

A Systematic Literature Review on the Role of Risk Perception and Risk Prevention in the Phases of Risk Communication: Insights from the COVID-19 Pandemic in Southeast Asia

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ABSTRACT

The COVID-19 pandemic revealed gaps in risk communication, particularly in Southeast Asia. Preventive prevention is based on evaluating risk, which determines compliance with the protective measures. As part of the lessons learned from communicating risks in the context of the COVID-19 pandemic, this study also looks at how risk communication influenced the population's actions in Malaysia, Vietnam, Singapore and other Southeast Asian countries. The study aims to explore the role of risk perception in influencing public behavior, assess the effectiveness of communicated prevention strategies, and evaluate the interconnection between risk perception and prevention in enhancing public compliance. A Systematic Literature Review (SLR) was performed under the guidelines of PRISMA. All the articles published after 2019 and those that appeared in the peer-reviewed journals were analyzed using thematic analysis. Information was collected from the research, and the target was COVID-19 risk perception and prevention of transmission in Southeast countries. Studies demonstrate that risky communication enhances compliance with protective measures. Compliance was controlled by sociocultural and economic factors, and early, severe interventions helped to lower the incidences. However, inadequate information and unequal and conflicting policies acted as barriers. This paper highlights the importance of cultural sensitivity when devising risk communication structures to improve compliance and prevent future pandemics. This paper presents theoretical lessons for policymakers drawn in multicultural environments such as the Southeast region.

Keywords: Risk Communication, Risk Perception, Risk Prevention, Southeast Asia, COVID-19.

INTRODUCTION

At the end of 2019, Covid-19 erupted in Wuhan, China. Covid-19 has been widespread in almost all countries in the world since then. The World Health Organization (WHO) has declared Coronavirus a global epidemic (WHO, 2019). Involving three tourists from China, the first coronavirus case was detected on January 25, 2020, in Malaysia. The positive progressively increased before the first two deaths reported on March 17. Involving 339 deaths by November 2020, Malaysia has reported over 56,659 COVID-19-positive cases (Elengoe, 2020).

To contain the wide spread of COVID-19, the Southeast Asian government has developed various actions to protect citizens, including health screening in the airport, compulsory quarantine of all entering travellers, setting up the pandemic fund, implementing Standard Operational Procedure (S.O.P.), and the Movement Control Order (MCO) (Mat Dawi, Namazi, & Maresova, 2021). Therefore, the government's risk communication with the public or citizens was among the essential tasks in combating the pandemic and the infodemic around COVID-19 (WHO, 2021). The S.O.P. and MCO include regulations such as social distancing, dine-in restrictions, vehicle capacity

restrictions, inter-state travel bans, international travel bans, and cinema restrictions, etc. Scientific facts have pointed out that S.O.P. and MCO have greatly decreased the spreading speed of the COVID-19 virus (Tay, Abdullah, Chelladorai, Low, & Tong, 2021).

In Southeast Asia, governments acted swiftly to implement measures to address the challenges posed by the COVID-19 pandemic, aiming to contain the virus and safeguard public welfare (Hassan et al., 2021). However, the success of these measures largely depended on public adherence, emphasizing the critical role of effective risk communication (Azlan, Hamzah, Sern, Ayub, & Mohamad, 2020). Governments needed to provide clear and consistent information about the pandemic, the rationale behind health protocols like lockdowns, and the importance of compliance for individuals and businesses. Traditional and social media were extensively utilized to reach diverse population segments, fostering widespread awareness (Sundarasan et al., 2020). Despite these efforts, noncompliance and varied community responses highlighted the complexity of health crisis communication as a social process. Inconsistent adherence to health protocols among some groups contributed to an increased spread of the virus (Yusuf & Oyelakin, 2022). Moreover, misinformation and delays in disseminating accurate information about vaccines led to mixed public reactions, undermining vaccine campaigns (Bin Naeem & Kamel Boulos, 2021). These challenges underline the importance of timely, transparent, and culturally sensitive communication strategies to build public trust, combat misinformation, and ensure effective implementation of health measures during pandemics in Southeast Asia.

On May 5th 2023, the World Health Organization announced that COVID-19 is no longer a global pandemic, which means the five years of the outbreak have ended (WHO, 2023) But WHO also pointed out the virus is still out there, “still killing, still changing”, during the years of combating Covid-19, many mistakes were made. The fear of Covid-19 is never truly disappeared, people’s behaviour has permanently changed, such as mask-wearing, hand-sanitizing, and hand-shake-avoiding.

Risk communication has been brought to the foreground mainly due to the realities of the COVID-19 pandemic. A study by Aziz, Othman, Lugova, and Suleiman (2020) conducted among the public in Kuala Lumpur, Malaysia, revealed that people’s perception of risk and further prevention of such risks influenced their compliance with policies like MCO and SOPs. However, the observed discrepancies in public adherence demonstrated that there was a significant leap in the overall misunderstanding of risk assessment and behaviour modification. It stated that cultural and economic differences affected compliance with the public health recommendations, as well as created additional risks in certain groups. Although these governmental approaches, like economic stimulus matters and targeted screenings, are partially controlled, the ways risk communication minimizes the departures between perception and behaviour still appear insufficient and incomplete, as described by Othman and Latif (2021).

Rationale of the Study

The justification for this study originates from the effects of the COVID-19 pandemic, a tremendous public health issue in Southeast Asia, affecting densely populated countries such as Indonesia, Thailand, and Malaysia. COVID outbreak showed an incompetent use of Risk Communication and Community Engagement when enforcing preventive measures. This research examines the role of risk perception in modifying health behaviour and adherence to instructions at various stages of risk communication. Knowing the cultural, psychological, and systemic features characteristic of Southeast Asia has to be done due to the significant difference in sociocultural norms and Southeast Asian countries’ economic development levels as stated by Kumar and Morawska (2019). Using a systematic literature review, this study reviews several research studies to understand the relationship between risk perception and preventive measures. It is designed to generate knowledge on ways to explain the cultural and contextual differences influencing the public’s compliance with health promotion. The aim is to provide policymakers and health professionals with profound knowledge to develop context-specific appropriate risk communication interventions. These approaches are valuable for readers because they are grounded in Southeast Asia’s context, which means that experience can be helpful in other multicultural areas.

Objectives

1. To explore the role of risk perception in influencing public responses during different phases of risk communication in the context of the COVID-19 pandemic in Southeast Asia.
2. To analyze the effectiveness of risk prevention strategies communicated during the COVID-19 pandemic in Southeast Asia.
3. To identify the interconnection between risk perception and risk prevention in enhancing public adherence to preventive measures during the COVID-19 pandemic.

Research Significance

This research provides important insights into the communication factors in risk communication during a global health catastrophe, especially in the culturally diverse and populated Asian region of Southeast Asia, including Indonesia, Thailand, Vietnam and Malaysia. Risk communication plays a central role throughout public health emergencies, during which the public receives information that affects perception and attitudes towards protective measures. Through analyzing cross-sectional and longitudinal data on risk perception and risk prevention behaviour in the context of COVID-19, this research contributes theoretical values and practical implications to how people make or ought to make decisions about their health and that of society. Such findings may be helpful in Southeast Asian countries, where cultural, social and economic differences influence the operationalization and outcomes of the communication strategies. The study brings attention to the need for appropriate culturally sensitive approaches that would improve the communities' compliance with preventive measures and the need for efficient planning to prevent other future pandemics. Evaluating risk reduction measures also helps strengthen the healthcare system and the adequacies stressed by Heydari et al. (2021) and Dryhurst et al. (2022).

LITERATURE REVIEW

Emphasizing Communication Theories: Agenda Setting and Framing Theory

To critically discuss the role of media in constructing or influencing public threat perception, the papers below can be reviewed based on two theories agenda setting theory and framing theory.

Agenda-setting theory was developed by McCombs and Shaw in 1972, it also established that media holds a lot of influence in deciding, what the public considers important enough to discuss. The media assumed a significant role in the COVID-19 pandemic in influencing the audiences' perception of risk and directing people's behaviour towards governmental callings. McCombs' Agenda-Setting Theory postulates that the media plays a very strong role in determining which issues the public considers most important. This theory has a significant role to play in addressing the COVID-19 case as the media rebuilt specific elements of the crisis namely the rising new cases of the pandemic disease or the financial impacts of lockdowns. Thus, raising these topics as a priority, the media regulated the attention of the population to particular dangers and appealed to the people, orienting the public to pay attention to certain dangers but not others, according to McCombs (2002). The selective risk communication reinforced some risks including focusing on the severity of infection rates or the disruption of the economy hence the people's orientations towards the pandemic and their compliance with polices.

Consequently, the use of media to set and influence the risk perceptions of the public can be theoretically reviewed and criticized with the aid of Agenda-Setting Theory and Framing Theory. Another theory concerning the topic is the theory of Agenda-setting whereby McCombs proved that the media influences the public to be concerned with certain types of risks. However, Framing Theory which was advanced by Goffman in 1974 takes this analysis a notch higher by looking at how an issue is couched. Media representation of a crisis plays a major role in how the public is going to respond to a particular issue. For instance, in the COVID-19 pandemic framing the virus as being strictly a health issue and therefore people should wear masks and support social distancing would lead to more adherence to health measures. Whereas framing the situation as an economic crisis to justify the opening of the economy to prevent the collapse led to anti-health measures, as Entman (2007).

Risk Communication Theory

Turner, Skubisz, and Rimal (2011), define risk communication theory as a scholarly field of study aiming at understanding people's psychological and behavioral patterns while perceiving and processing risk and developing effective ways of informing people about the risks in question. This domain includes a range of theoretical approaches and frameworks to explain cognitive factors that can affect related and relational changes at an individual level, specifically regarding risk information integration and decision-making (Bhattacharya, Saleem, & Singh, 2021). There has been a lot of literature learning on the improvement of risk communication theory and practice with a stronger focus on the optimality of risk management processes (W. E. Martin, Martin, & Kent, 2009).

Risk communication theory refers to a system that enables the exchange of information on risks/hazards between the stakeholders for instance the government and the public. The theory's focus is on facilitating informed audiences.

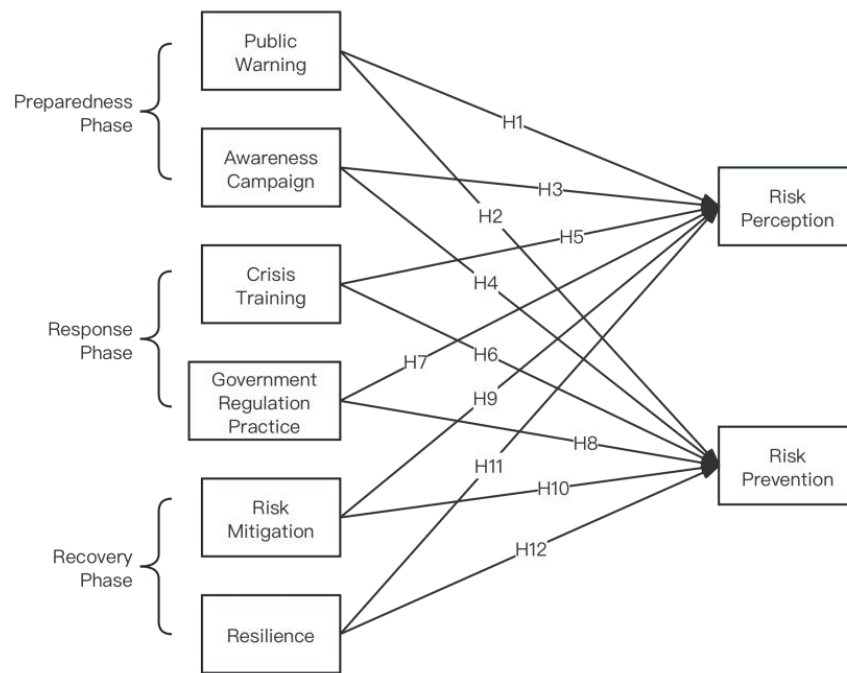


Figure 1. Theoretical Framework Based on Risk Communication Theory

As seen in **Figure 1**, risk communication theory contains three key processes: preparedness, response, and recovery. Governments or respective authorities may issue public warnings as the first step toward preparedness. Hence, this is where actionable risk communication comes in. The second step entails the response phase, focusing on crisis management and training processes. The focus of this stage entails image restoration as well as repair. The final stage is recovery. The stage entails recovery, mitigation, and resilience. Hence, the focus is on the “social amplification of the risk framework (Hussin, Rahman, & Azudin, 2021).”

The Theoretical Framework was developed by analyzing the theories and models involved in risk communication to develop the processes used in risk communication, i.e., preparedness, response, and recovery. The framework developed is based on acknowledging that risk communication is complex and requires several theoretical perspectives to be incorporated to understand better. During the development of the conceptual framework, a study by Martin et al. (2009), was used to give an overall understanding of risk communication theory and how it evolved. The reference gives an understanding of risk perception's behavioural and cognitive aspects. Use of this framework may require other theories such as the Extended Parallel Process Model (EPPM) to offer a sound analysis and enhance the overall understanding.

Risk Perception and Risk Prevention in the Preparedness Phase

In the Preparedness phase, awareness activities and alerting tools are two vital dimensions that determine citizens' behaviour. Public warning disseminated through social sites, official sites, and governmental media is a message/signal which is displayed to alert the public of certain dangers or risks. Such kind of warning is given to let the people know what kind of dangers exist and what precautions need to be taken for themselves or someone else's safety. The extent of warning effectiveness depends on the following; the warning messages, the channels used to deliver the warning, the types of warning issues, and the cognitive warning processes regarding risk assessment and information acquisition among the receiver (Guo, An, & Comes, 2022).

Authors argue that awareness campaigns form an important component of people's perception of health risks as posited by Cisternas, Cifuentes, Bronfman, and Repetto (2023). Knowledge about those dangers can be made more widespread and as a result, can alter how particular risks are perceived. For example, a campaign that provides details of the dangers of smoking can make the public conscious of the impact hence in exchange for quitting or refraining from smoking (Kraywinkel, Heidrich, Heuschmann, Wagner, & Berger, 2007).

The identity and evaluation of awareness campaigns to consider risk perception and preventive behaviours by the Extended Parallel Process Model (EPPM) by Witte and Allen, as put by Popova (2011). The EPPM holds that behaviour awareness about the magnitude of a health danger and recommended sound behavioural activities can influence individual perceptions. Hence the campaigns can achieve a high risk perception by increasing awareness

and knowledge of the public. Furthermore, there are other things required to make awareness campaigns successful like messaging and delivery techniques (Guo et al., 2022).

Risk Perception and Risk Prevention in the Response Phase

Guo et al. (2022) have also revealed that crisis management exercises multiple impacts on risk perception and risk prevention as well. Firstly, effective crisis management lowers the risks of the occurrence of a crisis hence lessening on perception of risk. Also, in the case of management of the situation, the efficiency of management tactics leads to decreasing the impact of a crisis, which in turn decreases the perceived risk (Matovu, Mulyowa, Akorimo, & Kirumira, 2022). Moreover, Armstrong's threat management establishes trust in organizational competencies and simultaneously reduces threat perception. Finally, by understanding the causes of a crisis and acting correspondingly wise crisis management acts as a preventive measure, avoiding a repetition of a logistic crisis, and therefore lowering risk perception. Based on Liu, Zhu, and Li (2021) the nature, scope, and enforcement of regulations play a crucial role in defining the way individuals and organisations view and respond to risks. The interrelationship between regulations and risk perception defines the degree to which regulations have influenced the risk perception of individuals or organizations. It is an interwoven relationship in which risk perception determines the policy-making process and the policy regulation. Being aware of such concerns, policymakers might indeed take such features into account while further developing regulation, which as Borio and Zhu (2009) noted, pointed out the interconnected relationship between regulation and risk appreciation.

This paper uses the Risk Perception Attitude (R.P.A.) framework introduced by Paul to realise that institutional trust and perceived control determine the risk perception of a particular subject. Having calibrated information that captures possible risks but also reports guidelines and compliance with such risk control measures also helps develop institutional trust (Paul, 2016).

Risk Perception and Risk Prevention in the Recovery Phase

Ozanne, Ballantine, and Mitchell (2020) defined risk management as the effort put in to minimize the possibility or impact of a hazard or risk. Such measures may be structural and nonstructural, for example, architectural plans and designs, the use of space and land, and the management of disasters. Disaster risk reduction is the effort to enhance a community's capacity to prevent and/or lessen the impacts of natural disasters and other hazards. Risk perception may be defined as how people understand or appreciate potential risks related to a given danger or event (Hashim & Salleh, 2021).

People's experience, what they read in the newspapers, and magazines, and learn from their culture and society all dictates how they perceive risk. Reducing risk can happen in various ways and one of them is Risk mitigation. First, with the reduction of the probability or consequences of a hazard or risk, risk mitigation can also decrease the perceived risk of that hazard or risk (Wut, Xu, & Wong, 2021). Second, risk mitigation can also alter the perception of the way people think and reason about risks. All in all, risk reduction can alter risk perception due to the extent that it modifies the likelihood or severity of the hazard or risk or transforms how persons conceptualize and perceive risks (Martin et al., 2009). Foremost, resilience is a multidimensional phenomenon particularly in psychological and community sciences, which plays central roles in the context of risk perception as well as preventive measures regarding the individual and the community (Vella & Pai, 2019). These spans positively adjusted coping in adversity, a construct known as resilience that interacts with underlying cognitive processes used in the assessment of risk. Also, coping with challenging stressful circumstances involves the input of strategies by resilient individuals and communities that embrace protective actions to combat risks and share communal responsibility to prevent or lessen probable dangers that might occur (OECD, 2020). This brings out the dualism between resilience or risk perception, and risk prevention and how this applies to current world challenges like the COVID-19 pandemic (Tallaki & Bracci, 2020).

Role of Social Media in Risk Communication

A particular focus of social media relates to the transmission of risk information with special reference to the COVID-19 outbreak. On one hand, it enables real-time updates on the other hand it enables the sharing of unauthenticated information hence distorting risk communication efforts that were named to enhance as stated by Kaspersen et al. (2012).

The two-step flow model offers a convenient way to make a distinction between social media and conventional media. Specifically, health information through social media platforms engaged the use of influencers and key opinion leaders in the dissemination of information particularly during the pandemic. While conventional media were more formally organized in their processes of public communication, social media fostered message diffusion. When it comes to information, the media informs the public through means of various channels in traditional media. However, social media works through opinion makers relaying information to their audience through the two-step communication network as proposed by Katz (1957).

Literature Gap

Risk perception, as well as strategies to prevent the spread of COVID-19 in Southeast Asia, has revealed many ways in which public health communication can be helpful. First, it is crucial to understand that although the reviewed studies are focused on the importance of risk perception for facilitating compliance with the protective measures, further research into the subject reveals a lack of information about people's sustained behaviour during the later stages of the threat in the sphere of public health. Other models related to this study are the risk perception attitude (RPA) and health belief models (HBM). The key disadvantage of these theories is that they are oriented toward single activities in the short run. According to Paul (2016), risk perception is a dynamic process that adapts to new information and experience, while most research has omitted to comprehend how consistent risk communication impacts long-term behaviour in the maintenance phase of the pandemic.

Secondly, there is little investigation of cultural and socio-economic influencers about risk perceptions. As Dryhurst et al. (2022) found, cultural and governmental trust are among the factors that influence the abidance with health measures. However, the potential of these factors and their correlation with digital communication channels remains limited to the present research.

Thirdly, very few of the analyzed studies take into account the structural and organizational aspects of risk prevention and instead rely on individual-level behaviours and attitudes. For example, Mohamad et al. (2020) also identified organizational structure, including resource management and training of workforce, as affecting compliance. Nevertheless, there is limited practice in comprehensive models that depict the reciprocal relations between institutional readiness and public compliance in supporting risk prevention.

METHODOLOGY

Research Design and Approach

Based on the analysis of the research objectives of this study, a qualitative research approach was used with the systematic literature review (SLR) as the chosen methodology. The SLR approach incorporates documentation of well-stated inclusion and exclusion criteria as well as the quality assessment of collected data for relevance and reliability. This approach was used to investigate the research objectives by analysing patterns and themes in the data collected.

Data Collection Methods

Keywords included combinations of the following terms: "Risk perception," "risk prevention," "risk communication," "COVID-19 pandemic", "Southeast Asia", "Indonesia," "Thailand," and "Malaysia." Other items that supported maximizing the search base included synonyms and related terms.

Data collection targeted multiple scholarly databases known for their robust repository of peer-reviewed articles, including Elsevier, SCOPUS, Web of Science, and Google Scholar.

Advanced search strategies employed Boolean operators to refine and expand search results: **AND**: To make the results more specific, connected words that denote similar topics were used (e.g., "risk perception AND COVID-19") **OR** to make the results cover more sources or issues potentially related to the subject connected words meaning similar things were used (e.g., "pandemic OR epidemic"), or **NOT** exclusion that was used to delete terms or concepts irrelevant to the search.

Inclusion and Exclusion Criteria

All included studies were categorized according to the following inclusion and exclusion criteria (**Table 1**).

Table 1. Inclusion and Exclusion Criteria

Criteria	Inclusion	Exclusion
Publications	Peer-reviewed journal articles from onward 2019	Non-peer-reviewed sources from before 2019
Research Type	Empirical studies, systematic reviews	Opinion pieces, editorials
Language	English	Non-English
Focus	Risk perception and prevention related to COVID-19 or comparable contexts in Southeast Asia	Studies unrelated to COVID-19, risk perception

Selection of Papers through PRISMA Framework

This study's selection process was informed by the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA). To do this, 80 articles were found and first filtered using titles and abstracts. Out of 80 identified articles, 40 were considered after the first phase of screening, and 10 articles were included for the qualitative synthesis (**Figure 2**).

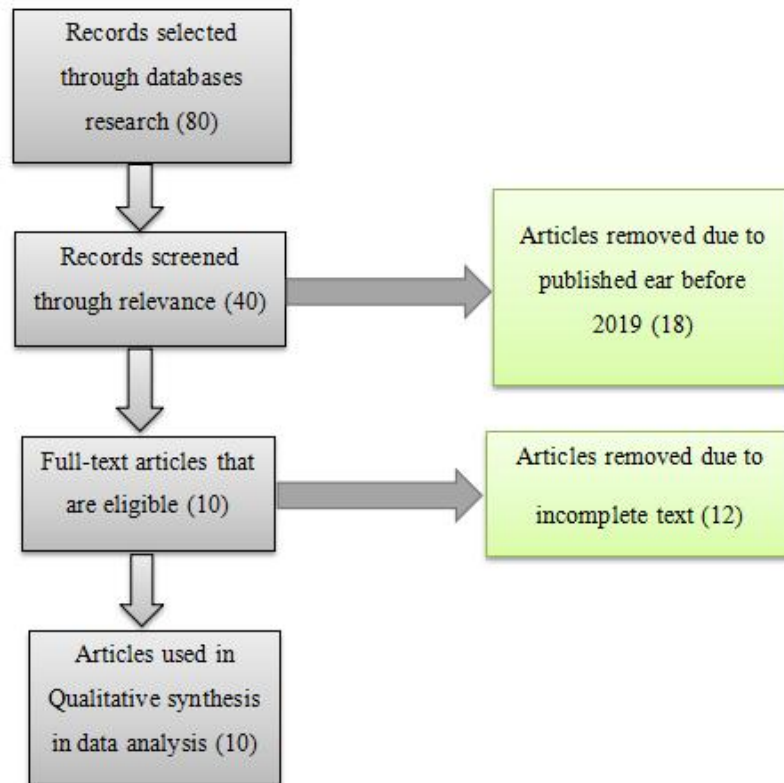


Figure 2. PRISMA Framework

Data Analysis Methods

The structured approach used in the study was thematic analysis. This included structured steps that involved the qualitative method of searching for, categorizing, and drawing general conclusions about key themes (**Table 2**).

Table 2. Data Analysis Methods

Steps	Description
Familiarization	Reading and re-reading the selected articles to gain an in-depth understanding of the data.
Generating Codes	Identifying key concepts and coding the data according to recurring themes related to risk perception and prevention.
Theme Development	Organizing codes into broader themes that address the interconnection between risk perception, prevention, and communication.
Reviewing Themes	Cross-referencing themes with the research objectives to ensure consistency and relevance.
Defining Themes	Refining themes to clearly describe their significance in the context of the research objectives.
Reporting Findings	Synthesizing the themes into a coherent narrative addressing the study's goals.

Ethical Considerations

The ethical issues of concern were upheld throughout the particular study. Because this was a systematic literature review, the author did not gather any primary data from human subjects.

RESULTS

This chapter presents the data collected in this study systematically in tabular form and the implications of each of the research objectives. The themes included in the data analysis and their description are given in **Table 3**.

Table 3. Themes Extraction for Data Analysis

Themes	Description
Role of Risk Perception	Examines how public perceptions of risk influenced their responses during various phases of risk communication in the COVID-19 pandemic.
Effectiveness of Risk Prevention	Analyzes the impact and outcomes of communicated risk prevention strategies in reducing COVID-19 risks in Southeast Asia.
Interconnection Between Risk Perception and Prevention	Explores the dynamic relationship between risk perception and risk prevention, focusing on their combined effect in enhancing public adherence to preventive measures.

Theme 1: Role of Risk Perception

Table 4 summarises the papers and provides a systematic understanding of the title and objectives, methods and analysis, and conclusion of the papers related to the Role of Risk Perception in the COVID-19 pandemic.

Table 4. Role of Risk Perception

Study	Objectives	Methodology	Data Analysis\Findings	Conclusion
Amul, Ang, Kraybill, Ong, and Yoong (2021)	To evaluate Southeast Asian countries' management of COVID-19 with emphasis on risk communication and health sector preparedness.	Comparative analysis of policies of leadership, communication and health system programs in Southeast Asia nations.	This paper finds that countries where governments provided explicit directions and previous exposure to pandemics, such as Vietnam and Singapore, received superior levels of public compliance with measures, as opposed to ambiguous messages and lack of prior experience in countries such as India and the United States.	Internal and external risk communication procedures decisively improve the observance of measures to prevent risks.
Praveena and Aris (2021)	To assess the different environmental and social effects of COVID-19 measures in Southeast Asia.	Qualitative content analysis of published studies and regional policy reports.	Risk perception and movement restriction enhanced compliance with the COVID-19 prevention measures, but communication in responding to other environmental risks was a barrier.	Risk communication should have an opportunity to combine both environmental issues with other health considerations to cover the whole society.
Rahman et al. (2022)	To assess knowledge, attitude and practices (KAP) regarding COVID-19 in Southeast Asia.	Mixed-method approach: systematic review and cross-sectional online survey.	Knowledge and attitude were good predictors of compliance with preventer behaviours such as wearing face masks, hand washing and other sanitation measures, although the KAP varied with the region.	There is thus a need for public health approaches focused more on enhancing the current knowledge and attenuating attitude gaps to ensure measures towards preventive health are embraced.
Wang et al. (2021)	To analyze the differences/similarities of infectious COVID-19 disease	Cross-sectional survey using standardized mental health scales (IES-R,	Mental health stress was higher among younger generations, college and universities, and those who	A suggested framework of mental health management in the course of

Study	Objectives	Methodology	Data Analysis\Findings	Conclusion
	on the mental health of the peoples of seven middle-forming Southeast Asia region countries.	DASS-21) among 4,479 participants.	lived in an urban setup. Incidence and general attitude towards the health systems determine how they can handle the pandemic.	pandemics should consider the general vulnerability of youths, individuals with education, and inhabitants of urban regions and should also ensure the public regains trust in its health care system.

Amul et al. (2021) put more significant attention on risk communication and people's previous pandemic experience, which increases their adherence to COVID-19 restrictions. Praveena and Aris (2021) stated that combining environmental risks and health communication enhances society's compliance with preventive measures. Rahman et al. (2022) discussed that more knowledge helps reduce attitude gaps, improving compliance to preventer measures. Wang et al. (2021) emphasized that governments should ensure that mental health interventions mainly target the groups of youths, those living in urban areas and the educated.

Theme 2: Effectiveness of Risk Prevention

Table 5 summarises the papers and provides a systematic understanding of the title and objectives, methods and analysis, and conclusion of the papers related to the Effectiveness of Risk Perception in the COVID-19 pandemic in Southeast Asia.

Table 5. Effectiveness of Risk Prevention

Study	Objectives	Methodology	Data Analysis\Findings	Conclusion
Arumsari, Fauzi, Maruf, and Bigwanto (2021)	To comprehend COVID-19 measures in Southeast Asia based on responses and non-responses that addressed public health and the economy.	Conducted a review analysis of the mitigation efforts of three countries, namely Indonesia, Malaysia, and Thailand, from peer-reviewed articles, government reports, and news articles.	Malaysia and Thailand have gone for total lockdowns, and Indonesia has gone for partial lockdowns, which were unsuccessful. Economic damage was more significant when there were poor responses during the pandemic.	Strict policies are necessary to effectively mitigate health and economic impacts, with lessons applicable to future public health crises.
Ting and Sim (2021)	A quantitative design will be used to assess knowledge, perceived threat, and perceived response efficacy on COVID-19 preventive measures in Malaysia.	Web-based questionnaires for 230 participants.	It was found that good knowledge about COVID-19 and high perceived severity was related to better compliance with all preventive measures, such as wearing facemasks and practising hygiene.	The finding shows that knowledge and perceived response efficacy are essential dimensions for practising preventive actions during a health issue.
Luo et al. (2022)	To identify the effects of public health intervention measures in connection with the advancement of COVID-19 in Southeast Asia.	The number of COVID-19 cases, the response strategy, area spatial metrics, and mortality data from four Southeast Asian countries, namely Malaysia, Thailand, Vietnam, and Indonesia.	Indonesia, which applied continuous restrictions, successfully minimized the risks; on the other hand, maintaining comparatively fewer restrictions in Malaysia and Thailand intensified infections. Effective containment monitoring was thus essential to keeping transmission in real-time.	Strict coordinated measures are essential for decreasing the epidemic spread, which underlines the need for a common strategy for the Southeast Asia countries.

The studies highlight the importance of communication strategies in risk prevention during the COVID-19 pandemic in Southeast Asia. Arumsari et al. (2021) emphasize clear and strict public health policies to mitigate

health and economic impacts. Ting and Sim (2021) demonstrate that effective communication of knowledge and perceived response efficacy enhances compliance with preventive measures. Luo et al. (2022) show that coordinated and consistent communication about containment strategies minimizes risks. These findings underline the necessity of transparent, culturally relevant, and continuous communication strategies to foster public trust, improve compliance, and ensure effective implementation of health policies in Southeast Asia.

Theme 3: Interconnection between Risk Perception and Prevention

Table 6 summarises the papers and provides a systematic understanding of the title and objectives, methods and analysis, and conclusion of the papers related to the interconnection between Risk Perception and prevention in the COVID-19 pandemic in Southeast Asia.

Table 6. Interconnection between Risk Perception and Prevention

Authors	Objectives	Methodology	Data Analysis\Findings	Conclusion
Harapan et al. (2020)	To assess the public's acceptance of COVID-19 vaccines and other characteristics across Southeast Asia.	An online survey was conducted on 1,359 individuals in Indonesia, examining their characteristics and psychological beliefs regarding the COVID-19 vaccine.	Perceived risks and shown a willingness to take vaccine: Vaccination acceptance was higher among the healthcare workers and the high-risk group but lower in the low-efficacy group. Hypothesized risk affected preventer decision-making most significantly.	Risk prevention measures should enhance the population's risk perception and get them more in touch with the various benefits of vaccination.
Nanda et al. (2021)	The paper aims to evaluate the association of perceived risk and measures taken in early COVID-19 in Indonesia.	Descriptive cross-sectional study involving 382 participants using an online survey.	The findings also suggest that high perceived risk correlates with suitable preventive measures such as the use of face masks and washing of hands regardless of the absence of COVID-19 cases in Indonesia.	Thus, public compliance with preventive measures might be increased by increasing perceived risk and improving public knowledge of the transmission mode of infections.
Lee et al. (2022)	To examine knowledge, perception, and preventive behavior toward COVID-19 among university staff and students in Malaysia.	A quantitative method of the study is a cross-sectional survey; 434 participants were from the University of Tunku Abdul Rahman (UTAR).	Moderate-to-high knowledge and preventive behaviour were revealed, depending on perceived risk, preparedness, and self-efficacy. In line with expectations, risk perception was a significant and positive predictor of preventive actions and desirable behaviour.	Concerns about risk and the promotion of preventive health measures in academic environments are highly dependent on risk perception.

Harapan et al. (2020): This paper further reveals that acceptance increases with higher risk perception, especially among healthcare workers, to eradicate the need to focus on the benefits of vaccination. Nanda et al. (2021): High perceived risk facilitates adherence to preventive measures despite low contact situations, such as wearing face masks and washing hands. Lee et al. (2022): Risk perception is strongly and positively related to preventive behaviours, further underlining the importance of risk-awareness interventions in schools.

DISCUSSION

Role of Risk Perception

The study focuses on how risk perception and prevention of COVID-19 based on the communication strategy in the Southeast Asia region. Amul et al. (2021) and Praveena and Aris (2021) found that the defined communication and consistent health campaigning brought higher compliance. This aligns with Jeong and Kim (2024), who observed that strengthened trust in government communication and the efficiency of the distribution of information influenced risk perception and preventive behaviors. These results prove that clear, unambiguous communication across media channels when preparing the public for a risk event is critical in the preparedness phase.

Rahman et al. (2022) also found knowledge and attitude to be factors affecting preventive behaviors that correlate with Roozenbeek et al. (2020) study about the impact of misinformation on risk perception. That underlines the relevance of the so-called 'signal management' in the interaction with the public during the response phase as the primary aim becomes the counteracting of misinformation, strengthening people's risk awareness, and popularizing factual knowledge. For instance, misunderstandings about the disease, symptoms, or transmission mode can be corrected using culturally sensitive messages to promote the use of masks and improved hygiene.

Wang et al. (2021) contributed to understanding the study of mental health effects induced by the pandemic, especially in urban and among youths. This research aligns well with Sciortino and Saini's (2020) call for broadcast communication in the recovery phase, focusing on psychological well-being and building confidence in healthcare facilities.

Effectiveness of Risk Prevention

The discussion emphasizes how the communication strategies promoting risk prevention when infected with COVID-19 in Southeast Asia strongly correlate with risk perceptions. According to Arumsari et al. (2021), the perceived efficacy of government messages about protecting against exposure to COVID-19 was significantly associated with adherence to public health procedures. This aligns with Hsiang et al. (2020), who noted that large-scale interventions must be approved by well-understood messaging that popularises their understanding. This underscores the importance of transparent communication in the preparedness phase, ensuring the public understands the rationale and urgency of preventive actions.

Ting and Sim (2021) find that knowledge and perceived response efficacy improve preventive behaviors; as argued by Bish and Michie (2010), effective communication helps determine protective behaviors. These findings suggest that it is important during the preparedness phase of an outbreak that public messaging is directed at reassuring the population about existing preventive measures.

Luo et al. (2022) emphasize real-time communication in adapting public health interventions, which aligns with Kraemer et al. (2020) on the effectiveness of timely communication in reducing virus transmission. This highlights the critical role of dynamic communication strategies in the response phase, ensuring updated and localized messages are disseminated to reinforce compliance.

Interconnection between Risk Perception and Prevention

This research provided insights into communication strategies that relate the perception of risks to the prevention of COVID-19 in Southeast Asia. Similar to the study by Harapan et al. (2020), they identified that risk perception is directly related to the willingness for vaccine acceptance and the impact of communication on vaccine benefits. Similarly, Cori, Bianchi, Cadum, and Anthonj (2020) pointed out that perceived communication credibility, trustworthiness, clarity, and cultural relevance increased perceived risk levels and, therefore, self-protective behaviors. These findings align with what is known as the preparedness phase of risk communication, which involves timely presenting accurate information to guide communities' perception regarding various health risks.

Nanda et al. (2021) explained that evidence suggests that higher perceived risks are associated with better adherence to protective behaviors, including wearing a mask and regular hand washing. This was further supported by Duan, Jiang, Deng, Zhang, and Wang (2020), which revealed that risk perception mediated the linkage between communication endeavors and implementing preventive measures. This highlights the significance of the response phase, during which dynamic and immediate communication is used to enhance confidence, erase misconceptions, and promote compliance with behaviors needed when risk is unchanging or continually increasing.

Lee et al. (2022) highlighted that self-efficacy and knowledge, enhanced through targeted communication, significantly predict preventive behaviors. This aligns with Majid, Wasim, Bakshi, and Truong (2020), who emphasized the importance of tailoring communication to demographic and cultural contexts. This is crucial in the recovery phase, where communication restores trust, fosters resilience, and encourages sustained adherence to preventive behaviors.

CONCLUSION

The study emphasizes the need for cultural sensitivity in exposure to risk information for the public during a pandemic. That is why understanding the context of relevance to sociocultural and economic practices may foster adherence to communicated preventive practices. Risk perception and prevention-initiated research framework

could help plan approaches within multicultural and ethno-culturally diverse Southeast Asia frameworks.

THEORETICAL IMPLICATIONS

This research has several theoretical implications, especially for risk communication and behaviour theories. This points out the need to embrace culture appraisal in risk communication through response to Movement Control Orders (MCO) and Standard Operation Procedures (SOPs) where Malaysians have responded due to sociocultural and economic factors (Aziz et al., 2020; Othman & Latif, 2021). Theories such as the Extended Parallel Process Model (EPPM) demonstrate how perception based on threat magnitude and response efficacy of awareness campaigns can increase levels of self-protective behaviour regarding measures (Popova, 2011). Furthermore, the research supports the extension and validation of the two theories—Agenda-Setting and Framing Theories to explain how the concentration of media on specific threats affects perceptions and compliance patterns (McCombs, 2002; Entman, 2007). The study also apprehends the risk perception process to new information and the changing sociocultural factors, which aligns with Paul (2016). This research developed cognitive and social aspects of risk communication to improve long-term theoretical models to tackle behavioural alteration during a health crisis in more specific areas, such as Southeast Asian countries. These are issues of immense value in planning for risk communication that will guarantee the populace's compliance and strengthen their spirit when facing future virus threats.

LIMITATIONS

Due to the nature of the study, based only on the systematic literature review, the study may overlook potential developments that have yet to appear in the academic peer-reviewed journal or other grey literature. The focus on Southeast Asia is also practical, as the review results cannot be generalized to population groups whose cultural, economic, or institutional conditions may vary and affect the perception of risks and their prevention. Their usage also brings specific variations in the methodological quality of the analyzed works to the foreground, which might influence the credibility of the derived overall findings. Furthermore, the variations in the methods by which different Southeast Asian countries address risk communication complicate the comparison process. The study fails to capture dynamism in the change of public attitude and behaviour as the pandemic unfolded; it is recommended that more longitudinal and comparative studies be undertaken to confirm and generalize the findings.

FUTURE DIRECTIONS

Further research should explore longitudinal studies to evaluate the durability of behavioural changes elicited by risk communication. Studying how digital and social media affect people's risk perception in multicultural areas is also suggested. Also, creating receptive theoretical approaches that consider individual regions' cultural, socioeconomic, and institutional systems would complement international pandemic prevention and mitigation approaches.

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