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Contextualizing institutional capacity in water governance framework: a literature review

Raja Noriza Raja Ariffin [a,*], Sanisah Sawon[b], Nur Hairani Abd Rahman [a], Hanira Hanafi [c] and Rustam Khairi Zahari [d]

[a] Department of Political Science, Public Administration and Development Studies, Faculty of Business and Economics, Universiti Malaya, Kuala Lumpur 50603, Malaysia
[b] Institute for Advanced Studies, Universiti Malaya, Kuala Lumpur 50603, Malaysia
[c] Department of Syariah & Law, Academy of Islamic Studies, Universiti Malaya, Kuala Lumpur 50603, Malaysia
[d] Kulliyyah of Architecture & Environmental Design, International Islamic University Malaysia, Kuala Lumpur 50728, Malaysia
*Corresponding author. E-mail: rnoriza@um.edu.my

RNR, 0000-0002-8754-5294; NHA, 0000-0002-0046-3588; HH, 0000-0003-3041-8646; RKZ, 0000-0002-5864-1703

ABSTRACT

Reliable water governance will ensure the strength and sustainability of an institution. The rising needs for water warrant a thorough study of critical variables of water governance. These variables are crucial for the development of a sound institutional framework. However, there were still insufficient studies that systematically review the existing literature in this field. Hence, the current study aims to examine the key components of the institutional framework for water governance. This study was guided by PRISMA 2020 in its systematic searching strategy on three databases, namely Web of Science, Scopus, and Science-Direct. Articles for the period of 2018–2022 were screened. The process resulted in the selection of 20 related studies which were then assessed using the Mixed-Method Appraisal Tool (MMAT). Thematic analysis was employed and three themes were identified, namely stakeholders engagement, policy and practices, and water resource management. Based on the pattern of previous studies, the study offered significant contributions to practical purposes and the body of knowledge.

Key words: Governance framework, Institutional capacity, Resource management, Stakeholders engagement, Water governance, Water sector

HIGHLIGHTS

- Key components of institutional capacity for water governance.
- Systematic literature review on water governance.
- Application of PRISMA 2020 and MMAT methods.
- Critical variables of water governance: stakeholders engagement, policy and practices, water resource management.
- Political interference highly influenced water governance.

GRAPHICAL ABSTRACT

1. INTRODUCTION

Water is vital for human survival and every living thing on earth. This idea flows throughout the 2030 Agenda for Sustainable Development and underpins most of the sustainable development goals (SDG). Water is the sixth on the agenda and is known as SDG 6 – clean water and sanitation for all. The crucial role of water means that if we fail to achieve SDG 6, we will fail to successfully achieve almost all of the other 16 SDGs relating to food, poverty, health, gender equality, energy, economy, sustainable cities, climate change, and the environment. All of humanity's hopes captured by the SDG depend on safeguarding water resources (United Nations, 2023). Hence, effective governance is crucial in ensuring continuous access to clean water for everyone (Bakker & Morinville, 2013).

The water crisis is largely a crisis of governance (UNESCO, 2006, p. 1). The current development shows that there is a rising need for water in every aspect of life. Its scarcity as well as the threat from climate change demands a sound water governance framework. Tropp (2007) highlighted that within the water sector, governance received less attention compared to other technical and infrastructure developments. Thus, a comprehensive study of the critical variables of water governance in strengthening institutional capacity (IC) is becoming crucial for future reference and policy formulation. Tan (2008) argued that a state should have the IC to make the right decisions and implement them. A strong IC will ensure the success of a governance set-up. Yasin *et al.* (2021) delineated that the strengthening of IC in various areas is vital for improving governance. Against this background, this study aims to contextualize the IC which is the heart of water governance's sustainability. The study is guided by the central research question: What are the critical variables of water governance in strengthening IC?

The systematic literature review (SLR) methodology was applied in this study to disclose the critical variables of water governance. SLR is a critical examination of an existing body of literature that employs a rigorous, transparent, and replicable technique for finding, evaluating, and synthesizing relevant material (Kraus *et al.*, 2020). It is necessary to conduct SLR before commencing any research to gauge the depth and breadth of the body of prior work (Liu *et al.*, 2020). A valid, reliable, and repeatable process must be used while doing the SLR (Xiao & Watson, 2019). SLR also helps to avoid research bias and errors (Smith & Noble, 2014; Dada, 2018) and reduces implicit prejudice and discrimination towards a subject matter (Sirelkhatim *et al.*, 2015). High-quality SLRs aid in better decision-making for businesses and policy-makers and assist authors in synthesizing the research under evaluation (Kraus *et al.*, 2020).

1.1. Water governance

Governance is a government's ability to make and enforce rules, and to deliver services (Fukuyama, 2013). Governance is also described as a decision-making process that drives the relationship between social institutions

and the public affairs of a given society (Vannevel & Goethals, 2021). Rhodes (1997) defined governance as 'the self-organizing inter-organizational networks characterized by interdependence, resource exchange, rules of the game, and autonomy from the state.' Moreover, governance refers to the rules of collective decision-making in settings where there are a plurality of actors or organizations (Chhotray & Stoker, 2009) and the use of authority for the purpose of directing a country's affairs (Weng, 2002).

The concept of water governance is highly contested wherein various definitions of the concept, as well as its specific aspects and forms, are adopted (Ozerol *et al*., 2018). There is no common understanding of water governance. For some, governance is an administrative and technological toolkit that can be used in diverse circumstances to achieve a goal, such as implementing a water policy. For others, governance is the debate and definition of society's ends and means through substantive democratic participation (Castro, 2007). Woodhouse & Muller (2017) explain the water governance discourses' conflict. According to them, there are three water governance issues, namely who should make decisions, at what geographical and political scales governance organizations should operate, and whether market or non-market factors should be used to allocate water.

Water governance is described as the 'range of political, social, economic and administrative systems that are in place to develop and manage water resources and the delivery of water services, at different levels of society' (Rogers & Hall, 2003). It can also be defined as the system of actors, resources, mechanisms, and processes which mediate society's access to water (Franks & Cleaver, 2007). Bakker & Morinville (2013) described water governance as the range of political, organizational, and administrative processes through which community interests are articulated, their input is incorporated, decisions are made and implemented, and decision-makers are held accountable in the development and management of water resources and delivery of water services. Zwarteveen *et al*. (2017) explain that 'water governance at heart is about political choices as to where water should flow; about the norms, rules and laws on which such choices should be based; about who is best able or qualified to decide about this; and about the kind of societal future such choices support'. In a much simpler form, water governance is defined as the decision-making interactions between stakeholders and institutions to manage water resources (Gumeta-Gomez *et al*., 2021). For this SLR, the authors shall follow Franks & Cleaver (2007) who define water governance as the system of actors, resources, mechanisms, and processes which mediate society's access to water.

1.2. Contextualizing IC

Understanding IC is vital as water management remains a complex and fragmented area (Renou & Bolognesi, 2019). Numerous studies used IC as synonymous with 'governance capacity' or 'administrative capacity' (Domorenok *et al*., 2021). Healey (1998) described the concept of IC as the ability of administrative and government agencies to respond to and resolve collective problems. Willems & Baumert (2003) argued that IC represents a broader 'enabling environment' which forms the basis upon which individuals and organizations interact. An IC that enables adaptive management to cope with external shocks and pressures will ensure the sustainability of any resource management regime (Kim *et al*., 2018).

Renou & Bolognesi (2019) suggested that IC relies on traditional, technical, and linear management approaches. However, Wang *et al*. (2017) delineated that IC should be dynamic since its elements and their relationships evolve. According to Healey (1998), the elements comprise three dimensions namely knowledge resources, relational resources, and mobilization capacity. Willems & Baumert (2003) acknowledged that country-level IC assessments are country-specific and should be undertaken in a national context. Nevertheless, it is possible to find some common characteristics of IC that are valid across countries. In this respect, all aspects of IC are needed to achieve policy success.

1.3. Significance of study

The subject of IC is gaining interest in the research on policy integration. However, most of the existing research only focused on the organizational and procedural aspects. Little attention has been paid to the governance dimensions in the water sector (Bakker & Morinville, 2013) such as the norms, rules, routines, and values. The possible linkages between these dimensions were also under-investigated (Domorenok *et al.*, 2021). Furthermore, there were still insufficient literature reviews that attempted to investigate the various critical variables in water governance. This is in the context of strengthening the IC, in general, and concerning the ones that utilize PRISMA 2020 as part of the methodology, in particular. Hence, the current understanding of how IC may shape the overall governance process remains fragmented and somewhat incomplete. Therefore, this article endeavours to bridge this gap by presenting a review of recent relevant debates. It aims to contribute to the development of the nascent body of literature on IC and water governance. The information presented in this study will hopefully add to the pool of knowledge in the literature on the water sector. This will be useful as a reference in strategizing an adaptation plan to cater to the current and future needs of the water sector. In addition, this study also explains the specific areas of water governance which could be referred to for future studies. The analysis presented in this SLR summarizes major contributions to the literature of the water sector to date. Apart from identifying the critical variables of water governance, a significant factor that influences all the variables is also presented in the Discussion section. This will highlight the significance of this factor to be taken into consideration in the overall formulation of future water governance policy.

2. MATERIALS AND METHODS

2.1. Preferred reporting items for systematic reviews and meta-analyses

Preferred reporting items for systematic reviews and meta-analyses (PRISMA) are a publication standard that facilitates accurate, transparent, and complete reporting of systematic reviews. It was first published in 2009 as PRISMA 2009 before being updated to PRISMA 2020 to reflect advances in systematic review methodology and terminology. Although it is primarily designed for health-related studies, it is also suitable for other fields such as social science (Haddaway *et al.*, 2018). PRISMA is the most cited reporting guideline (Caulley *et al.*, 2020) with over 60,000 citations and endorsed by almost 200 journals and systematic review organizations in various disciplines (Page *et al.*, 2021). It is used by editors and peer-reviewers to improve reporting standards across medical and general journals to ensure the quality of the revision process and its replicability (Abelha *et al.*, 2020). PRISMA has been translated into other languages such as Russian, Japanese, and Korean to encourage global usage (Haddaway *et al.*, 2018). Further details of the PRISMA can be accessed at PRISMA (prisma-statement.org).

In this study, PRISMA was used to examine the extensive database of literature related to the IC. Its adoption will ensure the transparency, consistency, and completeness of the reporting as well as offer a thorough understanding of the research topic (Sohrabi *et al.*, 2021). The step-by-step process of retrieving and selecting the relevant literature for the SLR is presented in the flowchart diagram. This transparent process is hoped to enhance the quality and credibility of the produced paper as well as pave the way for scholars to refer to, repeat, or replicate the process in the future.

2.2. Formulation of research questions

One of the key distinctions between SLR and conventional literature reviews is the research question. The evidence that is intended to be produced by the SLR is related to the initial research topic (Briner & Denyer, 2012). The development of this current SLR is based on the main research question: What are the critical variables of water governance in strengthening IC? The main focus of the investigation was on water governance's

elements. More importantly, special attention was given to the elements that hold significant impact in strengthening the IC.

2.3. Systematic searching strategy

2.3.1. Identification

Identification is a procedure used to improve the primary search terms. The identifying procedure enhances the likelihood that more relevant articles will be found for the reviewing process (Abu Samah *et al.*, 2021). For SLR, rigorous evidence identification is essential as sample selection determines the review's outcome, validity, and explanatory power (Gusenbauer & Haddaway, 2020). There are three types of searching, namely lookup, exploratory, and systematic. Systematic searching is the most rigorous and sophisticated as the methods used are prioritized and carefully developed. All three types of searching must be conducted using different search methods and using search systems with specific capabilities (Gusenbauer & Haddaway, 2021).

Gusenbauer & Haddaway (2020) investigated the systematic search capabilities and qualities of 28 widely used academic search systems to check their levels of precision, recall, and reproducibility. It was reported that 14 of the 28 search systems examined were suitable to be used as principal search systems for SLR. Among them are ProQuest, PubMed, ScienceDirect, Scopus, and Web of Science. Another 14 databases, including Google Scholar and Microsoft Academics, were unsuitable for primary review searches and shall only serve as supplementary or supporting databases. This is due to severe performance limitations concerning the formulating queries, the correct interpretation of queries by the system, data retrieval capabilities, and the reproducibility of searches.

During the identification process, more than one database should be used to cover most articles (Kraus *et al.*, 2020) since no single database includes the complete set of published materials (Xiao & Watson, 2019). Furthermore, no two-search systems are identical and none is perfect (Gusenbauer & Haddaway, 2021). The focus should be concentrated on the main online databases to create a more transparent process that can be applied globally (Kraus *et al.*, 2020). This is because SLR should be valid, reliable, and repeatable (Xiao & Watson, 2019). The present study made use of Web of Science, SCOPUS, and ScienceDirect database(s) since they serve as the principal search systems and offer a vast majority of previous research in the field (Kraus *et al.*, 2020).

Keyword enrichment is necessary to retrieve more relevant articles for SLR. Thus, mastering advanced search skills such as Boolean operator, phrase searching, truncation, wildcard, and field code function is highly recommended (Mohamed Shaffril *et al.*, 2021). As shown in Table 1, the primary keywords for the current study

Table 1 | The search string.

Databases	Keyword used
Web of Science Core Collections	TS = ((‘water governance*’ OR ‘water administration*’ OR ‘water organization*’ OR ‘water policy*’) AND (‘institutional* capacity*’ OR ‘institutional framework*’ OR ‘institutional structure*’) AND (‘variable*’ OR ‘element*’ OR ‘unit*’ OR ‘aspect*’ OR ‘attribute*’ OR ‘factor*’))
SCOPUS	TITLE-ABS-KEY ((‘water governance*’ OR ‘water administration*’ OR ‘water organization*’ OR ‘water policy*’) AND (‘institutional* capacity*’ OR ‘institutional framework*’ OR ‘institutional structure*’) AND (‘variable*’ OR ‘element*’ OR ‘unit*’ OR ‘aspect*’ OR ‘attribute*’ OR ‘factor*’))
ScienceDirect	((‘water governance’ OR ‘water administration’ OR ‘water organization’ OR ‘water policy’) AND (‘institutional capacity’ OR ‘institutional framework’ OR ‘institutional structure’) AND (‘variable’ OR ‘element’))

Note: ScienceDirect limits the Boolean Operator to a maximum of 8 and does not support Wildcards.

namely 'water governance' and 'institutional capacity' were further enhanced with the use of search functions. The search process was performed on 12 November 2022 and yielded a total of 1,168 articles.

2.3.2. Screening

The identified articles were then subjected to the screening process. This is done to reduce the number of studies to be analysed to a number that can be practically managed by the reviewers. At this stage, the determination is not based on careful evaluation of the papers' quality but rather on pragmatic considerations to determine whether they are worth reading further for review purposes (Okoli, 2015). During this screening stage, it is crucial to establish inclusion and exclusion criteria based on the research objectives or questions (Kitchenham & Charters, 2007). Literature type, publication year, and language were the criteria used for the screening procedure (see Table 2). For this study, only academic research journal articles were chosen as they act as the primary sources that offer empirical data (Mohamed Shaffril *et al*., 2019) and are considered the 'best' sources as they are peer-reviewed by other scholars (Kraus *et al*., 2020). Hence, publications in the form of systematic reviews, reviews, meta-analyses, meta-synthesis, book series, books, chapters in a book, and conference proceedings were excluded from the current study.

This study employed a 5-year time frame comprising the articles published between 2018 and 2022. This time frame is selected to ensure that the context of the study reflects the current trend of the study area. It is also used to determine the manageable periods as it is impossible to review all published articles. Practicality is a subjective part of the literature review as there are no absolute rights and wrongs; however, there are considerations of what is reasonable and justifiable (Okoli, 2015). Furthermore, only articles written in English were chosen for easier understanding and comprehension since articles in other languages can be confusing, expensive, and time-consuming to review (Linares-Espinós *et al*., 2018).

Kraus *et al*. (2020) delineated that SLR is dependent on previous research on the topic. Thus, there is a question of how many articles a literature review should contain. The answers are ranging from several hundred articles to a few dozen, depending on the maturity of the field being studied. A much lower number of articles are justifiable for an SLR that covers a very specific topic. This study used a computerized screening based on the set inclusion and exclusion criteria, thus the number was automatically determined by the result. The screening process yielded 78 articles. Sixteen duplicates were removed via EndNote and leaving a total of 62 articles.

2.3.3. Eligibility

The title and abstract of those 62 articles were then thoroughly examined for linkage with the research objective and research question. This is to ensure that the selected articles focused on the specific water governance aspects needed for this study. The full text should also be retrievable for analysis at a later stage. At this point, a total of 42 articles were excluded; specifically, 31 articles were found to be irrelevant and not focusing on water governance, three articles were of the SLR type and two articles were of the literature review type. Meanwhile, the full text of

Table 2 | Inclusion and exclusion criteria.

Criterion	Inclusion	Exclusion
Literature type	Journal (research articles only)	Journals (SLR), book, book series, book chapter, conference proceeding
Date range	2018–2022	2017 and earlier
Language	English	Other languages

six articles was unretrievable from the database, hence the need to be excluded. The summary of this process is stated in Figure 1: PRISMA Flow Diagram.

2.4. Quality appraisal

The remaining 20 articles were appraised for quality based on Mixed-Method Appraisal Tool (MMAT) version 2018. MMAT has been applied in various mixed-method systematic reviews and tested for reliability (El-Awaisi *et al.*, 2018). This tool assesses the methodology of the articles based on five core quality criteria for each study design. It is advisable to provide a detailed presentation of the ratings of each criterion instead of calculating the overall score. A sensitivity analysis is suggested in which the quality of the studies shall be considered by contrasting the results. It is discouraged to exclude studies with low methodological quality (Hong *et al.*, 2018). Further details about MMAT are available at http://mixedmethodsappraisaltoolpublic.pbworks.com/. Based on the MMAT checklist, the quality of the selected articles was assessed independently by three reviewers. The scores were compared and disagreements were discussed and resolved. It was mutually agreed that all 20 articles shall be included in this study.

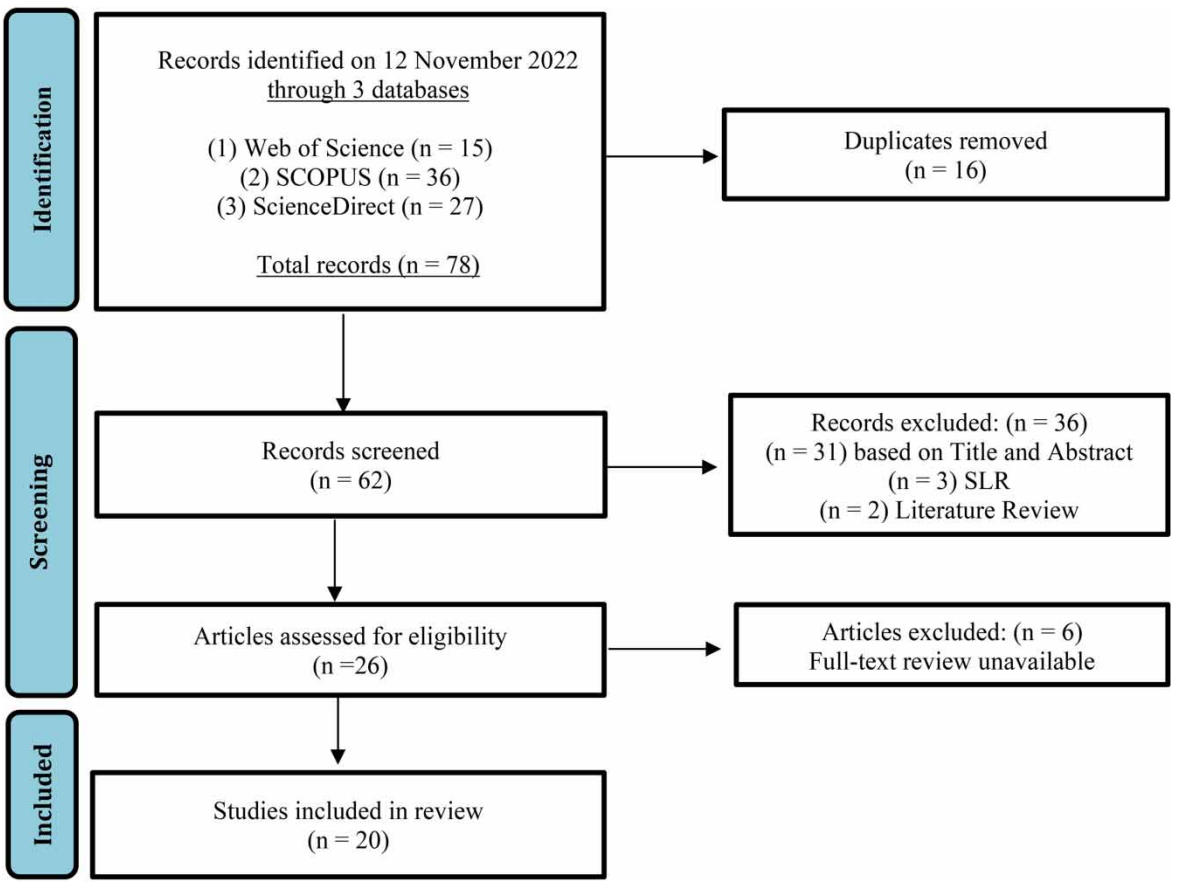

Fig. 1 | PRISMA flow diagram of the SLR Methodology. *BMJ 2021;372:n160* http://dx.doi.org/10.1136/bmj.n160.

2.5. Data extraction and analysis

The full text of the remaining 20 articles was then analysed for relevant themes. The retrieved data were put into a table in Excel format to ease the synthesis process. Thematic inductive analysis was used to uncover themes associated with water governance using a qualitative synthesis. Thematic analysis is a method for identifying, analysing, and reporting themes within data which will organize and describe the data set in detail (Braun & Clarke, 2006). This technique aids in highlighting the key point of vast data by guiding authors to use a well-structured approach which then yields organized and transparent findings (Nowell *et al*., 2017). The process was performed by three coders who subsequently produced key themes. All the themes were re-examined and discussed to ensure their accuracy and suitability with the study's objective.

3. RESULTS

Applying the systematic searching strategy, this study used a computerized screening based on the set inclusion and exclusion criteria. Hence, the number of selected articles as well as the locations of the study (either rural or city), are automatically generated. This process yielded 20 articles for review and resulted in the identification of 3 themes, namely stakeholders engagement, policy and practices, and water resource management (WRM).

There were 14 qualitative research studies, 2 quantitative research studies, and 4 mixed-method studies being reviewed. The results summary was presented in Figure 2 (author, year, and country of studies), Figure 3 (yearly total publication), Table 3 (location of research) and Table 4 (method, themes, and frequencies). Two authors did

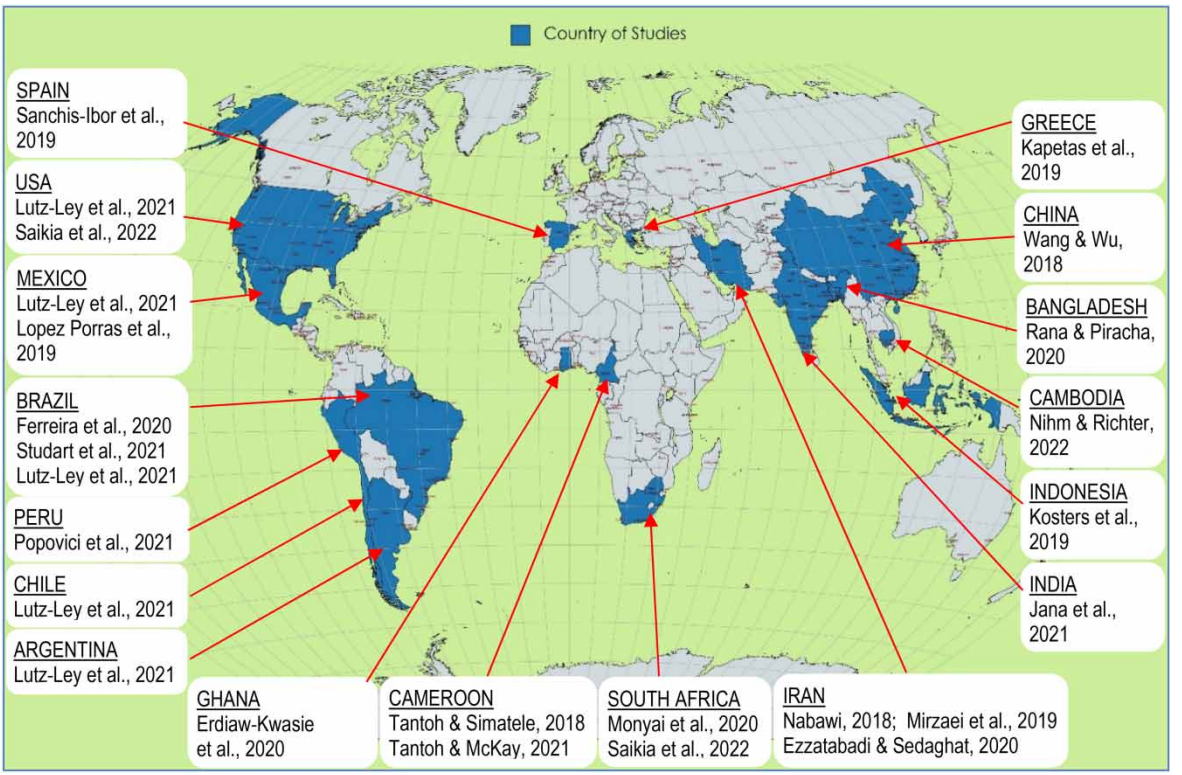

Fig. 2 | Author, year, and country of studies. *(Created with mapchart.net World Map – AdvancedMapChart).*

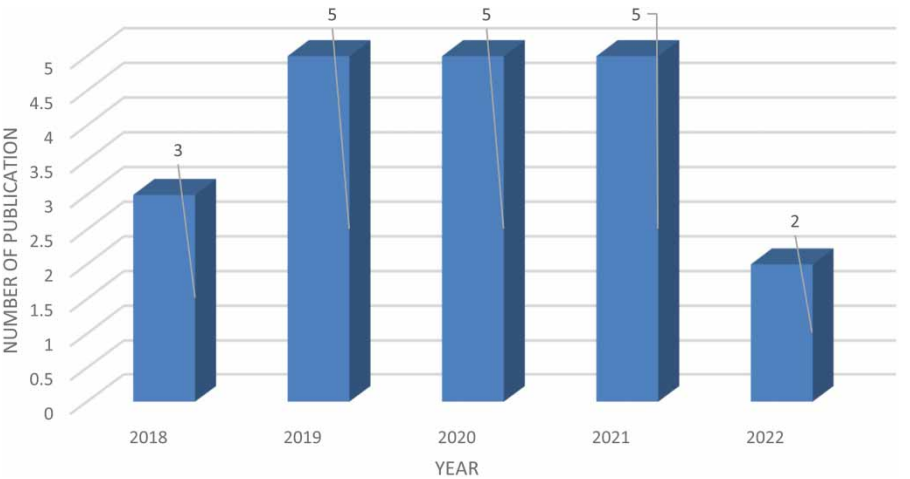

Fig. 3 | Yearly total publication.

Table 3 | Location of research.

NO.	Authors	Location of research	Rural	City
1	Ezzatabadi & Sedaghat (2020)	Iran		√
2	Ferreira *et al.* (2020)	Brazil		√
3	Jana *et al.* (2021)	India		√
4	Kapetas *et al.* (2019)	Greece		√
5	Kosters *et al.* (2019)	Indonesia		√
6	Lopez Porras *et al.* (2019)	Mexico	√	
7	Lutz-Ley *et al.* (2021)	Argentina		√
8	Mirzaei *et al.* (2019)	Iran		√
9	Monyai *et al.* (2022)	South Africa		√
10	Nabavi (2018)	Iran		√
11	Nhim & Richter (2022)	Cambodia	√	
12	Erdiaw-Kwasie *et al.* (2020)	Ghana		√
13	Popovici *et al.* (2021)	Peru		√
14	Rana & Piracha (2020)	Bangladesh		√
15	Saikia *et al.* (2022)	South Africa		√
16	Sanchis-Ibor *et al.* (2019)	Spain		√
17	Studart *et al.* (2021)	Brazil		√
18	Tantoh & McKay (2021)	Cameroon	√	
19	Tantoh & Simatele (2018)	Cameroon	√	
20	Wang & Wu (2018)	China	√	
		Total frequency	5	15

Table 4 | Method, themes, and frequencies.

No.	Authors	Method	SE	P&P	WRM
1	Ezzatabadi & Sedaghat (2020)	QN – survey	1		1
2	Ferreira *et al.* (2020)	QL – index	1	1	1
3	Jana *et al.* (2021)	QL – indicator analysis		1	1
4	Kapetas *et al.* (2019)	QL – interview	1	1	1
5	Kosters *et al.* (2019)	MM – interview	1	1	1
6	Lopez Porras *et al.* (2019)	QL – interviews	1	1	1
7	Lutz-Ley *et al.* (2021)	QL – case study	1	1	1
8	Mirzaei *et al.* (2019)	MM – interview	1	1	
9	Monyai *et al.* (2022)	QL – interview	1	1	1
10	Nabavi (2018)	QL – desk study		1	
11	Nhim & Richter (2022)	MM – experiments	1		
12	Erdiaw-Kwasie *et al.* (2020)	QL – interviews, focus group	1		1
13	Popovici *et al.* (2021)	QL – interview transcripts	1	1	
14	Rana & Piracha (2020)	QL – interviews, focus group	1	1	
15	Saikia *et al.* (2022)	QL – workshop, focus group	1	1	1
16	Sanchis-Ibor *et al.* (2019)	QL – workshop, interview	1	1	
17	Studart *et al.* (2021)	QL – case study	1	1	1
18	Tantoh & McKay (2021)	QL – interview	1	1	1
19	Tantoh & Simatele (2018)	MM – interviews, focus group	1	1	1
20	Wang & Wu (2018)	QN – survey	1	1	
		Total frequency	18	17	13

QL, qualitative; QN, quantitative; MM, mixed-method; SE, stakeholders engagement; P&P, policies & practices; WRM, water resource management.
Note: SE, P&P, and WRM are the themes found in the paper.

their research in multiple countries, namely (i) Lutz-Ley *et al.* (2021) in Argentina, Brazil, Chile, Mexico, and the USA); and (ii) Saikia *et al.* (2022) in Africa and USA. Hence, their names appeared multiple times in Figure 2, according to the studied countries. Concerning the location, there are only 5 studies done in rural areas compared to 15 studies carried out in the cities (Table 3). Even though there are water governance issues in the rural areas, however, based on the screening result and the 5-year time frame, most of the studies are done in the cities.

3.1. Stakeholders engagement

Stakeholders range from government actors to regular citizens consisting of individuals, civil society, and institutional actors and judicial (Studart *et al.*, 2021). Stakeholder engagement refers to a process by which the water stakeholders get engaged and involved in the decision-making and management of water resources (Lopez Porras *et al.*, 2019). This theme was mentioned in 18 out of the 20 articles in various contexts. Most of the articles in this SLR emphasized the active engagement of stakeholders through participatory governance. The objective is to enable decisions to be made at a local level and in a less hierarchical manner (Ferreira *et al.*, 2020).

Stakeholder engagement is an entry point for enabling collaboration and acceptance of formal institutions (Lopez Porras *et al.*, 2019). This will then aid in addressing corruption, conflicts, and the loss of water ecosystem

services. Stakeholders engagement enhances social awareness and acceptability of trade-offs while reducing conflicts over water access. Effective water governance requires strong stakeholder engagement as they aid in designing water allocation policies and improving management practices (Kapetas *et al*., 2019). In contrast, loose stakeholder ties can result in weak and inefficient governance. Studies have highlighted that stakeholders sometimes fail to fully understand the benefits of collaboration, despite their expertise. Moreover, some stakeholders prioritize profit-oriented water supply and economic reasons, neglecting the significance of institutional structures and system design (Kapetas *et al*., 2019).

The inclusion of a broad number of stakeholders is vital for uniting resource systems, addressing issues, and upholding the rights of marginalized communities (Sanchis-Ibor *et al*., 2019; Rana & Piracha, 2020). Broad participation also facilitates tackling current and emerging problems, ensuring accountability and participation in water management, and enhancing water system resilience (Lutz-Ley *et al*., 2021). Additionally, inclusive participation guarantees acceptance and distribution of trade-offs, fosters a sense of ownership and belonging, and ensures that all stakeholders, not just elites, are involved in the decision-making process (Tantoh & Simatele, 2018; Rana & Piracha, 2020). However, exclusion of important stakeholders during decision-making processes has been observed, as was the case with irrigation communities adversely affected by decisions they were not involved in (Sanchis-Ibor *et al*., 2019). Additionally, government participation mechanisms suffer from internal and external challenges, including a focus on technical aspects over appropriate engagement strategies with customers (Erdiaw-Kwasie *et al*., 2020). Dominance from influential stakeholders and limited communication channels undermine participatory forums, leading to one-way communication instead of the desired dialogic style (Erdiaw-Kwasie *et al*., 2020).

The socio-economic aspects of stakeholders also play a significant role in public participation. Studies have found that farmers' motivation to attend meetings is influenced by factors such as the organization's age and understanding of agriculture, the location of gatherings, and the availability of advanced visual aids (Ezzatabadi & Sedaghat, 2020). Effective leadership and long-term strategies that incorporate local knowledge, culture, and inputs from various stakeholders are essential for water resilience (Saikia *et al*., 2022).

Limited participation from the marginalized communities strains existing community-level cooperation in water management (Popovici *et al*., 2021). Communities' limited understanding of their roles, lack of participation in decision-making, and other issues like water quality and quantity concerns contribute to the complexity of water services management (Monyai *et al*., 2022). Existing institutional arrangements with low fee collection and moderate sustainability and governance scores hinder the development of effective participatory mechanisms (Ferreira *et al*., 2020). The lack of cooperative strategies leads to poor infrastructure, water scarcity, and a collapse of cooperation (Nhim & Richter, 2022).

Studies evaluating the performance of local water user associations (WUAs) and appointed non-governmental organizations (NGOs) reveal that they may not perform better than traditional institutions, indicating the need for improved intermediaries between the government and stakeholders (Wang & Wu, 2018; Ezzatabadi & Sedaghat, 2020). Effective water management requires active participation and collaboration among all tiers of government, public actors, and locals, with a bottom-up paradigm adopted by the government (Mirzaei *et al*., 2019; Tantoh & McKay, 2021). However, imbalances in stakeholder responsibilities and passive participation from state authorities may hinder successful participatory water governance (Rana & Piracha, 2020). Rather than burdening local communities, strengthening and streamlining intermediary and government institutions at regional scales could be more effective in addressing local needs (Popovici *et al*., 2021).

In conclusion, achieving effective water governance necessitates encouraging stakeholder engagement to tackle imbalances, promoting meaningful participation, and fostering collaboration among various actors and

institutions. While participatory governance is advocated, challenges and limitations need to be carefully navigated to ensure its success and equitable outcomes.

3.2. Policy and practices

The scholars in the reviewed papers highlight the water policy implementation and practices as well as the challenges faced in different countries. Policy and practices differ from one country to another. Hence, the local context should always be considered to ensure successful policy implementation (Lutz-Ley *et al*., 2021). Water policy instruments are necessary to overcome the barriers and improve water governance (Mirzaei *et al*., 2019). There are three policy instruments, namely effectiveness, efficiency, and trust and engagement. These instruments were interdependent and must be adopted in a holistic way to solve difficulties. According to Kapetas *et al*. (2019), the successful implementation of policy and technical interventions required a set of conditions to be met simultaneously. These conditions were divided into three dimensions, namely authority, capacity and priority. Authority is the political and administrative power and control while capacity is the technical expertise and financial ability to carry out an intervention. Meanwhile, priority is the multilevel alignment of goals and objectives. Policies are more effective when their role within a system is better understood.

In India, water use efficiency and water conservation remain a gap in the current water policies. Existing water supply policies failed to address the challenges of equitable and high-quality water accessibility. This was due to the lack of information on benchmarking of water-covered zones, uniformity of information on coverage thresholds, the current status of water metering, quantifiable metering technologies, and a tariff indicator system (Jana *et al*., 2021). The study by Kapetas *et al*. (2019) in Greece found that the flat rate abstraction license for agricultural purposes had reduced environmental flow to below-acceptable standards, which indicated a lack of understanding of other users' priorities.

Bangladesh and Indonesia shared some similarities concerning policy and practices. Political influence in both countries had weakened policy implementation. The development projects and investments were not aimed at local necessities but followed political gains instead. It was visible in the prioritization of certain development goals, the emphasis on short-term planning, and the selective enforcement of laws (Kosters *et al*., 2019). Politicians were also seen to appease the poor community by promising free water for their political mileage. This act hindered participatory governance, particularly the process of decentralization. Partisan politics through the politicization of local city government and the absence of local representatives as stakeholders were major concerns in the successful implementation of participatory water governance (Rana & Piracha, 2020).

In Mexico, mismanagement, over-exploitation, and conflicts over access to water were due to the lack of application and neglect of formal rules. Breaches of the legal framework were commonplace, permitted by the corruption of both former and current government officials (Lopez Porras *et al*., 2019). Meanwhile, a study by Lutz-Ley *et al*. (2021) in arid Americas (Argentina, Brazil, Chile, Mexico, and the United States) identified a major challenge in the integration of science and water management. The integration became difficult as the policy-making and practice were not unidimensional nor driven by a rational imperative. In Africa, the sense of ownership and accountability to water projects was affected by feelings of dissatisfaction. Lack of community participation, poor water quality, water scarcity, income restrictions, loss of land, and violation of the water right were the issues. Ownership was lacking because of exclusion in the decision-making process and the lack of truth among project implementers (Monyai *et al*., 2022).

Policies developed to control illegal abstraction were the biggest failures in Iran's history of water policy-making. The government hoped to reduce illegal abstraction by issuing licenses to unregistered wells. However, this strategy backfired as users learned to break the law by digging new wells or deepening old ones. Users also complained that water authorities were selective and unfair in enforcing the law. Among the major hurdles were

the disconnect between users and the policy-makers, the resulting mistrust, the lack of public participation, and the lack of local political power (Nabavi, 2018).

Peru implemented Integrated Water Resource Management (IWRM) policy in 2009 but this approach complicated local participation in water management. Community members had limited ability to participate due to market integration, labour migration, and other socio-economic and political stressors (Popovici *et al*., 2021). IWRM was also implemented in Brazil based on three pillars namely demand management, supply management, and conflict management. Under conflict management, some arenas described the setting wherein water conflicts were resolved (Studart *et al*., 2021).

The water transfer policy introduced in Spain could only solve temporary or structural local water deficits. Without proper and coherent regulation, this could weaken water governance. Contracts' limitations and the failure to include all the users of the resources system created a group of outsiders (Sanchis-Ibor *et al*., 2019). Concerning Cameroon, Tantoh & McKay (2021) highlighted that fragmented water policies, poor institutional framework, and uncoordinated development policies resulted in weak sector performance, limited access to water services, and degradation of water sources. Although community-based water resource management (CBWRM) was promoted, rural water supply systems faced internal and external constraints. Internal constraints linked to local community dynamics, poverty, traditions, misplaced priorities, inadequate capacity, and passive community members. External constraints referred to political interference, the State's prescriptive control and the absence of supportive policies. Another study by Tantoh & Simatele (2018) found that the focal challenge to sustainable CBWRM in Cameroon was the jurisdiction between central and local governments.

In China, the unsatisfactory performance of WUAs was attributed to the lack of conditions to support the WUAs' work. The WUAs operation conflicted with issues of limited autonomy, weak participation of local farmers, government interference, and popular concurrence of WUA leaders by village cadres (Wang & Wu, 2018). Hence, the key to policy-making in addressing water management challenges was to guarantee the congruence between institutional design and local context. Meanwhile, Tantoh & McKay (2021) admitted that while state involvement was necessary, it should not hinder the smooth functioning of rural water systems. In the same vein, Ferreira *et al*. (2020) suggested that municipalities need to strengthen their policy-making skills to be more effective at analysing water management conflicts.

Saikia *et al*. (2022) proposed a City Water Resilience Framework as a governance-based planning tool to enhance urban water resilience. Among the suggestions were effective enforcement of economic regulations, environmental regulations, and enforcement of public health regulations for water. Nabavi (2018) further added that regulatory mechanisms need to be accompanied by complementary actions such as (1) clear and transparent legal and institutional frameworks; (2) an integrated legal and institutional framework for law enforcement that takes a holistic view of policing and partnering with community organizations; (3) reducing the social and political costs of enforcing regulations; and (4) including local communities in policy-making and implementation.

3.3. Water resource management

WRM is a critical and multifaceted theme, as identified in this comprehensive SLR. Saikia *et al*. (2022) referred WRM as a focus on safeguarding communities from water-related shocks and pressures, providing safe and cost-effective water services, and cultivating healthy environments. However, the current WRM faces numerous challenges, hindering its effectiveness and sustainability. Weak institutional frameworks, high operation and maintenance costs, and limited community involvement in decision-making have been identified as key obstacles (Tantoh & Simatele, 2018; Tantoh & McKay, 2021). Moreover, issues such as excessive licensing of aquifers, illegal wells, and injustice in licenses (Lopez Porras *et al*., 2019; Ezzatabadi & Sedaghat, 2020), along with struggles

for institutional power and failure to address pollution, further compound the problem (Studart *et al*., 2021). The integration of environmental and water management remains inadequate (Ferreira *et al*., 2020), while factors like vulnerable dryland systems, corruption, and lack of coordination exacerbate the challenges (Lopez Porras *et al*., 2019; Studart *et al*., 2021). Additionally, water insecurity and inequity, a widening demand-supply gap, urban–rural disparity, and insufficient consideration of water quality and treatment monitoring have led to a rise in waterborne diseases (Erdiaw-Kwasie *et al*., 2020; Jana *et al*., 2021).

Case studies, such as the one on Surabaya by Kosters *et al*. (2019), highlight specific issues in WRM. Low regional cooperation and the prioritization of individual city interests impede the development of new water resources. Political interference hinders tariff adjustments, and short-term planning overlooks future water demand and focuses only on revenue generation from profitable areas.

To address these challenges, various practical recommendations have been proposed. Kapetas *et al*. (2019) advocate for the establishment of a local and catchment-scale monitoring network to oversee surface water and groundwater. Climate-adaptive agriculture and treated-water reclamation are also vital for sustainable water management. Prioritizing environmental flow through adaptive allocation plans and strengthening transboundary cooperation are essential for long-term resource preservation (Kapetas *et al*., 2019). Monitoring land use to protect hydrological recharge areas and control pollution is another critical measure (Ferreira *et al*., 2020). Kosters *et al*. (2019) propose rehabilitating water distribution systems to minimize losses and prevent tap water contamination. Additionally, raising water tariffs to cover operating costs and conducting in-depth studies on the dynamics of stakeholders involved in water management are recommended (Lutz-Ley *et al*., 2021).

Ensuring the active involvement of citizens and fostering strong links between citizen participation and water governance are crucial in tackling water insecurity and inequity (Erdiaw-Kwasie *et al*., 2020). Tantoh & McKay (2021) argue that interconnecting social players can empower society and contribute to the sustainable management of water resources. To achieve this, a thorough water governance assessment is necessary to understand the system's needs and challenges (Lopez Porras *et al*., 2019). By comprehending how the governance system influences ecological and societal interactions, we can identify barriers and opportunities to increase resilience.

4. DISCUSSION

The present study conducted an SLR to comprehensively examine various aspects of water governance, stakeholder engagement, policy and practices, and WRM. The findings shed light on the complex challenges faced by different countries and regions in managing water resources effectively. The discussion will rigorously analyse and synthesize the key themes and implications identified in the review.

Stakeholder engagement emerges as a critical factor in achieving successful water governance. The active involvement of stakeholders, ranging from government actors to regular citizens, is essential for making informed decisions and managing water resources effectively. Participatory governance facilitates the decentralization of decision-making and empowers local communities, leading to more equitable outcomes and improved water system resilience. However, the review also highlights the challenges faced in stakeholder engagement, including exclusion, weak communication channels, and dominant stakeholders. Addressing these challenges is crucial to ensuring meaningful participation and collaborative decision-making in water governance processes.

Policy and practices play a pivotal role in shaping WRM. The review identifies the need for tailored policy instruments, such as effectiveness, efficiency, and trust and engagement, to overcome barriers and improve water governance. Additionally, successful policy implementation requires the consideration of three key dimensions: authority, capacity, and priority. These dimensions encompass political and administrative power, technical expertise, financial ability, and multilevel alignment of goals and objectives. The diverse policy landscape in different countries highlights the importance of contextualizing policy measures to fit unique

circumstances and local realities. For instance, India's water policies need to address water use efficiency and conservation, while Mexico faces challenges related to mismanagement and neglect of formal rules.

WRM is a multifaceted theme with various challenges that hinder its effectiveness and sustainability. Weak institutional frameworks, high operation and maintenance costs, and limited community involvement are key obstacles to successful WRM. Pollution, excessive licensing of aquifers, and illegal wells also contribute to the complexities faced in managing water resources. The review emphasizes the significance of integrating environmental and water management, as well as adopting adaptive allocation plans to preserve water resources in the long term. Moreover, citizen participation and strong links between society and water governance are essential to address water insecurity and inequity.

The strengths of this SLR lie in its comprehensive analysis of various aspects of water governance, considering different case studies and regions. The inclusion of practical recommendations offers valuable insights for policymakers and water resource managers to address the identified challenges. The rigorous approach to examining stakeholder engagement, policy and practices, and WRM provides a holistic understanding of the complexities in managing water resources.

This SLR offers some policy implications. Firstly, broad stakeholder engagement or participation should be prioritized and institutionalized in water governance. This requires forums for meaningful engagement and collaboration among all water stakeholders. Stakeholder engagement in water resource decision-making and management ensures that multiple demands and viewpoints are recognized. Hence, it should be regulated by governments and supported by resources. Secondly, distinct areas and countries face distinct water governance difficulties, thus governments must tailor water policies to their settings. Policies and practises should be customized for each location. This requires extensive water governance system analyses to identify impediments and resilience options. Governments should work with local communities, academics, and experts to create and execute policies that address water management issues and promote sustainable water resource management. Finally, to sustain water resources, water policies should protect water habitats, environmental flows, and pollution. IWRM covers social, economic, and environmental aspects of water management. Overall, government policies shape water governance and resource management. Stakeholders engagement, contextualizing policies, and effective water resources management can help governments build more resilient and sustainable water systems for future generations.

5. CONCLUSION

In conclusion, this SLR has rigorously examined water governance, stakeholder engagement, policy and practices, and WRM. The findings underscore the importance of stakeholder engagement, contextualized policy implementation, and adaptive management approaches in achieving effective and sustainable water governance. Addressing the identified challenges and adopting the proposed recommendations can contribute to equitable and resilient WRM worldwide. This SLR has some limitations. The articles included in this review are limited to 5 years only. Thus, there may be other elements that are not mentioned. In terms of the three variables mentioned, this paper does not examine how these elements are interrelated and influence each other. Future research should continue to explore emerging issues in water governance to inform evidence-based policies and practices for sustainable WRM. This effort will hopefully be the basis for designing an efficient service delivery system for the water supply in the near future.

AUTHOR CONTRIBUTIONS

R. N. R. A. rendered support in funding acquisition, supervision, project administration, conceptualization, methodology, and writing – review & editing. S. S. wrote the original draft, investigated the article, and rendered

support in data curation, and conducted a formal analysis. N. H. A. R. wrote the review & editing, conceptualized the article, developed the methodology, validated the date, and conducted the formal analysis. H. H. wrote the review and edited the article, conceptualized the article, validated the article, and conducted the formal analysis. R. K. Z. wrote the review and edited the article, conceptualized the article, validated the data, and conducted the formal analysis.

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DATA AVAILABILITY STATEMENT

All relevant data are included in the paper or its Supplementary Information.

CONFLICT OF INTEREST

The authors declare there is no conflict.

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