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Organisational models for managing Public Health Emergencies of International Concern (PHEICs) in the South-East Asia Region (SEAR) nations: protocol for a systematic review

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ABSTRACT

Introduction The current literature suggests that the frequency and complexity of public health emergencies are rising and this trend will likely continue. From 2000 to 2023, seven events have been declared as a Public Health Emergency of International Concern (PHEIC) by the World Health Organization (WHO). Organisational models such as the Incident Management System, Incident Response System and Incident Command System or country-specific models are essential in managing PHEIC.

The review aims to achieve four key objectives. First, identify and describe the organisational models used in the South-East Asia Region (SEAR) nations defined by WHO as Bangladesh, Bhutan, India, Indonesia, Maldives, Myanmar, Nepal, Sri Lanka, Thailand, Timor-Leste and DPR Korea for managing PHEICs. Second, explore the indicators used to gauge the effectiveness of these models. Third, assess how these indicators impact the overall success of organisational models. Finally, the review will delve into the implementation aspects gaining a deeper understanding of how the organisational models are put into practice to manage PHEICs in the SEAR region.

Methods and analysis Following Preferred Reporting Items for Systematic review and Meta-Analysis Protocols guidelines, a qualitative evidence synthesis will be conducted. A defined search strategy will be employed to conduct a comprehensive literature search of the following academic databases: PubMed (MEDLINE), Excerpta Medica Database, Cochrane CENTRAL, Cumulative Index to Nursing and Allied Health Literature, WHO Library Database, US Centers for Disease Control and Prevention (CDC), CDC's Morbidity and Mortality Weekly Report and Web of Science; as well as non-academic databases including Google Scholar, Evidence Aid, Epistemonikos, Shodhganga and ResearchGate. This review will employ the SPIDER-D tool for searching qualitative studies. Two reviewers will check the quality of included studies and will be appraised using standard critical appraisal tools. In case of any difference between the two reviewers, a third reviewer will take the decision.

STRENGTHS AND LIMITATIONS OF THIS STUDY

⇒ To the best of the knowledge of the authors, the review will be the first of its kind to provide evidence related to the characteristics of the organisational models, indicators for their effectiveness and implementation issues in the South-East Asia Region nations.
⇒ It will provide evidence to guide policymakers, public health authorities and researchers in enhancing emergency response strategies.
⇒ The inclusion of only English-language publications means that there is a possibility of cultural bias in the findings.

Ethics and dissemination No ethical approval is required. Results will be published in a peer-reviewed journal and disseminated through a workshop for stakeholders and policymakers.
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INTRODUCTION

A public health emergency (PHE) is the incidence or impending threat of a disease or health condition that poses a high risk of significant numbers of fatalities, serious injuries or long-term or permanent disabilities in humans.[1] A Public Health Emergency of International Concern (PHEIC) is defined as 'an extraordinary event which is determined to constitute a public health risk to other states through the international spread of disease and to potentially require a coordinated international response'.[2]

PHEs are often caused by infectious diseases and are complicated by environmental factors, demographics and social structures.[3] It is evident from the available research that

the frequency and complexity of PHEs are rising and this trend will likely continue.[4]

From 2000 to 2023, seven events have been declared a PHEIC by the WHO: 2009 H1N1 (or swine influenza), Ebola outbreaks in West Africa in 2013–2015 and the Democratic Republic of Congo in 2018–2020, the ongoing poliovirus health emergency (2014 to present), the Zika virus disease outbreak (2016), COVID-19 (2020) and the multi-country outbreak of mpox (2022). The poliovirus health emergency is the longest PHEIC. The declaration in 2009 that the H1N1 pandemic constituted a PHEIC was the first such declaration under the revised International Health Regulations (IHR) adopted in 2005.

These emergencies frequently cause delays and disruptions to national development goals. Through their direct effects on health and their indirect effects on socioeconomic aspects that impact resilience, PHEs influence people's lives and means of sustenance.[5] Scientific evidence is necessary to plan for and respond to PHEs to save lives and reduce expenses and losses.[4]

'Public Health Emergency Management (PHEM) is a field that uses specialized sets of knowledge, techniques and organizing principles' that are required for the effective management of intricate and complex health events.[6] It comprises prevention, mitigation, preparedness, response and recovery. A preliminary search of the PubMed database exposed a gap in the exploration of organisational models for managing the PHEICs in the South-East Asia Region (SEAR) nations. This gap highlights the need for further research of organisational models tailored for the management of PHEICs. Addressing this gap could contribute significantly to strengthening the organisational models and subsequently enhance the preparedness, response and overall resilience in the face of emergencies. This review will describe the organisational models used for managing PHEIC in the SEAR nations. It also seeks to study the effectiveness and various implementation aspects of these organisational models.

The rationale behind selecting SEAR nations as the focus of this review is justified by their unique environmental, political, social and economic diversity which exposes them to significant health risks.[7] With a population of almost two billion individuals, accounting for more than 25% of the world's population, this region plays a critical role in global health security.[8] Since 2014, these nations have been making rapid advancements in improving healthcare systems and building resilience against potential threats. Efforts have included fostering surveillance techniques, risk assessment practices and epidemiology to tackle possible risks to public health. While considerable strides have been made, recent PHEs such as COVID-19 highlight the need for concentrated efforts to bolster human resources capacity and comprehensively address disease prevention and control measures. It is crucial to strengthen system resilience further.[9] Furthermore, scientific evidence is essential for effective planning and response to PHEs. It not only saves lives but also reduces expenses and losses suffered as a result.[5] Therefore, conducting this review within the SEAR nations will provide valuable insights that can inform policies and strategies aimed at enhancing preparedness and response capabilities in managing future PHEs.

RESEARCH AIMS
The review aims to achieve the following four key objectives:
1. List the names, features and characteristics of organisational models used to manage PHEICs in SEAR nations.
2. Identify indicators used to monitor the effectiveness of organisational models.
3. Assess the impact of identified indicators on the effectiveness of organisational models in managing PHEICs in SEAR nations.
4. Understand the implementation aspects of organisational models used for the management of PHEICs in SEAR nations.

ORGANISATIONAL MODEL FOR PHEM
The response to a PHEIC is determined by a nation's organisational model for PHEM. For this review, the base definition of the organisational model is adopted from the Incident Management System (IMS) definition that the WHO employs for emergency response.[7] The definition, however, has been extrapolated to accommodate several other functions that nations fulfil for emergency response.

The WHO describes the IMS as a globally recognised system that operationalises response functions reflective of WHO's responsibilities under the IHR, 2005. It includes the functions of (1) leadership; (2) partner coordination, information and planning; (3) health operations and technical expertise; (4) operations support and logistics; and (5) finance and administration.

The emergency response framework of the WHO[10] delineates the functions (online supplemental annexure 1):

Through consultations during workshops (mentioned in the 'Methods and analysis' section) with subject matter experts (SMEs), we have adopted an operational definition of the organisational model for the purposes of this review. An organisational model is:

A formal management system that is responsible for managing Public Health Emergencies of International Concern (PHEICs) in a country by operationalizing the functions of leadership, partner coordination, information, and planning; health operations and technical expertise; operations support and logistics; finance and administration; legal provisions, sustainability, infrastructure and human rights.

The additional components are:
Legal provisions: Legal mandates for PHEM in a nation.

Sustainability: This function assists in the maintenance of PHEM mechanisms to support the continuation of effective emergency response.

Infrastructure: This function addresses the physical space and structures coordinating emergency response. It includes a control room/emergency operations centre (EOC)/public health emergency operations centre (PHEOC)/public health systems resource centre/public health emergency response centre and information technology (IT) for emergency management.

Human rights: This function looks into the intangible effects of an emergency on human beings, such as the psychosocial effects of a PHE.

All the critical functions of an organisational model are implemented through subfunctions. The same has been delineated in Annexure 1 (online supplemental file).

The intervention, that is, the organisational model for PHEM, aims to reduce the negative consequences of a PHE. These consequences include loss of lives, loss of livelihoods and generational health issues.

To combat the consequences or minimise their effects, the goals of the organisational models are to optimise preparedness and response and enhance resiliency. As delineated during the consultation workshop with the SMEs, some of the objectives of PHE preparedness and response are to mitigate the effects of PHEs by ensuring (1) the availability of early warning signals; (2) multisectoral coordination; (3) timeliness in response; (4) trained workforce; (5) adequate and available emergency response financing mechanisms; (6) coordination of resources such as laboratory and field support services; (7) legal provisions, protocols and standard operating procedures; (8) infrastructure; and (9) community engagement. By executing the functions listed

above, organisational models establish a framework for harnessing the appropriate resources and expertise that allow the achievement of these objectives, depicted in the theory of change (figure 1). The theory of change was developed during the consultation workshop. The organisational models are based on legal mandates which authorise health ministries and institutes to manage responses and ensure the sustainability of PHEM mechanisms.

Several governmental and non-governmental decision-makers engage at different levels (strategical, operational and tactical) to implement the organisational models.

METHODS AND ANALYSIS

The protocol adheres to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses Protocols.[11] The methodology for conducting this review was decided during a three-part protocol development workshop series organised by the Centers for Disease Control and Prevention (CDC), Country Office - India in collaboration with the National Centre for Disease Control, Directorate General of Health Services, Ministry of Health and Family Welfare, Government of India (GoI) and National Institute of Disaster Management, Ministry of Home Affairs, GoI. The workshops were facilitated by Campbell South Asia. The three workshops include: Introduction to systematic review and evidence synthesis; protocol development workshop and workshop on analysis and report writing. The review is proposed to begin in February 2024 and conclude in December 2024.

Search strategy
Electronic databases
We will search for studies from the following databases:
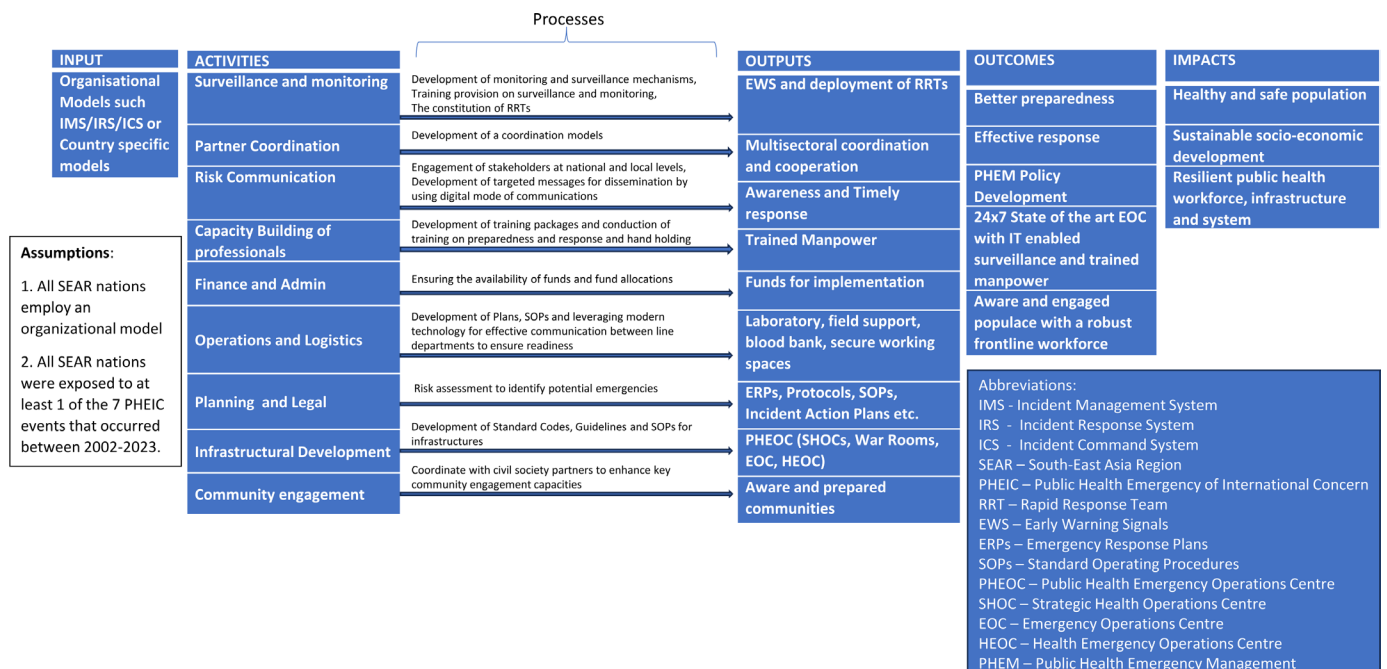

Figure 1 Theory of change.

► Academic databases including PubMed (MEDLINE), EMBASE, Cochrane CENTRAL, CINAHL, WHO Library Database, CDC MMWR and Web of Science.
► Non-academic databases including Google Scholar, Evidence Aid, Epistemonikos, Shodhganga and ResearchGate.

The search strategy for PubMed (MEDLINE) is mentioned in Annexure 2 (online supplemental file).

Searching other resources

Besides searching through the databases mentioned above, we will look for relevant studies including government reports, unpublished reports, records, studies being reviewed for publication shared by authors, theses, dissertations and conference proceedings, from ministry websites, non-governmental organisation websites and research organisation websites. We will code information for objective 1 from organisational websites if necessary. The expanded table is in Annexure 3 (online supplemental file).

Selection of studies

Based on the inclusion and exclusion criteria mentioned below, we have developed a screening tool to assess studies for inclusion in this review. EPPI-Reviewer software will be used for this exercise. It is a web-based tool that helps develop all types of literature reviews including systematic reviews, meta-analyses, 'narrative' reviews and meta-ethnographies. It supports data collection, analysis and synthesis. For this review, two reviewers will screen the studies from their designated accounts in the software (Annexure 4 of online supplemental file). A third reviewer will be consulted in case of any differences.

We will include the following types of studies in this review:

1. Primary descriptive studies.
2. Website reports, government reports, academic thesis and guidelines.
3. Systematic reviews and meta-analyses (quantitative and qualitative).
   a. Quantitative systematic review: The reviews in which primary quantitative studies are included.
   b. Qualitative systematic review: The reviews in which primary qualitative studies are included.
4. We will include the studies published between 2002 and 2023 focusing on organisational models implemented within this date range.
5. Process evaluations: Assess if a programme has been implemented as planned.
6. Impact evaluations: Assess programme effectiveness in achieving its ultimate goals.

We will exclude the following from this review:
► Blog posts.
► Editorials.
► Opinion pieces.
► Perspective pieces.
► Media reports.
► Magazine articles.
► Conference abstracts.
► Other types of personal opinion pieces are published online/offline.

Studies written in English will be considered for this review.

We will adopt the SPIDER-D[12] tool for this review as it is well-suited for a qualitative review. The SPIDER-D tool, as adapted for this review, includes:

(S) Sample size.
(PI) Phenomenon of interest.
(D) Study design.
(E) Evaluation.
(R) Research type.
(D) Date range.

The studies will be selected using the inclusion and exclusion criteria given in table 1.

Table 1 Studies inclusion and exclusion criteria

	Inclusion	Exclusion
Sample	Studies based on interventions implemented in the SEAR region.	Studies based on intervention implemented out of the SEAR region.
Phenomenon of interest	Organisation models like IMS, IRS, ICS or country-specific models.	Exclude interventions not sanctioned by the national governments as part of the organisational model.
Design	Descriptive studies, impact evaluations, process evaluations, reports, guidelines, SOPs, books.	Conceptual or theoretical studies without primary data or synthesis of studies involving primary data collection.
Evaluation	Public health emergency management (PHEM)-related indicators.	Indicators not related to PHEM.
Research	Both qualitative and quantitative study.	Personal perspectives, blogs, opinion pieces, conference abstracts.
Date	Studies published between 2002 and 2023.	Studies published out of date range 2002–2023.
Language	English.	Studies not in English.

ICS, Incident Command System; IMS, Incident Management System; IRS, Incident Response System; SEAR, South-East Asia Region; SOPs, Standard Operating Procedures.

Sample

The scope of this review will primarily be restricted to the following 11 SEAR nations as described by the WHO—Bangladesh, Bhutan, India, Indonesia, Maldives, Myanmar, Nepal, Sri Lanka, Thailand, Timor-Leste and DPR Korea.

Phenomenon of interest

The phenomenon of interest is the organisational model used to manage PHEIC. The definition of an organisational model has been extrapolated from the definition of an IMS provided by the WHO.[7]

Based on the consultation with the SMEs during the workshops, we are expecting that terminology used to name organisational models could include (but not be limited to):

1. IMS.
2. Incident Command System.
3. Incident Response System.
4. National task force.
5. Joint monitoring group.
6. High-Level Working Group.
7. Strategic Health Operations Centre.
8. PHEOC.
9. War Room.
10. EOC.
11. Health Emergency Operations Centre.
12. Central Command Centre.
13. Public Health Surveillance and Response Centre.

The studies could present their findings for one or many different stages of emergency response including preparedness (planning the response), mitigation (minimising the effects of an emergency), prevention (removing the impacts of hazards), response (efforts to minimise the hazards) and recovery (restoring a community).

Evaluation (outcomes)

We have identified the indicators for this review based on the WHO-IMS framework. We have added additional indicators to this list of outcomes to account for organisational models outside of IMS. The indicators are listed below:

Primary outcomes

1. Leadership/incident management (staff health, well-being and security, communications, external relations, EOC management).
2. Partner coordination (health and intersectoral coordination, liaison).
3. Information and planning (information—risk and needs assessment, early warning and surveillance, monitoring and evaluation, information products, planning—strategic and operational planning, project management).
4. Health operations and technical expertise (prevention and control measures, risk communication and community engagement, health service delivery, technical expertise, science and research, training of health staff).
5. Operations support and logistics (supply chain management, field support, health logistics)
6. Finance and administration (finance budget/grants management, procurement, human resources and surge).
7. Sustainability (replicable at the subnational, district level).
8. Infrastructure (IT, information and communication technology, software, PHEOC).
9. Legal provisions for the implementation of organisational models.
10. Human rights.

The outcomes have been further detailed in Annexure 5 (online supplemental file).

Setting

The review encompasses all settings across the SEAR where PHEICs interventions are delivered using organisational models.

Data extraction and management

The coding framework for the review was developed based on discussions with public health experts (RS, PV, NV, AS, RHG, JK) and the review team (NB, AK, AD, RG, TVB, SJ) during the protocol workshop. Some coding framework parameters were determined during the workshop and some will be determined during the review process. The data coding framework is detailed in Annexure 6 (online supplemental file).

Quality appraisal of included studies

Critical appraisal methods address the credibility and rate the confidence of study findings.

We will use standardised critical appraisal tools developed to assess the confidence of the findings of the included studies (Annexures 7, 8 and 9 of online supplemental file). Separate tools will be used for systematic reviews, effectiveness/quantitative studies and qualitative studies.

For systematic reviews, we will assess the study confidence using the A Measurement Tool to Assess Systematic Reviews (AMSTAR-2) checklist.[13] 'A systematic review attempts to collate all empirical evidence that fits the prespecified eligibility criteria in order to answer a specific research question. It uses explicit, systematic methods that are selected with a view to minimising bias, thus providing more reliable findings from which conclusions can be drawn and decisions made.'[14 15] AMSTAR-2 is one of the most widely used instruments to assess systematic reviews. The checklist has 16 questions (Annexure 7 of online supplemental file). The 16 items cover: (1) population, intervention, comparison, outcomes, and studies (PICOS) in inclusion criteria, (2) ex-ante protocol, (3) rationale for included study designs, (4) comprehensive literature search, (5) duplicate screening, (6) duplicate data extraction, (7) list of excluded studies with justification, (8) adequate description of included studies, (9) adequate risk of bias assessment, (10)

report sources of funding, (11) appropriate use of meta-analysis, (12) risk of bias assessment for meta-analysis, (13) allowance for risk of bias in discussing findings, (14) analysis of heterogeneity, (15) analysis of publication bias and (16) report conflicts of interest. Items 2, 4, 7, 9, 11, 13 and 15 are termed 'critical'.

For impact evaluations or studies that assess the effect of interventions, we will use the tool that was first used by Saran *et al* in the disability evidence and gap map[16] which was adapted from Lund *et al* (2010). It assesses the confidence in studies by appraising studies based on seven items related to (1) study design, (2) blinding, (3) power calculations, (4) attrition, (5) description of the intervention, (6) outcome definition and (7) baseline balance (Annexure 8 of online supplemental file).

For qualitative studies or process evaluations, we will use the Keenan-White (KW)[17] checklist. 'Process evaluations focus on understanding the relationship between interventions and context to explain how and why interventions work or fail and whether they can be transferred to other settings and populations.'[18] The KW tool is based on three existing tools: The Critical Appraisal Skills Programme checklist,[19] the Specialist Unit for Review Evidence[20] and the Joann-Briggs Institute.[21]

The KW tool assessment is based on 12 questions in the following domains: Research questions (1), methodology (2), sampling strategy (2), researcher–participant connection (1), ethical issues (1), data collection (1), data analysis (2), policy suggestions (1) and coherence between recommendations and study findings (1) (Annexure 9 of online supplemental file).

To evaluate public health guidelines, we will use a modified version of the Scientific, Transparent and Applicable Rankings (STAR) tool. STAR is a comprehensive instrument for evaluating and ranking clinical guidelines. It targets a wide range of users including healthcare providers, policymakers, guideline methodologists and researchers.[22]

The tools contain critical dimensions of the evaluation. Each of these is marked as high, medium and low. (Annexures 7, 8 and 9 of online supplemental file). The overall score uses the 'weakest link in the chain' principle. Hence, confidence in study findings can only be as high as the lowest rating given to the six critical items in the effectiveness study and nine critical items in the qualitative/process evaluation.

Critical appraisal will be carried out by two independent reviewers with disagreements resolved through discussion with a third-party reviewer.

Assessment of heterogeneity

Significant heterogeneity in intervention approach and methodology is expected in this largely qualitative systematic review. As we expect heterogeneity to inform our outcomes of interest rather than bias or invalidate them, an assessment of heterogeneity will not be conducted.

Data synthesis

The analysis will be based on organisational model. The model is our basic unit of analysis.

The team proposes to adapt framework synthesis and thematic synthesis for the analysis. We will adopt a three-stage approach for the thematic synthesis of qualitative synthesis in systematic reviews by Thomas and Harden.[23] In the first stage, preliminary 'free codes' will be determined based on a review of the included data. Using these free codes, 'line-by-line' text coding will be carried out in the included studies. The codes will be grouped into hierarchical structures according to the meaning, content and context and considering similarities and differences between the codes of the text. Finally, the meaningful themes will be derived, known as descriptive themes.

Framework analysis may be adapted as it is a multidimensional framework that would capture essential information in this research and would present a means for grouping and interpreting descriptive themes arising from thematic synthesis. We could adopt an iterative process that involves familiarisation with the literature initially with the gradual development of a conceptual framework based on concepts derived from the review question and the theoretical and empirical literature, applying the framework systematically to evidence from the studies included in the review and constructing a picture for each key dimension and collating evidence and presenting in the form of summaries from all relevant documents. The analysis will be conducted by six or seven reviewers from key stakeholders. The list of key stakeholders is given in Annexure 10 of the online supplemental file.

Patient and public involvement

None

DISCUSSION

This protocol delineates the methodology for thoroughly reviewing the organisational models used for managing PHEICs in the SEAR nations defined by WHO as Bangladesh, Bhutan, India, Indonesia, Maldives, Myanmar, Nepal, Sri Lanka, Thailand, Timor-Leste and DPR Korea. The discussion aims to define the rationale of the review, its objectives, its search strategy and the methods of data extraction and synthesis.

As witnessed recently, PHEICs pose significant challenges to public health systems. Therefore, understanding the organisational models that facilitate a coordinated and efficient response is crucial. The rationale of this review rests on the high importance of PHEIC management. This systematic review will contribute to the evidence base for PHEM and inform policy and practice in the region.

The objective of the review is to understand the different organisational models employed in the SEAR nations. The objectives consider the factors influencing the effectiveness and implementation of these models. They provide a framework for identifying relevant

studies, extracting data and synthesising findings to gain a comprehensive understanding of organisational models for PHEM.

Data extraction will involve systematically recording relevant information from the included studies. This will include details on hazard/emergency type, population, intervention/organisational models examined, stages of emergency response and outcomes related to the effectiveness and implementation of organisational models. A coding framework has been developed (Annexure 6 of online supplemental file) which will be piloted to ensure consistency and accuracy in the extraction process. Two reviewers will perform data extraction independently and any discrepancies will be resolved through discussion or consulting a third reviewer if necessary.

Considering the heterogeneity of the included studies the synthesis of findings will involve a narrative approach. The extracted data will be analysed and categorised according to themes and subthemes related to organisational models, their functions and outcomes.

This systematic review protocol outlines a rigorous and transparent methodology for conducting a comprehensive review of organisational models for PHEM in the SEAR. The review presents a unique opportunity to enhance our understanding of the current systems in place within SEAR nations to effectively manage PHEIC. By generating evidence through this review, we aim to identify best practices, lessons learnt and challenges associated with the organisational models used by SEAR nations for PHEIC management. These evidence-based insights will not only facilitate cross-learning but also serve as a valuable resource at the policy level. This will help us prepare and equip ourselves with effective organisational models to combat future pandemics.

The impact of this review cannot be overstated. It will contribute significantly to our collective knowledge enabling us to strengthen countries response mechanisms and ensure better preparedness for any future PHEs.

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