news articles published in mainstream media in the last decades. Due to the limitations of research data sources from the Factiva database, some eligible news articles might not have been included. The generalization of research findings, therefore, is limited because the health news data employed in this study was not exhaustive and systematic, and so the research findings should be applied and generalized with caution. In addition, the scope of research objects in this research is limited

to mass media health news. However, health communication for different segments of the population should set different goals and use different methods. It is suggested that classical and new media forms of health communication have advantages for different population groups. In addition, it is suggested that a targeted population's preference for how they receive health communication should be identified. Mass media is restricted in delivering customized content, so social media may be better suited to target information for specific populations or even specific individuals.

Second, this study had limitations related to the aspects of cross-cultural and cross-lingual comparisons that flaws in operationalization and measurement of information evidentiality and relevance may also underlie some limitations. This study would not suggest that it is an easy task of health news communication analyses and comparisons between nations/cultures. Since there is no perfect analytical framework, the information evidentiality and relevance that were selected to be analyzed and compared may have had limitations. While corpus-assisted and comparative methodology makes a significant contribution to the empirical linguistic analysis of news communication, empirical linguistic examinations and comparisons are inherently challenging because of the varied and different linguistic features; they may also be influenced by contextual elements which are beyond discourse research. The analysis of information evidentiality is complex and, in other contexts, other evidential markers and contextual elements have potential to influence the objectiveness of evidentiality. The objectiveness of evidentiality has limitations. While objectiveness is valuable in health news reports, however, future researchers should be aware that this assertion may differ in other domains. In this study, the distinction between subjective/neutral/objective evidentiality was drawn by the researcher using linguistic expressions and contextual features that could be biased. The notion of information evidentiality is notoriously difficult to define. In this study, evidentiality is represented by lexical linguistic expressions in English and Chinese which are categorized into the trichotomy of subjective/neutral/objective, judged from sources and bases of information. This categorization is matched with certain research purpose for other research, for example, direct/indirect, visual/non-visual, different levels of certainty, and so forth could be applied as

criteria. Meanwhile, the reductionist approach to cross-linguistic and cross-cultural comparisons of information evidentiality in digital news territory has its inherent limitation. A systematic exploration of information evidentiality in different language systems remains an interesting venue in the future. Therefore, the robustness of conceptualization and operationalization should be verified and enhanced with further elaboration and adaptation of the theoretical and analytical framework. Furthermore, any behavioral changes or retention of the persuasive effects derived from health news had not been assessed in this study.

Because of these limitations, the following is recommended for future exploration in this research domain. First, in future research, the robustness of analysis procedures and the reliability of findings must be assessed. Future research could be but is not limited to: (1) verifying the validity and reliability of the current findings in relation to the Chinese corpus; (2) examining whether the results of ANTMN three-step approach are consistent with the results detected by other methods or other algorithms and verifying more community detection algorithms. According to Walter & Ophir (2019), while the topic network remains relatively stable with different community detection algorithms, some changes may occur in the frame structures. Future studies should also consider other strategies to examine news texts, such as different inter-raters' opinions, or investigate the extent to which people's attitudes and behavioral intentions are influenced by health messages with different linguistic cues. Such research may provide further suggestions for health communication design. Lastly, as well as information evidentiality and information relevance investigated in this thesis, future research could examine other linguistic characteristics, for example, information actionability could facilitate the dissemination of behavioral recommendations thus could foster health-related behaviors.

6.6 Concluding remarks

As a result of this study comparing health news communication of salt consumption in Australia and China, it was found that there are some differences, as well as similarities, in

presenting persuasive and effective health information. This research has significant findings for health communication in mass media and implications for the improvement of Chinese health news. These include more evidentiality in news to improve news persuasion, especially objective evidentiality, and enhancing information relevance for different geographical areas and population groups to increase news reach for wider audiences. It is anticipated that this study will benefit health communication from an empirical linguistic perspective.

Audiences are now exposed to persuasive communication across different contexts (Matz et al., 2017). One thing we should be aware of, however, is that digital communication has political and scientific implications in the meantime. The line between digital mass persuasion and political manipulation depends on the veracity of the claims made in media. Questions and disagreements are what stimulate debate and science. In contrast, eliminating choices is political, not scientific. An issue related to communication should create opportunities for a variety of debates and opinions to take place (Noren, 2020). Therefore, the media should be inclusive and embrace multiple viewpoints, avoiding becoming a tool for political manipulation. Meanwhile, audiences should be alerted to be indoctrinated, but the distinction between indoctrination and persuasion lies in the quality of active independence (Garsten, 2009).

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APPENDICES

APPENDIX A

INTRODUCTION OF WHO-SHAKE PACKAGE OF INTERVENTIONS & WHO TECHNICAL BRIEFING OF SALT REDUCTION

(Excerpted from WHO, 2016, 2020)

WHO-SHAKE package of interventions consists of 5 interventions, namely:

1. Surveillance
2. Harness the industry for reformulation: reduce salt intake by engaging the industry in a voluntary reformulation process.
3. Adopt labelling: reduce salt intake through implementation of front-of-pack labeling
4. Knowledge: reduce salt intake through behavior change communication mass media campaign.
5. Environment: reduce salt intake through establishment of a supportive environment in public institutions such as hospitals, schools and nursing homes to enable low sodium meals to be provided.

WHO-SHAKE package - Intervention K1:

Implement integrated education and communication strategies to raise awareness about the health risks and dietary sources of salt and ultimately change behavior. Behavior change communication mass media campaign, or communication for behavioral impact (COMBI) has been adopted as an important intervention for salt reduction.

WHO technical briefing of salt reduction interventions - reduce salt intake through a behavior change communication mass media campaign:

1. Effect size on salt consumption: 5% reduction in salt intake per day

2. Comments on evidence: Movement from 8.48 to 8.05 g/day via urinary excretion in Viet Nam following BCC campaign. The same campaign in Australia saw a 10% reduction in sodium intake. We have taken the conservative option.

3. Major costing assumptions: behavior change communication is considered as an intensive mass media campaign. Costs have been developed based on literature review across public health and marketing to ensure adequate viewership is reached.

APPENDIX B6

Appendix B-1: 18 Australian mainstream newspapers

	Newspapers	Locations	Websites
1	The Australian	National	www.theaustralian.com.au/
2	The Canberra Times	Canberra, ACT	www.canberratimes.com.au
3	The Sydney Morning Herald	Sydney, NSW	www.smh.com.au
4	The Sun Herald	Sydney, NSW	www.sunherald.com.au
5	The Daily Telegraph	Sydney, NSW	www.dailytelegraph.com.au
6	Sunday Telegraph	Sydney, NSW	www.dailytelegraph.com.au
7	The Age	Melbourne, VIC	www.theage.com.au
8	Herald Sun	Melbourne, VIC	www.heraldsun.com.au
9	Sunday Herald Sun	Melbourne, VIC	www.heraldsun.com.au
10	The West Australian	Perth, WA	www.thewest.com.au
11	Sunday Times	Perth, WA	www.perthnow.com.au
12	Courier Mail	Brisbane, QLD	www.couriermail.com.au
13	Sunday Mail	Brisbane, QLD	www.couriermail.com.au
14	The Advertiser	Adelaide, SA	www.adelaidenow.com.au
15	Sunday Mail	Adelaide, SA	www.adelaidenow.com.au
16	The Mercury	Hobart, TAS	www.themercury.com.au
17	The Examiner	Hobart, TAS	www.theexaminer.com.au
18	Northern Territory News	Darwin, NT	www.ntnews.com.au

Appendix B-2: 18 Chinese mainstream newspapers

	Newspapers	Locations	Websites
1	People's Daily	Beijing	www.peopledaily.com.cn
2	China Daily	Beijing	www.chinadaily.com.cn
3	China Industry Information Database	Beijing	www.cinic.org.cn
4	China News Service	Beijing	www.ecns.cn
5	Xinhua Daily	Beijing	www.xinhuanet.com
6	Reference News	Beijing	www.cankaoxiaoxi.com
7	Global Times	Beijing	www.globaltimes.cn
8	Beijing News	Beijing	www.bjnews.com.cn

6 These 18 Australian newspapers and 18 Chinese newspapers were chosen since (1) they are among the most influential ones with high circulations and are issued in different geographical locations; (2) they cover public health topics in news reports.

9	The China Youth Daily	Beijing	www.cyol.com
10	Yangtse Evening News	Jiangsu	www.yangtse.com
11	Jinling Evening News	Jiangsu	www.jlwb.net
12	Yangcheng Evening News	Guangdong	www.ycwb.com
13	Southern Weekly	Guangdong	www.infzm.com
14	Southern Metro Daily	Guangdong	www.oeeee.com
15	Information Times	Guangdong	www.xxsb.com
16	Qilu Evening News	Shandong	www.qlwb.com.cn
17	Xinmin Evening News	Shanghai	www.xinmin.cn
18	Chutian Metro Daily	Hubei	www.ctdsb.net

APPENDIX C

Concerning one of the news formats, namely information evidentiality, two lexicons are built for AusCorp and ChnCorp respectively. According to the criterion of objectiveness, evidential markers are classified into subjective, neutral and objective. Since neutral and objective evidentiality are judged depending on news contexts, the two lexicons are: subjective evidentiality lexicon and neutral/objective evidentiality lexicon. Components of each lexicon are demonstrated as follows.

LEXICONS ESTABLISHED FROM AUSCORP

Appendix C-1: Subjective evidentiality lexicon

word	Freq.	%o
SEE	3999	0.21
LOOK	2759	0.14
WATCH	778	0.04
SEEM	965	0.05
APPEAR	749	0.04
AWARE	625	0.03
BELIEVE	1213	0.06
FEEL	2154	0.11
THINK	2911	0.15
PERHAPS	247	0.01
PROBABLE	673	0.03
POSSIBLE	931	0.05
CAN	19781	1.04
COULD	3443	0.18
MAY	4405	0.23
MIGHT	1456	0.08
MUST	1071	0.06
SHALL	122	0.006
SHOULD	4286	0.22
WILL	7526	0.39
WOULD	4479	0.23
SHOW	3307	0.17
REVEAL	665	0.03
EMERGE	209	0.01

INDICATE	446	0.02
DISPLAY	134	0.007
DEMONSTRATE	131	0.006
STATE	1364	0.07
MEAN	2247	0.12
ARGUE	244	0.01
ASSERT	30	0.002
CLAIM	1724	0.09
NOTE	638	0.03
PROPOSE	369	0.02
SUGGEST	1431	0.07
OBVIOUS	247	0.01
CLEAR	908	0.05
PLAIN	404	0.02
SURE	6103	0.32
APPARENT	141	0.007
INDEED	53	0.003
CERTAIN	873	0.05
VISIBLE	84	0.004

Appendix C-2: Neutral/objective lexicon

word	Freq.	%o
Acknowledged	38	0.0024
Generally	529	0.028
In fact	398	0.02
Prove	84	0.004
Proves	28	0.0014
Proved	79	0.004
Proven	120	0.006
Proof	53	0.0025
Proving	47	0.002
Report	917	0.047
Reports	221	0.012
Reported	261	0.014
Reportedly	35	0.002
Reporting	34	0.0022
According to	1518	0.08

LEXICONS ESTABLISHED FROM CHNCORP

Appendix C-3: Subjective evidentiality lexicon

word	Freq.	‰
看到 kandao	284	0.03
看见 kanjian	13	0.001
听到 tingdao	32	0.003
听见 tingjian	4	0
似乎 sihu	77	0.007
好像 haoxiang	20	0.001
好似 haosi	5	0
显得 xiande	42	0.004
意识到 yishidao	68	0.006
相信 xiangxin	116	0.01
感到 gandao	131	0.01
认为 renwei	1283	0.12
也许 yexu	41	0.004
可能 keneng	1575	0.14
必须 bixu	527	0.05
应该 yinggai	781	0.07
表明 biaoming	414	0.04
说明 shuoming	219	0.02
显示 xianshi	1485	0.14
揭示 jieshi	11	0.001
提出 tichu	842	0.07
提议 tiyi	11	0.001
展示 zhanshi	122	0.01
发现 faxian	1650	0.15
显然 xianran	46	0.004
显而易见 xianeryijian	11	0.001
确实 queshi	126	0.01
肯定 kending	126	0.01
当然 dangran	161	0.01
	10223	0.923

Appendix C-4: Neutral/objective lexicon

word	Freq.	‰
公认 gongren	1	0
一般 yiban	30	0.005
实际上 shijishang	5	0
证明 zhengming	170	0.031

证实 zhengshi	102	0.019
根据 genju	933	0.171
据了解 ju liaojie	181	0.033
据悉 juxi	108	0.019
据说 jushuo	13	0.002
据此 juci	28	0.005
据统计 jutongji	89	0.016
据调查 judiaocha	39	0.007
据报道 jubaodao	20	0.004

APPENDIX D

LEXICONS ESTABLISHED FROM AUSCORP

Concerning one of the news formats, namely information relevancy, four lexicons are built for the four dimensions. The components of lexicons are demonstrated as follows.

Appendix D-1: Geographical closeness lexicon (44 words)

word	Freq.	%	dispersion	
Australia	3848		0.12	0.94
Sydney	976		0.03	0.95
NSW	664		0.02	0.89
Melbourne	653		0.02	0.82
Australia's	607		0.02	0.87
American	471		0.01	0.9
New Zealand	470		0.01	0.92
Queensland	465		0.01	0.88
British	434		0.01	0.9
UK	378		0.01	0.77
Chinese	239		<0.01	0.91
CSIRO	230		<0.01	0.85
Adelaide	215		<0.01	0.88
Tasmania	215		<0.01	0.85
Mediterranean	210		<0.01	0.84
Victorian	202		<0.01	0.9
Brisbane	200		<0.01	0.82
London	190		<0.01	0.83
Murray	179		<0.01	0.8

China	169	<0.01	0.78
European	131	<0.01	0.89
Tasmanian	126	<0.01	0.79
Asia	125	<0.01	0.69
Melbourne's	117	<0.01	0.84
North Territory	117	<0.01	0.86
Europe	115	<0.01	0.85
Sydney's	115	<0.01	0.93
England	104	<0.01	0.82
Indian	101	<0.01	0.86
Califonia	99	<0.01	0.89
Brazil	97	<0.01	0.71
NHMRC	92	<0.01	0.68
India	84	<0.01	0.83
Spanish	82	<0.01	0.81
Italy	78	<0.01	0.74
Swiss	74	<0.01	0.77
German	62	<0.01	0.81
Hobart	62	<0.01	0.81
Newcastle	60	<0.01	0.84
Tasmanians	60	<0.01	0.8
Darwin	55	<0.01	0.72
Korean	55	<0.01	0.67
Turkish	51	<0.01	0.57
Bondi	50	<0.01	0.87

Appendix D-2: Cultural closeness lexicon (351 words)

word	Freq.	%	dispersion	
salt	11549		0.36	0.92
foods	9072		0.28	0.98
sugar	6755		0.21	0.9
diet	5913		0.18	0.96
fruit	4230		0.13	0.97
vegetables	3481		0.11	0.96
meat	3116		0.1	0.94
bread	2485		0.08	0.87
milk	2261		0.07	0.92
fish	2176		0.07	0.95
chicken	1797		0.06	0.88
cheese	1728		0.05	0.91

alcohol	1655	0.05	0.94
nuts	1434	0.04	0.94
cereals	1378	0.04	0.91
chips	1354	0.04	0.94
salad	1328	0.04	0.85
rice	1292	0.04	0.92
dairy	1285	0.04	0.94
diets	1280	0.04	0.97
chocolate	1191	0.04	0.94
lunch	1186	0.04	0.92
yoghurt	1167	0.04	0.91
butter	1142	0.04	0.9
juice	1115	0.03	0.89
snack	1067	0.03	0.92
eggs	1048	0.03	0.93
sauce	1017	0.03	0.86
sweet	1002	0.03	0.88
snacks	983	0.03	0.9
cream	963	0.03	0.89
McDonald's	953	0.03	0.69
vegetable	942	0.03	0.92
cereal	911	0.03	0.88
beans	880	0.03	0.87
olive	849	0.03	0.87
pizza	837	0.03	0.81
pasta	826	0.03	0.91
tea	820	0.03	0.92
dinner	802	0.02	0.89
coffee	801	0.02	0.89
wine	773	0.02	0.9
potato	763	0.02	0.86
tomato	745	0.02	0.83
sugars	723	0.02	0.89
soy	719	0.02	0.88
burger	708	0.02	0.95
beef	701	0.02	0.9
fruits	690	0.02	0.9
wholegrain	676	0.02	0.84
biscuits	666	0.02	0.9
grains	654	0.02	0.86
meats	623	0.02	0.91
flour	616	0.02	0.82

garlic	611	0.02	0.87
legumes	602	0.02	0.92
oils	585	0.02	0.85
gluten	574	0.02	0.74
egg	567	0.02	0.87
additives	551	0.02	0.86
tomatoes	542	0.02	0.82
coconut	532	0.02	0.78
honey	529	0.02	0.85
herbs	522	0.02	0.91
grain	519	0.02	0.91
apple	514	0.02	0.9
wheat	505	0.02	0.89
soup	501	0.02	0.84
lemon	499	0.02	0.88
bacon	493	0.02	0.83
sausages	483	0.02	0.82
potatoes	480	0.01	0.87
sandwich	474	0.01	0.89
bread	470	0.01	0.85
salmon	465	0.01	0.91
burgers	450	0.01	0.84
muesli	450	0.01	0.87
oats	444	0.01	0.85
salads	444	0.01	0.91
corn	440	0.01	0.88
dishes	440	0.01	0.86
vegies	429	0.01	0.87
orange	422	0.01	0.86
avocado	400	0.01	0.82
dish	393	0.01	0.84
sauces	389	0.01	0.86
cakes	388	0.01	0.88
pork	383	0.01	0.83
sausage	382	0.01	0.8
spinach	381	0.01	0.88
broccoli	378	0.01	0.9
toast	375	0.01	0.89
juices	373	0.01	0.92
wholemeal	371	0.01	0.85
pies	370	0.01	0.86
fries	363	0.01	0.95

onion	362	0.01	0.75
wholegrains	359	0.01	0.82
beer	354	0.01	0.88
spices	352	0.01	0.83
greens	344	0.01	0.86
mushrooms	340	0.01	0.83
roll	337	0.01	0.84
banana	336	0.01	0.84
ham	334	0.01	0.87
pepper	328	0.01	0.82
ginger	325	0.01	0.88
tuna	324	0.01	0.78
seafood	323	0.01	0.91
cake	321	0.01	0.88
chilli	321	0.01	0.84
sushi	315	<0.01	0.76
lamb	306	<0.01	0.88
carrot	302	<0.01	0.83
rolls	297	<0.01	0.92
vinegar	290	<0.01	0.89
crackers	285	<0.01	0.83
pie	278	<0.01	0.86
noodles	273	<0.01	0.85
soups	272	<0.01	0.87
peanut	268	<0.01	0.78
peas	263	<0.01	0.85
vegemite	260	<0.01	0.76
roast	257	<0.01	0.84
sandwiches	257	<0.01	0.91
pumpkin	247	<0.01	0.89
KFC	244	<0.01	0.73
nut	241	<0.01	0.88
almond	240	<0.01	0.87
carrots	240	<0.01	0.9
dressing	240	<0.01	0.87
lentils	240	<0.01	0.87
rosemary	240	<0.01	0.9
capsicum	234	<0.01	0.86
tofu	228	<0.01	0.87
lettuce	225	<0.01	0.82
apples	224	<0.01	0.89
celery	224	<0.01	0.86

syrup	222	<0.01	0.84
barbecue	221	<0.01	0.85
muffins	219	<0.01	0.87
porridge	218	<0.01	0.85
parsley	214	<0.01	0.69
canola	213	<0.01	0.86
popcorn	213	<0.01	0.78
cola	211	<0.01	0.88
pizzas	211	<0.01	0.7
poultry	210	<0.01	0.89
spreads	204	<0.01	0.87
café	203	<0.01	0.87
cigarettes	196	<0.01	0.86
curry	191	<0.01	0.82
jam	191	<0.01	0.81
turkey	191	<0.01	0.79
beverages	186	<0.01	0.82
onions	185	<0.01	0.89
bananas	178	<0.01	0.82
lunchbox	177	<0.01	0.8
strawberries	177	<0.01	0.85
cinnamon	175	<0.01	0.7
beetroot	172	<0.01	0.84
vanilla	171	<0.01	0.87
olives	169	<0.01	0.69
SUBWAY	168	<0.01	0.62
dessert	167	<0.01	0.82
lunches	167	<0.01	0.83
kale	165	<0.01	0.6
MSG	164	<0.01	0.71
yeast	163	<0.01	0.81
spice	162	<0.01	0.8
cabbage	158	<0.01	0.9
flakes	158	<0.01	0.87
sesame	153	<0.01	0.84
sweets	153	<0.01	0.94
chip	152	<0.01	0.89
rye	152	<0.01	0.77
muffin	151	<0.01	0.86
sourdough	151	<0.01	0.63
starch	150	<0.01	0.88
pastries	148	<0.01	0.81

coriander	147	<0.01	0.75
mayonnaise	147	<0.01	0.82
pastry	147	<0.01	0.75
chickpeas	147	<0.01	0.87
steak	145	<0.01	0.9
cucumber	143	<0.01	0.83
oranges	143	<0.01	0.88
citrus	141	<0.01	0.88
asparagus	138	<0.01	0.69
walnuts	137	<0.01	0.86
lime	136	<0.01	0.77
coke	135	<0.01	0.86
almond	134	<0.01	0.69
cheeses	134	<0.01	0.86
smoothie	134	<0.01	0.7
sweeteners	133	<0.01	0.85
avocados	132	<0.01	0.81
blueberries	131	<0.01	0.85
dressings	131	<0.01	0.92
zucchini	131	<0.01	0.79
cocoa	130	<0.01	0.81
tumeric	128	<0.01	0.36
cuisine	126	<0.01	0.85
dough	126	<0.01	0.74
mushroom	123	<0.01	0.8
smoothies	123	<0.01	0.7
wraps	122	<0.01	0.82
strawberry	121	<0.01	0.84
weet-bix	121	<0.01	0.81
prawns	120	<0.01	0.79
coco	116	<0.01	0.8
miso	116	<0.01	0.63
peanuts	115	<0.01	0.79
herb	112	<0.01	0.83
mint	110	<0.01	0.75
graps	109	<0.01	0.89
hamburger	109	<0.01	0.86
soda	109	<0.01	0.85
salami	108	<0.01	0.81
beverage	107	<0.01	0.82
hamburgers	107	<0.01	0.75
cauliflower	106	<0.01	0.83

KRAFT	104	<0.01	0.82
ALDI	103	<0.01	0.6
chicken	102	<0.01	0.69
lactose	102	<0.01	0.81
ricotta	101	<0.01	0.81
cafes	100	<0.01	0.93
graham	99	<0.01	0.82
yoghurts	97	<0.01	0.8
cherry	95	<0.01	0.83
deli	94	<0.01	0.78
soya	94	<0.01	0.59
superfood	92	<0.01	0.72
buckwheat	90	<0.01	0.68
pineapple	89	<0.01	0.83
risotto	89	<0.01	0.84
spaghetti	89	<0.01	0.92
IGA	88	<0.01	0.63
chocolates	87	<0.01	0.88
apricots	86	<0.01	0.68
milo	85	<0.01	0.7
curries	84	<0.01	0.8
pears	84	<0.01	0.58
pita	84	<0.01	0.77
bun	83	<0.01	0.74
creams	83	<0.01	0.91
chia	82	<0.01	0.53
fillet	82	<0.01	0.82
breadcrumbs	81	<0.01	0.65
eggplant	81	<0.01	0.84
lunchboxes	81	<0.01	0.7
biscuit	79	<0.01	0.79
DOMINO'S	78	<0.01	0.68
mango	78	<0.01	0.79
oat	78	<0.01	0.84
mayo	77	<0.01	0.79
pancakes	77	<0.01	0.84
superfoods	77	<0.01	0.74
pudding	76	<0.01	0.76
pear	75	<0.01	0.81
cheddar	74	<0.01	0.83
oysters	74	<0.01	0.8
fillets	73	<0.01	0.71

teas	73	<0.01	0.88
curcumin	72	<0.01	0.26
sweetener	72	<0.01	0.85
custard	71	<0.01	0.74
grapefruit	69	<0.01	0.68
milks	69	<0.01	0.73
watermelon	68	<0.01	0.8
cider	67	<0.01	0.72
cumin	66	<0.01	0.74
apricot	65	<0.01	0.8
MCDONALD	64	<0.01	0.73
pea	63	<0.01	0.85
wagyu	63	<0.01	0.52
MCDONALDS	62	<0.01	0.69
spirite	62	<0.01	0.7
salsa	61	<0.01	0.77
cookies	60	<0.01	0.71
cordial	60	<0.01	0.78
wines	60	<0.01	0.79
BBQ	59	<0.01	0.66
cherries	59	<0.01	0.78
cocktail	59	<0.01	0.84
paprika	59	<0.01	0.78
peppers	59	<0.01	0.72
shellfish	59	<0.01	0.69
tahini	59	<0.01	0.72
yogurt	59	<0.01	0.43
pecans	57	<0.01	0.51
lentil	55	<0.01	0.64
soybeans	55	<0.01	0.86
cashews	54	<0.01	0.75
kimchi	54	<0.01	0.55
oyster	54	<0.01	0.82
breakfasts	53	<0.01	0.69
chives	53	<0.01	0.79
cornflakes	52	<0.01	0.76
tania	52	<0.01	0.53
wholefoods	52	<0.01	0.71
cacao	51	<0.01	0.52
malt	51	<0.01	0.7
starches	50	<0.01	0.82
brekkie	49	<0.01	0.47

steaks	49	<0.01	0.61
cadbury	48	<0.01	0.66
casseroles	48	<0.01	0.73
doughnut	48	<0.01	0.75
plums	48	<0.01	0.75
flours	47	<0.01	0.73
yolks	47	<0.01	0.75
chickpea	46	<0.01	0.57
peaches	46	<0.01	0.68
prawn	46	<0.01	0.68
prunes	46	<0.01	0.72
tart	46	<0.01	0.75
chessesburger	45	<0.01	0.73
lasagne	45	<0.01	0.85
wasabi	45	<0.01	0.54
stuffing	44	<0.01	0.79
caramel	43	<0.01	0.74
marinade	43	<0.01	0.68
noodle	43	<0.01	0.68
chorizo	42	<0.01	0.6
grape	42	<0.01	0.78
kiwifruit	42	<0.01	0.75
lard	42	<0.01	0.78
cookie	41	<0.01	0.7
gin	41	<0.01	0.68
don	39	<0.01	0.63
nutella	39	<0.01	0.62
ribs	39	<0.01	0.69
squid	39	<0.01	0.77
whey	39	<0.01	0.63
cocktails	37	<0.01	0.74
cracker	37	<0.01	0.77
wholefood	37	<0.01	0.62
cuisines	36	<0.01	0.75
tonic	36	<0.01	0.79
champagne	35	<0.01	0.74
crab	35	<0.01	0.87
leek	35	<0.01	0.68
sultana	35	<0.01	0.72
lemons	33	<0.01	0.76
beers	31	<0.01	0.75
chillies	31	<0.01	0.74

crumpets	31	<0.01	0.67
ginseng	31	<0.01	0.59
leeks	31	<0.01	0.64

Appendix D-3: Population groups lexicon (81 words)

word	Freq.	%	dispersion
people	7792		0.24
she	5934		0.18
children	5386		0.17
Australian	3771		0.12
my	3536		0.11
us	3466		0.11
his	3065		0.1
her	2943		0.09
women	2763		0.09
kids	2061		0.06
parents	1951		0.06
family	1475		0.05
me	1471		0.05
Ms.	1407		0.04
own	1381		0.04
men	1337		0.04
consumers	1234		0.04
adults	1093		0.03
child	1087		0.03
researchers	1071		0.03
experts	988		0.03
they're	978		0.03
I'm	881		0.03
children's	812		0.03
dietitian	812		0.03
nutritionist	781		0.02
doctor	780		0.02
yourself	734		0.02
baby	716		0.02
we're	696		0.02
person	627		0.02
patients	625		0.02
author	587		0.02
consumer	586		0.02

human	575	0.02	0.94
childhood	535	0.02	0.84
scientists	496	0.02	0.8
babies	443	0.01	0.88
friends	407	0.01	0.93
adult	405	0.01	0.92
man	405	0.01	0.93
manager	399	0.01	0.94
dietitians	394	0.01	0.91
expert	390	0.01	0.9
spokeswoman	379	0.01	0.9
students	356	0.01	0.8
vegetarian	346	0.01	0.79
we've	333	0.01	0.89
woman	325	0.01	0.89
chefs	285	<0.01	0.79
he's	272	<0.01	0.83
Asian	236	<0.01	0.88
Aussie	221	<0.01	0.83
Mrs.	221	<0.01	0.78
professional	182	<0.01	0.85
male	180	<0.01	0.85
teenagers	175	<0.01	0.85
female	172	<0.01	0.9
wife	168	<0.01	0.88
boy	165	<0.01	0.85
people's	165	<0.01	0.9
daughter	164	<0.01	0.89
father	162	<0.01	0.85
women's	160	<0.01	0.78
workers	160	<0.01	0.87
producers	150	<0.01	0.87
athletes	149	<0.01	0.73
miss	149	<0.01	0.92
patient	149	<0.01	0.81
trainer	149	<0.01	0.86
scientist	148	<0.01	0.92
smokers	143	<0.01	0.79
individuals	141	<0.01	0.85
she's	139	<0.01	0.91
Europeans	131	<0.01	0.89
chairman	128	<0.01	0.84

Tasmanian	126	<0.01	0.79
males	119	<0.01	0.76
himself	118	<0.01	0.83
official	115	<0.01	0.87
Americans	113	<0.01	0.78

Appendix D-4: Human emotions lexicon (1217 words in total; top-100 as examples)

word	Freq.	%	word	Freq.	%
high	5518	0.17	dark	299	<0.01
like	3762	0.12	carry	298	<0.01
need	3374	0.11	close	291	<0.01
low	2122	0.06	dry	280	<0.01
used	1860	0.06	allow	279	<0.01
want	1641	0.05	artificial	274	<0.01
keep	1512	0.04	mind	268	<0.01
back	1491	0.04	wrong	268	<0.01
small	1444	0.04	complex	266	<0.01
lower	1412	0.04	worst	264	<0.01
content	1251	0.04	mixed	241	<0.01
long	1221	0.04	slow	239	<0.01
bad	1059	0.03	changing	231	<0.01
overweight	1057	0.03	expect	229	<0.01
soft	1012	0.03	require	227	<0.01
unhealthy	941	0.03	mandatory	219	<0.01
green	853	0.03	heavy	208	<0.01
hard	754	0.02	hidden	206	<0.01
love	749	0.02	severe	202	<0.01
light	714	0.02	alone	199	<0.01
poor	712	0.02	dangerous	198	<0.01
trying	639	0.02	expensive	198	<0.01
lean	628	0.02	centre	191	<0.01
mean	609	0.02	cheap	191	<0.01
support	593	0.02	warm	190	<0.01
stress	525	0.02	base	189	<0.01
old	501	0.02	demand	186	<0.01
active	500	0.02	tiny	183	<0.01
raw	490	0.02	affected	179	<0.01
serious	480	0.02	worry	174	<0.01
excess	457	0.01	oily	168	<0.01
value	438	0.01	waste	167	<0.01

care	436	0.01	prefer	166	<0.01
boost	425	0.01	extremely	164	<0.01
general	421	0.01	hope	159	<0.01
frozen	419	0.01	thanks	159	<0.01
generally	417	0.01	cool	156	<0.01
difficult	413	0.01	pass	154	<0.01
consider	391	0.01	so-called	153	<0.01
focus	384	0.01	negative	153	<0.01
encourage	377	0.01	extreme	152	<0.01
meet	369	0.01	harmful	150	<0.01
acid	342	0.01	thin	146	<0.01
cold	331	0.01	absorption	146	<0.01
mix	331	0.01	heavily	145	<0.01
promote	326	0.01	minute	144	<0.01
happy	320	0.01	strict	143	<0.01
excessive	309	<0.01	blue	143	<0.01
plain	303	<0.01	critical	142	<0.01
black	300	<0.01	toxic	142	<0.01

APPENDIX E

LEXICONS ESTABLISHED FROM CHNCORP

Concerning one of the news formats, namely information relevancy, four lexicons are built for the four dimensions. The components of lexicons are demonstrated as follows.

Appendix E-1: Geographical closeness lexicon (28 words)

word	Freq.	%	dispersion
北京 (Beijing)	55	0.02	0.73
上海 (Shanghai)	48	0.02	0.78
中国 (China)	45	0.01	0.83
美国 (the U.S.)	41	0.01	0.7
英国 (the U.K.)	39	0.01	0.72
广州 (Guangzhou)	29	<0.01	0.63
日本 (Japan)	26	<0.01	0.73
山东 (Shandong)	20	<0.01	0.76
河南 (He'nan)	16	<0.01	0.67

江苏 (Jiangsu)	16	<0.01	0.72
成都 (Chengdu)	15	<0.01	0.79
芬兰 (Finland)	15	<0.01	0.73
福建 (Fujian)	15	<0.01	0.64
广东 (Canton)	15	<0.01	0.79
浙江 (Zhejiang)	15	<0.01	0.67
韩国 (South Korea)	14	<0.01	0.66
杭州 (Hangzhou)	13	<0.01	0.77
深圳 (Shenzhen)	13	<0.01	0.72
天津 (Tianjin)	13	<0.01	0.69
香港 (Hong kong)	13	<0.01	0.63
河北 (Hebei)	12	<0.01	0.67
加拿大 (Canada)	12	<0.01	0.64
南京 (Nanjing)	12	<0.01	0.72
澳大利亚 (Australia)	10	<0.01	0.55
辽宁 (Liaoning)	10	<0.01	0.55
安徽 (Anhui)	9	<0.01	0.51
德国 (Germany)	9	<0.01	0.74
港澳台 (Hong Kong, Macao,Taiwan)	9	<0.01	0.46

Appendix E-2: Cultural closeness lexicon (185 words)

word	Freq.	%	dispersion
五毛食品 (Fifty-cent foods)	248	0.08	0.4
盐 (Salt)	217	0.07	0.88
五毛零食 (Fifty-cent snack)	126	0.04	0.51
水果 (Fruits)	122	0.04	0.81
糖 (Sugar)	110	0.04	0.79
蔬菜 (Vegetables)	100	0.03	0.81
儿童食品 (Child food)	94	0.03	0.45
辣条 (Spicy breadsticks)	94	0.03	0.57
垃圾食品 (Junk food)	83	0.03	0.51
轻食 (Light meal)	79	0.03	0.63
鱼 (Fish)	60	0.02	0.85
蛋 (Egg)	58	0.02	0.77
酱油 (Soy sauce)	58	0.02	0.73
味精 (MSG)	58	0.02	0.83
碳水化合物 (Carbohydrate)	57	0.02	0.75
豆类 (Beans)	56	0.02	0.77
奶类 (Dairy)	55	0.02	0.71
食品 (Foods)	53	0.02	0.77

家禽 (Poultry)	52	0.02	0.72
重口味 (Heavy taste)	50	0.02	0.7
豆制品 (Soy product)	44	0.01	0.67
香肠 (Sausage)	43	0.01	0.76
糖果 (Candy)	42	0.01	0.64
饼干 (Biscuit)	41	0.01	0.86
蛋类 (Eggs)	41	0.01	0.65
玉米 (Corn)	41	0.01	0.78
面包 (Bread)	38	0.01	0.83
方便面 (Instant noodle)	37	0.01	0.72
肉 (Meat)	36	0.01	0.76
瘦肉 (Lean meat)	36	0.01	0.71
花生 (Peanut)	35	0.01	0.74
鸡精 (MSG)	35	0.01	0.69
薯片 (Potato chips)	33	0.01	0.7
菠菜 (Spinach)	31	0.01	0.75
大豆 (Soybean)	31	0.01	0.74
调味面制品 (Flavoured flour products)	31	0.01	0.67
坚果 (Nuts)	31	0.01	0.7
健康饮食 (Healthy diet)	31	0.01	0.71
虾 (Shrimps)	31	0.01	0.76
膨化食品 (Puffed foods)	30	<0.01	0.6
饮料 (Beverage)	30	<0.01	0.73
合理膳食 (Proper diets)	29	<0.01	0.67
牛奶 (Milk)	29	<0.01	0.83
肉类 (Meats)	29	<0.01	0.8
方便食品 (Instant foods)	28	<0.01	0.74
火腿 (Ham)	28	<0.01	0.67
食物 (Foods)	28	<0.01	0.67
胡萝卜 (Carrots)	27	<0.01	0.78
鸡蛋 (Eggs)	27	<0.01	0.78
牛肉 (Beef)	27	<0.01	0.81
燕麦 (Oats)	27	<0.01	0.69
核桃 (Walnuts)	26	<0.01	0.69
苹果 (Apple)	26	<0.01	0.76
肉制品 (Meat product)	26	<0.01	0.46
薯条 (French fries)	25	<0.01	0.68
海带 (Kelp)	24	<0.01	0.78
蚝油 (Oyster sauce)	24	<0.01	0.69
酒 (Wine)	24	<0.01	0.8
洋葱 (Onion)	24	<0.01	0.67

鱼类 (Fishes)	24	<0.01	0.79
绿色食品 (Green foods)	22	<0.01	0.68
咸菜 (Pickles)	22	<0.01	0.71
高盐饮食 (High-salt diet)	21	<0.01	0.78
姜 (Ginger)	21	<0.01	0.67
康师傅 (Master Kong)	21	<0.01	0.71
水产制品 (Aquatic products)	21	<0.01	0.29
速冻食品 (Frozen food)	21	<0.01	0.71
大蒜 (Garlic)	20	<0.01	0.68
果脯 (Dried fruits)	20	<0.01	0.72
辣椒 (Pepper)	20	<0.01	0.68
零食 (Snacks)	20	<0.01	0.71
奶酪 (Cheese)	20	<0.01	0.44
乳制品 (Dairy products)	20	<0.01	0.68
油炸食品 (Fried food)	20	<0.01	0.64
低盐饮食 (Low-salt diet)	19	<0.01	0.7
鸡肉 (Chicken)	19	<0.01	0.89
面 (Flour)	19	<0.01	0.74
面条 (Noodle)	19	<0.01	0.75
鱼肉 (Fish)	19	<0.01	0.7
醋 (Vinegar)	18	<0.01	0.78
蛋糕 (Cake)	18	<0.01	0.78
地沟油 (Swill-cooked oil)	18	<0.01	0.18
儿童酱油 (Soy sauce for children)	18	<0.01	0.61
糕点 (Pastry)	18	<0.01	0.77
挂面 (Noodle)	18	<0.01	0.57
黑木耳 (Fungus)	18	<0.01	0.74
红肉 (Red meat)	18	<0.01	0.68
今麦郎 (Jinmailang)	18	<0.01	0.57
巧克力 (Chocolate)	18	<0.01	0.67
小米 (Millet)	18	<0.01	0.63
油条 (Fried dough stick)	18	<0.01	0.84
预包装食品 (Packaged foods)	18	<0.01	0.54
食品添加剂 (Food additives)	17	<0.01	0.74
西红柿 (Tomato)	17	<0.01	0.67
香菇 (Mushroom)	17	<0.01	0.86
羊肉 (Lamb)	17	<0.01	0.5
洋快餐 (Western fast food)	17	<0.01	0.42
紫菜 (Nori)	17	<0.01	0.73
刀削面 (Sliced noodle)	16	<0.01	0.62
果汁 (Juice)	16	<0.01	0.48

火腿肠 (Ham)	16	<0.01	0.75
咖啡 (Coffee)	16	<0.01	0.73
绿豆 (Green bean)	16	<0.01	0.77
芹菜 (Celery)	16	<0.01	0.69
全谷物 (Wholegrain)	16	<0.01	0.56
碳酸饮料 (Carbonate drinks)	16	<0.01	0.73
土豆 (Potato)	16	<0.01	0.79
外卖 (Take-away)	16	<0.01	0.6
香蕉 (Banana)	16	<0.01	0.6
猪肉 (Pork)	16	<0.01	0.65
调味品 (Condiments)	15	<0.01	0.73
豆瓣酱 (Bean paste)	15	<0.01	0.73
蘑菇 (Mushroom)	15	<0.01	0.79
白象 (Baixiang)	14	<0.01	0.55
豆腐 (Tofu)	14	<0.01	0.7
罐头 (Canned food)	14	<0.01	0.63
馒头 (Steamed bun)	14	<0.01	0.63
奶 (Milk)	14	<0.01	0.68
荞麦 (Buckwheat)	14	<0.01	0.61
薯类 (Potato)	14	<0.01	0.56
甜味剂 (Sweeteners)	14	<0.01	0.37
杏仁 (Almond)	14	<0.01	0.63
休闲食品 (Snacks)	14	<0.01	0.57
鱼虾类 (Fish and shrimp)	14	<0.01	0.6
安赛蜜 (Acesulfame potassium impurity)	13	<0.01	0.55
糙米 (Brown rice)	13	<0.01	0.67
葱 (Shallot)	13	<0.01	0.8
动物内脏 (Animal innards)	13	<0.01	0.6
腐乳 (Fermented bean curd)	13	<0.01	0.8
瓜子 (Melon seeds)	13	<0.01	0.74
红薯 (Sweet potato)	13	<0.01	0.74
健康食品 (Healthy foods)	13	<0.01	0.63
垃圾食物 (Junk foods)	13	<0.01	0.23
冷冻调理食品 (Frozen & seasoned food)	13	<0.01	0.49
米饭 (Steamed rice)	13	<0.01	0.65
水产品 (Aquatic products)	13	<0.01	0.51
咸鱼 (Salted fish)	13	<0.01	0.67
鸭 (Duck)	13	<0.01	0.72
植物油 (Vegetable oil)	13	<0.01	0.49
包子 (Steamed bun)	12	<0.01	0.67
低钠盐 (Low-sodium salt)	12	<0.01	0.55

番茄酱 (Ketchup)	12	<0.01	0.67
防腐剂 (Preservatives)	12	<0.01	0.75
肥肉 (Fat)	12	<0.01	0.75
橄榄油 (Olive oil)	12	<0.01	0.58
工业味 (Industrial taste)	12	<0.01	0.48
红豆 (Red bean)	12	<0.01	0.72
话梅 (Preserved plum)	12	<0.01	0.67
鸡 (Chicken)	12	<0.01	0.75
可乐 (Coke)	12	<0.01	0.62
米饭 (Steamed rice)	12	<0.01	0.58
茄子 (Eggplant)	12	<0.01	0.72
禽肉 (Poultry meat)	12	<0.01	0.62
甜点 (Dessert)	12	<0.01	0.67
人造肉 (Artificial meat)	12	<0.01	0.44
蛋黄 (Yolk)	11	<0.01	0.73
动物肝脏 (Animal liver)	11	<0.01	0.4
豆浆 (Soybean milk)	11	<0.01	0.76
番茄酱 (Ketchup)	11	<0.01	0.61
海鲜 (Seafood)	11	<0.01	0.57
汉堡包 (Burger)	11	<0.01	0.51
黄瓜 (Cucumber)	11	<0.01	0.67
培根 (Bacon)	11	<0.01	0.73
山药 (Yam)	11	<0.01	0.69
松子 (Pine nuts)	11	<0.01	0.59
酸奶 (Yogurt)	11	<0.01	0.59
王致和 (Wangzhihe)	11	<0.01	0.49
午餐肉 (Ham)	11	<0.01	0.57
蚕豆 (Bean)	10	<0.01	0.42
蜂蜜 (Honey)	10	<0.01	0.8
谷物 (Grain)	10	<0.01	0.55
酱菜 (Pickles)	10	<0.01	0.44
橘子 (Orange)	10	<0.01	0.53
腊肠 (Sausage)	10	<0.01	0.58
腊肉 (Bacon)	10	<0.01	0.55
猕猴桃 (Kiwi fruit)	10	<0.01	0.33
南瓜 (Pumpkin)	10	<0.01	0.58
泡菜 (Kimchi)	10	<0.01	0.58
烧烤 (Barbecue)	10	<0.01	0.55
速食面 (Instant noodle)	10	<0.01	0.55
腌制食品 (Preserved food)	10	<0.01	0.42
薏米 (Coix seed)	10	<0.01	0.53
油菜 (Rape flower)	10	<0.01	0.75

杂粮 (Grains)	10	<0.01	0.75
榨菜 (Pickle)	8	<0.01	0.24

Appendix E-3: Population groups lexicon (33 words)

word	Freq.	%	dispersion
他 (HE)	93	0.03	0.66
儿童 (Children)	70	0.02	0.78
专家 (Experts)	63	0.02	0.78
记者 (Journalists)	58	0.01	0.71
她 (SHE)	55	0.01	0.58
院士 (Fellow of academic institutes)	41	0.01	0.68
老年人 (The elder)	27	<0.01	0.70
孕妇 (Pregnant women)	17	<0.01	0.76
业内人士 (Insiders)	16	<0.01	0.62
网民 (Netizens)	15	<0.01	0.63
孟素荷 (Meng suhe)	15	<0.01	0.60
北京人 (People in Beijing)	14	<0.01	0.34
营养师 (Dietitian)	14	<0.01	0.55
吃货 (Foodie)	12	<0.01	0.60
青少年 (Teenagers)	12	<0.01	0.51
郭孝宝 (Guo xiaobao)	12	<0.01	0.35
朱丹蓬 (Zhu danpeng)	11	<0.01	0.49
主持人 (The host)	11	<0.01	0.19
患者 (Patients)	10	<0.01	0.53
家长 (Parents)	10	<0.01	0.61
政协委员 (CPPCC member)	10	<0.01	0.42
王陇德 (Wang longde)	10	<0.01	0.22
范志红 (Fan zhihong)	9	<0.01	0.74

老人 (The elder)	9	<0.01	0.57
梁晓峰 (Liang xiaofeng)	9	<0.01	0.51
吴永宁 (Wu yongning)	9	<0.01	0.34
小胖墩 (Overweight young)	9	<0.01	0.12
杨月欣 (Yang yuexin)	9	<0.01	0.54
糖尿病患者 (Diabetic)	8	<0.01	0.62
许少明 (Xu shaoming)	8	<0.01	0.54
女性 (Female)	7	<0.01	0.66
白领 (White-collar)	6	<0.01	0.67
高血压患者 (Hyperpietic)	6	<0.01	0.66

Appendix E-4: Human emotions lexicon (1308 words, top-100 as examples)

word	Freq.	%	word	Freq.	%
要 (Need)	3132	1.2	认可 (Recognition)	70	0.02
说 (Say)	1590	0.6	应用 (Application)	69	0.02
需要 (Require)	1586	0.6	聚焦 (Focus)	68	0.02
通过 (through)	1505	0.58	倾向 (Tendency)	66	0.02
注意 (Caution)	878	0.32	偏好 (Preference)	64	0.02
向 (Toward)	877	0.32	重 (Heavy)	64	0.02
关注 (Concern)	763	0.28	期待 (Expect)	64	0.02
好 (Well)	739	0.25	焦虑 (Anxiety)	62	0.02
用 (Use)	697	0.21	质疑 (Doubt)	61	0.02
支持 (Support)	491	0.15	自愿 (Voluntary)	54	0.02
应 (Should)	489	0.15	快乐 (Happiness)	53	0.02
满足 (Satisfaction)	448	0.14	用 (Use)	52	0.02
喜欢 (Like)	411	0.13	兼顾 (Take both into account)	52	0.02
希望 (Hope)	374	0.11	奖励 (Reward)	51	0.02
接受 (Accept)	371	0.11	投诉 (Complaints)	51	0.02
过 (Through)	349	0.1	忽略 (Neglect)	48	0.02
重视 (Emphasis)	318	0.1	喜好 (Preference)	48	0.02

注重 (Emphasis)	277	0.08	想要 (Want)	47	0.02
需 (Need)	228	0.08	难 (Difficulty)	45	0.01
集中 (Concentration)	215	0.06	重要 (Important)	44	0.01
提倡 (Promote)	210	0.06	恐慌 (Panic)	44	0.01
要说 (Say)	196	0.05	原 (Original)	43	0.01
想 (Want)	193	0.05	患 (Suffer)	43	0.01
应 (Should)	178	0.05	美 (Beautiful)	42	0.01
称 (Weigh)	177	0.05	批准 (Approve)	42	0.01
担心 (Worry)	162	0.05	患者 (Patient)	41	0.01
应要 (Require)	160	0.05	同意 (Agreement)	39	0.01
患病 (Fall ill)	142	0.05	期 (Period)	39	0.01
欢迎 (Welcome)	138	0.05	开心 (Happiness)	38	0.01
好好 (Well)	130	0.04	愉悦 (Delight)	37	0.01
关心 (Care)	130	0.04	偏爱 (Favor)	37	0.01
喜爱 (Like)	128	0.04	抑郁 (Depression)	36	0.01
肯定 (Affirm)	121	0.04	舒服 (Comfortable)	36	0.01
允许 (Permit)	120	0.04	用用 (Use)	35	0.01
快 (Quick)	115	0.04	怕 (Fear)	35	0.01
讲究 (Be particular about)	110	0.04	快要 (going to)	35	0.01
发作 (Onset)	110	0.04	应说 (Should say)	34	0.01
爱 (Love)	109	0.04	担忧 (Worry)	34	0.01
期望 (Expect)	106	0.04	憋 (Suppress)	34	0.01
维护 (Maintain)	96	0.03	要应 (Should)	33	0.01
引领 (Lead)	94	0.03	需应 (Should)	33	0.01
迎来 (Greet)	93	0.03	爱好 (Hobby)	32	0.01
满足需要 (Satisfy the need)	92	0.03	酸 (Acid)	31	0.01
愿意 (Willing)	89	0.03	说用 (Use)	31	0.01
许可 (Permit)	85	0.03	主持 (Host)	30	< 0.01
忽视 (Neglect)	83	0.03	怀疑 (Doubt)	29	< 0.01
留意 (Notice)	81	0.03	尚 (Advocate)	29	< 0.01
讲 (Speak)	81	0.03	渴望 (Desire)	29	< 0.01
说好 (Agreement)	72	0.02	轻 (Light)	29	< 0.01
好要 (Need)	71	0.02	推崇 (Promote)	28	< 0.01

