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REVIEWS

An Investigation of Simulation Research Trends in Asian Countries from 2006 to 2021 - A Bibliometric Review

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Abstract

In this bibliometric review, we have examined five English-language journals to investigate the distribution and characteristics of simulation-based research in Asia from 2006 to 2021. The handsearching method was used for accessing articles from online issues. Eight variables were extracted and the frequency of each variable within 2 time frames (2012−2016; 2016 to 2021) was quantified to compare the trends. The results depicted that a majority were research publications (86.4%) from Eastern and Western Asia, with intervention (66.1%) as the primary focus and mannequin (34.7%) as the major simulation modality. There was an equal representation of healthcare professionals (47.5%) and undergraduate students (44.1%) as participants and Nursing (40.7%) was the most targeted specialty. This study highlighted the paucity of published simulation research conducted in Asian countries and explored the most targeted characteristics and least explored areas of the existing research, thereby providing insights for future research in this context.

Keywords: Healthcare simulation, Asian, Bibliometric, Review

1. Introduction

The term 'simulation' is defined as "*the imitative representation of the functioning of one system or process by means of the functioning of another.*" [1] Simulation principles have been adopted from complex environments (e.g., military and aviation) to deliver skills training in a range of healthcare specialties such as intensive care, anaesthesia, and surgical care [2]. In healthcare education, the diverse spectrum of simulation ranges from the simple imitation of isolated body parts to complex human interactions portrayed by simulated patients or high-fidelity patient simulators representing whole body appearance and variable physiological parameters [3]. In developed countries, the growing emphasis on improving patient safety and evidence supporting the use of simulation in the healthcare industry has resulted in the transition of medical training from a didactic approach towards simulation-based training [4]. This scale of growth in the field is demonstrated by the significant increase in healthcare simulation-based research [5]. Previous reviews depict a general increase in the volume of publications related to simulation per year, in addition to the establishment of dedicated simulation journals to publish advances in research and practice [6−8].

Despite this growth, developing and low-resource countries report challenges in implementing simulation into mainstream use, partly due to the

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perceived misconceptions regarding cost-effectiveness [9,10] and challenges regarding its consistency and validity [10]. This is reflected by disparities in relation to publications in developing regions; for example, a recent publication on the most cited papers in simulation-based research found that 96% of articles originated from America and Europe, and none were conducted in Asia [6]. Further, a recent review of authorship in healthcare simulation journals found that first and senior authors were most frequently affiliated with North American institutions (64.3% and 67.1%) and European institutions (24.1% and 21.8%), with few affiliated with Asian institutions (3.4% and 2.9% respectively) [11]. This discrepancy is perhaps unsurprising, given that previous studies have found that medical education research in Asia fails to receive comparable attention as in developed countries [12]. This is discouraging for the implementation of simulation for healthcare education in Asia, considering the influence that evidence-based research has on educational policies and practices [12–14]. Furthermore, scholarly advancement and participation in scientific review and research activities are considered key indicators of success and productivity as such outputs influence healthcare practice [15].

Reviewing the publishing trends and content of the literature on healthcare simulation research conducted in Asia would provide insights into the past and present trends, thereby encouraging a prospective researcher in Asia to explore the possibilities and opportunities for advancing simulation research, and impact healthcare practice in a continent where sixty percent of the world's population lives. Further, examining this issue is timely, given that the onset of the COVID-19 pandemic resulted in limited patient interaction for training, and created a potential opportunity to gain momentum for the use of simulation in these low to middle-income countries (LMIC) [16,17].

Therefore, the aim of this study is to explore: (1) the publication trends over time, and; (2) the characteristics of healthcare simulation research in Asia by conducting a retrospective bibliometric review across English-language healthcare simulation journals. This will facilitate an overview of the current research and provide recommendations for future research in areas least explored within the Asian context. Moreover, the study intends to identify disparities in authorship representation in simulation research in LMIC and contribute to the existing literature by addressing questions such as: What are the potential causes for this discrepancy? What can be done to alleviate them? How does it impact the academic global health?

2. Methods

2.1. Study design

A bibliometric review is a systematic method used to examine data to provide valuable insights into both qualitative and quantitative research trends [18,19]. This approach will summarise the research area of interest and give insights to explore areas where further research is required. As there are no best practice guidelines for performing bibliometric reviews, this review was informed by the protocols employed in similar published bibliometric reviews [6,18,19].

2.2. Journal and study selection

All existing English-language dedicated healthcare simulation journals were considered for examination, of which there were seven. Two of these were excluded; 'Simulation and Gaming' as it was not deemed relevant to healthcare, and 'International Journal of Healthcare Simulation' which was only established in late 2021 and was in its early stages, with a limited number of volumes. Subsequently, the articles within the following retained journals were examined for inclusion:

1) Clinical Simulation in Nursing (established in 2006)
2) Simulation in Healthcare (established in 2006)
3) British Medical Journal Simulation & Technology Enhanced Learning (BMJ STEL) (established in 2018)
4) Advances in Simulation (established in 2016)
5) The Journal of Surgical Simulation (established in 2014)

Journals were examined from their first issue until the final issue of December 2021. Articles were accessed via the online issues of these journals using the hand-searching method, which is a methodical process of manually screening journal contents to identify relevant studies [20]. This method is commonly used in bibliometric reviews [6,18,19] and its efficacy is strongly justified [21].

2.3. Eligibility criteria

Articles from the first issue of each of the five journals up until the last issue of 2021 were examined for inclusion. The article was selected if it described a research study conducted in either a clinical or educational setting in an Asian country. Both original research studies (defined as any article using specified research methods and reporting on

original and empirical data) [6] and non-research papers (e.g., commentaries, editorials, and reviews) were included.

In line with similar reviews, suggesting that they do not provide novel contributions to simulation research [6,15], the following types of articles were excluded: book reviews; letters from society presidents; abstracts for conference or meeting presentations; errata, reprints, addendums or supplementary materials; lists of reviewers; continuing medical education exercises; articles focused on one individual's career or contribution to the field; and articles focused on a specific conference or meeting. Articles employing computational simulation and mathematical modelling were also excluded.

2.4. Data extraction and coding

The following data was extracted from the articles considered appropriate for inclusion: Type of Article; Year of Publication; Region of publishing country; Targeted participant group; Healthcare specialty of target participants; Simulation modality; Focus of article; and Targeted skill domain. Additional information on data extraction and coding procedures is presented in Table 1. If the data was not clear on examining the abstract of an article, then the full text was examined to obtain the relevant information. For comparison purposes, the number of total publications (i.e., both conducted in Asia and conducted elsewhere) within each journal issue was also noted. The data was stored on an Excel sheet during this process and listed under each category with the corresponding article title and hyperlink to the article pages.

2.5. Interrater agreement

The measurement of the extent to which the raters assign similar scores to the same variable is known as Interrater Reliability (IRR). To examine IRR, 13 articles (10%) fulfilling the inclusion criteria were analyzed independently by a second author. This data was then compared to the original extraction data. For each article, the variables provided eight opportunities to agree upon:

1. Publication year
2. Type of article
3. Country
4. Participants
5. Specialty
6. Simulation modality
7. Focus of the research, and,
8. Skill domain

Agreement was then calculated at 94.2%, which is considered sufficient [22]. Disagreements in coding were discussed and reviewed until consensus was obtained by the raters [23].

2.6. Statistical analysis

The extracted data was stored in a Microsoft Excel sheet and, coded and analyzed using SPSS software. The distribution of the number of studies conducted in Asia over time across all the journals was investigated using a chi-square test for trend [15]. A p value of <0.05 was considered significant. Descriptive statistics were used to describe the article characteristics, which were examined:

(a) overall (across all years) and,
(b) with the 'year of publication variable' collapsed into two categories for further insight:
   (1) 2012–2016
   (2) 2017–2021

3. Results

3.1. Overview

Of the 118 articles included in this bibliometric review, 40.7% were published in Clinical Simulation in Nursing (n = 48), followed by 32.2% in Simulation in Healthcare (n = 38) and 18.6% in BMJ STEL (n = 22). Fewer articles (4.2%) were published in Advances in Simulation and Journal of Surgical Simulation (n = 5).

1. Distribution of research conducted in Asian countries over time.

The included articles were published between 2012 and 2021 (see Fig. 1). Visual inspection suggested an increasing trend in the number of Asian articles published over time (e.g., two articles in 2012 as compared to 26 articles in 2021). However, considering the increase in the total number of articles published by the journals over time (see Fig. 2), the proportions of Asian articles relative to the total number of published articles were further inspected.

The number of 'non-Asian articles' was calculated for each year across all of the journals (total papers published - Asian papers). The percentage of Asian articles showed little change over time (4.4% in 2012 to 7.1% in 2021) as shown in Fig. 3.

Table 1. Summary of the variables and the coding terms.

Variable	Coding
Type of Article	• Research (original research) • Non-research (e.g., commentaries, editorials, reviews)
Region of publishing country (22)	• Central Asia ○ Tajikistan, Uzbekistan, Kazakhstan, Turkmenistan, and Kyrgyzstan • East Asia ○ China, Mongolia, North Korea, South Korea, Japan, Hong Kong, Taiwan, and Macau • South Asia ○ Sri Lanka, Bangladesh, India, Afghanistan, Pakistan, Bhutan, Nepal, Iran, and the Maldives • Southeast Asia ○ Brunei, Cambodia, Indonesia, Laos, Malaysia, Myanmar, Philippines, Singapore, Thailand, Timor Leste, and Vietnam. • Western Asia ○ Georgia, Armenia, Azerbaijan, Turkey, Cyprus, Syria, Lebanon, Israel, Palestine, Jordan, Iraq, Kuwait, Bahrain, Qatar, Saudi Arabia, United Arab Emirates, Oman, and Yemen.
Targeted participant group	• Undergraduate students • Healthcare professionals (Including Postgraduates) • Others (Community, Patients etc) • Multiple groups
Healthcare specialty of target participants	• Medical • Surgical • Nursing • Allied Healthcare • Interprofessional • Others
Simulation modality	• Manikin • Task trainer • VR (also includes computer based/AR etc) • Standardised/Simulated Patient (SP) • Various/not specified • Others
Focus of article	• Intervention • Tool development • User Evaluation • Curriculum development • Review Paper • Discussion Paper
Targeted skill domain	• Technical, (Communication, decision making etc) • Non-technical (Suturing, Chest Compressions etc) • Both

Moreover, there was no significant trend of increased Asian representation which was evident when a Chi-square for trend was performed ($p = 0.22$).

2. Characteristics of existing research

The summary of the characteristics of the existing research conducted in Asia overall (i.e., across all time periods) and categorized by (a) 2012–2016 and (b) 2017–2021 is depicted in Table 1.

a. Region in Asia

Overall, 45.8% of studies were conducted in the East Asian Region ($n = 54$). This was also evident in the period 2017–2021. However, the majority of articles in 2012–2016 were conducted in Western Asia (33.3%) [24].

b. Type of article

A majority (86.4%) of the total publications consisted of research papers ($n = 102$). This pattern was consistent across both time periods (81.5% and 87.9% respectively).

c. Focus of the article

Overall, interventions were the focus of most of the articles ($n = 78$; 66.1%), with few focusing on tool development ($n = 4$, 3.4%) or consisting of reviews ($n = 2$; 1.7%). This was also consistent across the two time periods (see Table 2).

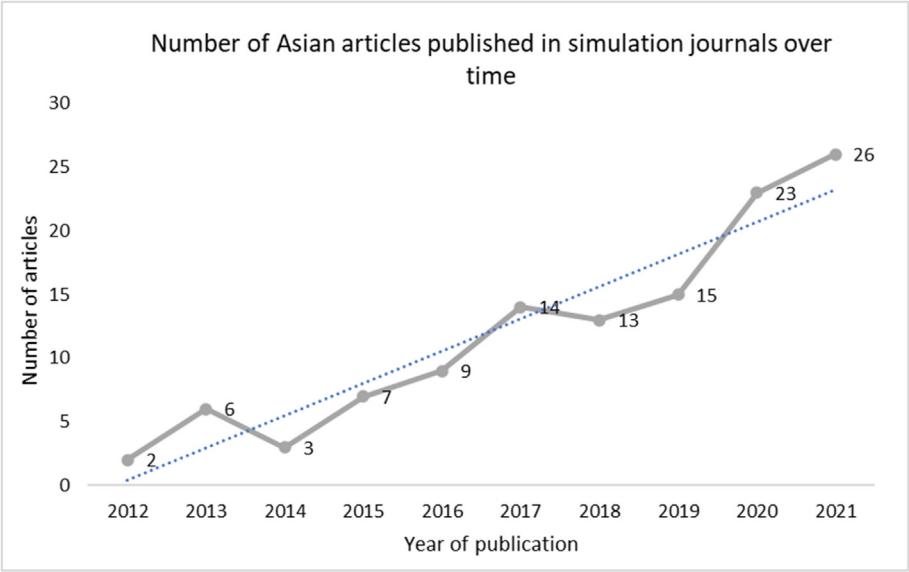

Fig. 1. Number of Asian articles published in simulation journals over time.

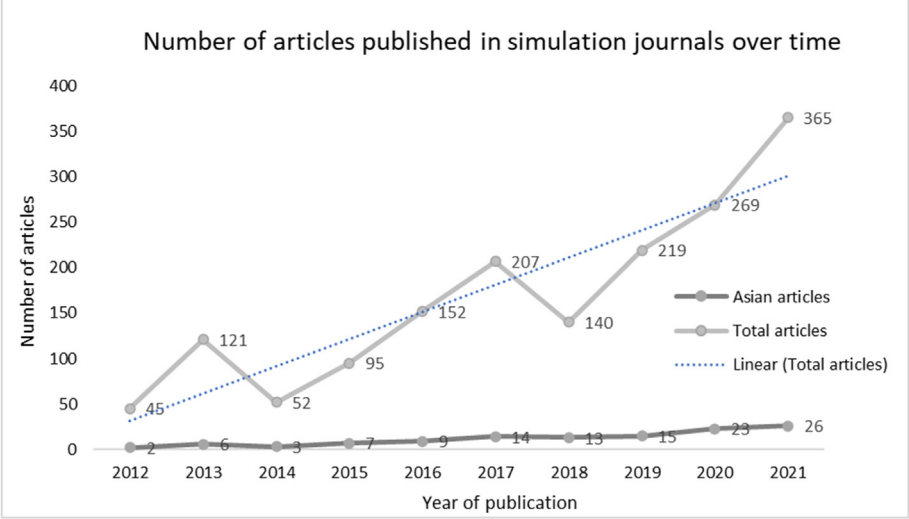

Fig. 2. Number of articles published in simulation journals over time.

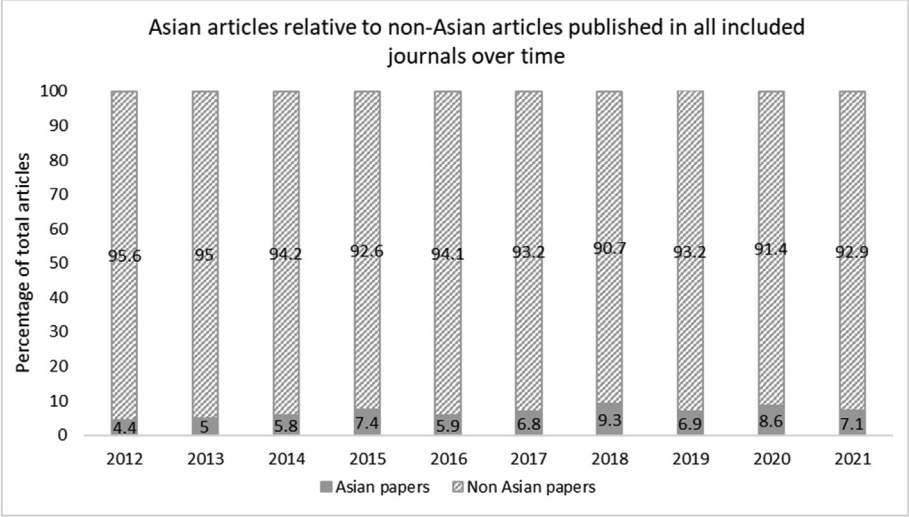

Fig. 3. Asian articles relative to Non-Asian articles published in all included journals over time.

Table 2. Summary of the characteristics of the existing research from Asia overall, and divided by time period.

Characteristic	Total overall n (%)	2012–2016 n (%)	2017–2021 n (%)
Region in Asia			
East Asia	54 (45.8%)	9 (33.3%)	45 (49.5%)
Western Asia	35 (29.7%)	12 (44.4%)	23 (25.3%)
Southeast Asia	19 (16.1%)	5 (18.5%)	14 (15.4%)
South Asia	10 (8.5%)	1 (3.7%)	9 (9.9%)
Central Asia	–	–	
Type of Article			
Research	102 (86.4%)	22 (81.5%)	80 (87.9%)
Non-research	16 (13.6%)	5 (18.5%)	11 (12.2%)
Focus of Article			
Intervention	78 (66.1%)	17 (63%)	61 (67%)
User evaluation	19 (16.1%)	5 (18.5%)	14 (15.4%)
Curriculum development	8 (6.8%)	2 (7.4%)	6 (6.6%)
Discussion paper	7 (5.9%)	2 (7.4%)	5 (5.5%)
Tool development	4 (3.4%)	–	4 (4.4%)
Review paper	2 (1.7%)	1 (3.7%)	1 (1.1%)
Target Participants			
Healthcare professionals	56 (47.5%)	13 (48.1%)	43 (47.3%)
Undergraduate students	52 (44.1%)	12 (44.4%)	40 (44%)
Others	6 (5.1%)	–	6 (6.6%)
Multiple groups	4 (3.4%)	2 (7.4%)	2 (2.25%)
Target Specialty			
Nursing	48 (40.7%)	12 (44.4%)	36 (39.6%)
Medical	28 (23.7%)	7 (25.9%)	21 (23.1%)
Interprofessional	23 (19.5%)	4 (14.8%)	19 (20.9%)
Surgical	11 (9.3%)	3 (11.1%)	8 (8.8%)
Allied healthcare	2 (1.7%)	1 (3.7%)	1 (1.1%)
Others	6 (5.1%)	–	6 (6.6%)
Simulation Modality			
Manikin	41 (34.7%)	8 (29.6%)	33 (36.3%)
Various/not specified	23 (19.5%)	9 (33.3%)	14 (15.4%)
Standardised/Simulated Patient (SP)	18 (15.3%)	5 (18.5%)	13 (14.3%)
VR/AR	13 (11%)	–	13 (14.3%)
Task trainer	12 (10.2%)	5 (18.5%)	7 (7.7%)
Other	11 (9.3%)	–	11 (12.1%)
Skill Domain			
Non-technical	36 (30.5%)	4 (14.8%)	32 (35.2%)
Technical	22 (18.6%)	6 (22.2%)	16 (17.6%)
Both	60 (50.8%)	17 (63%)	43 (47.3%)

d. Participants

The target participants included both healthcare professionals (n = 56; 47.5%) and undergraduate students (n = 52; 44.1%) almost equally in most of the articles. A similar breakdown was evident across both time periods. Others (n = 6; 5.1%) included community members, patient bystanders, patients, etc.

e. Specialty

The majority of the publications focused on nursing (n = 48, 40.7%), while allied healthcare (n = 2, 1.7%) was the least targeted specialty. 'Others' included non healthcare participants such as bystanders, patients, etc. The target participants remained mostly unchanged across the two time periods, although interprofessional specialties were included more frequently in 2017–2021.

f. Simulation modality

The most commonly documented simulation modality was mannequins (n = 41, 34.7%) followed by 'various'. All of the articles utilizing VR/AR and 'other' (e.g. smartphone apps, mock MRI scanners, videos, etc.) were conducted in the 2017–2021 time period.

g. Skill domain

Most of the publications targeted a combination of both technical and non-technical domains of learning (n = 60, 50.8%), which was consistent across both time periods. Emphasis on non-

technical skills showed considerable growth from the first to the second time period (14.8%–35.2%).

4. Discussion

In the current study, the contents of five English-language journals were examined to investigate the distribution and characteristics of simulation-based research originating from Asian countries over time. To our knowledge, this bibliometric review is the first of its kind to do so.

Although initially there appeared to be a rise in the number of publications originating from Asian countries over time, there was also a relative rise in the total number of publications over the same period. Statistical comparison of the proportion of Asian articles with the proportion of non-Asian articles shows little change over time. This reiterates previous findings regarding the lack of published simulation research conducted in Asian countries [6,11]. Further, despite some of the included journals' establishment in 2006, the earliest publication eligible for inclusion in the current review was in 2012, indicating six consecutive years without any studies conducted in Asia being published in simulation-specific journals. This is highly problematic considering the impact that evidence-based research has on educational practice [12]. Scholarly output from these low to middle-income countries is crucial to sustaining the use of simulation in these regions and helping to overcome the challenges faced by these countries [25]. Therefore, there exists a need for future research to investigate and address the 'information poverty' in this resource-poor region. The data collected and presented in this review offers a wide range of opportunities to explore the facilitating and limiting factors for conducting research in Asian countries [26]. This could be achieved by investigating the barriers to publishing among Asian authors using qualitative (e.g. interview) methodology. This methodology would also facilitate scrutiny of the disparate spread of research conducted across various regions in Asia (e.g. the majority of the included articles described research conducted in Eastern and Western Asia, while research conducted in Southern and Central Asia was minimal).

The significant surge in simulation-related publications originating from Asia between 2020 and 2021 remains unexplored, yet it may be attributed to the pandemic, which has created opportunities to harness the potential of simulation in mitigating the impact of reduced clinical hours in developing countries. Additionally, there has also been an improvement in the readiness to handle COVID-19 situations, owing to the innovative methods employed to enable remote learning [17], thus providing researchers with more time to publish. Similar increasing trends of simulation research publications have been reported in the literature [6,19].

A number of the characteristics of the included articles remained largely unchanged over time, such as the focus of the articles, which consistently remained on interventions. This is comparable to previous literature, where there were no differences by journal and no apparent differences by time [11]. However, review articles were notably few, which is in contrast to Western literature, where reviews are the most cited type of simulation research article [6]. Reviews provide stakeholders with summaries of the existing evidence and are useful for informing decision-making about education policy and practice [12].

There was almost equal representation of healthcare professionals and students as target participants. This is a positive finding, as targeting healthcare professionals highlights the importance of continued professional development and training which directly impacts patient safety and quality of care [27]. In terms of the targeted specialty, a majority of the studies were focused on Nursing whereas most of the international literature for simulation education was intended for surgical specialties [6]. Few papers focused on Surgery in the current study, which is surprising given that simulation can be valuable in surgical education for skills development [28]. The infrequent inclusion of allied healthcare groups warrants further research as there is a growing emphasis on allied healthcare educational establishments in these regions [29].

Almost all simulation modalities were represented in the Asian articles with the overall majority documenting the use of mannequins and multiple modalities, which is comparable with the previously existing literature from non-Asian regions [6,19]. VR/AR is becoming more popular in the more recent time period, and this is likely a result of technological advances. 'Other' modalities are also becoming more popular in this time period. The growth in these innovations is also due to the widespread forced adoption of these modalities for the purpose of distance learning during the pandemic [30].

Overall, both technical and non-technical skills were most commonly combined in articles. However, across the two time periods, an increasing emphasis on non-technical skills such as communication and empathy was observed. This may have been due to an increased awareness of the

importance of non-technical skills especially in emergency and crisis scenarios and the realization that skills like task management, leadership, communication, situation monitoring, decision-making, etc are not inherent even though they are based on behavior, and therefore, must be formally taught [27].

The relatively recent emergence and growth of simulation practices in these regions is one of the contributing factors to the scarcity of Asian representation in simulation research [26,30]. A majority of scientific publications still stem from High-Income and Upper-Middle-Income Countries (HICs and UMICs, respectively) [31]. This could be due to various reasons. With most funding bodies based in HICs, more often than not, research agendas from these regions are prioritized with respect to funding acquisition. There is a paucity of academic grants and sponsorships in LMICs. This could be mitigated by establishing funding agencies to ensure research equality. Promoting fee waivers within open access journals for LMICs could also reduce the financial barrier [32].

In addition, the sociocultural and linguistic diversity in Asia indicates that English is frequently not the primary language. It has been found that Low English Proficiency (LEP) negatively impacts participation in research. In order to breach the linguistic barrier, innovative solutions are needed to devise language-appropriate surveys that target all populations. Publishers could offer editorial services or free copyediting services for writing manuscripts [33]. Implementation of community-based participatory research (CBPR) ensures active participation by individuals from every community [34].

There is a need to set up avenues that increase accessibility to the latest research resources in LMICs to facilitate publications in well-accepted journals. Moreover, educating Asian researchers regarding criteria to be listed as authors in academic studies and raising awareness on authorship issues in global health research should also be explored and applied to the Asian context [33,35].

There is a tendency for authors with multiple affiliations to selectively list only their non-LMIC institutions [30]. International journals could redefine authorship or the types of articles being published to promote inclusivity of local discussions in the broader international discourse to avoid implicit bias against authors from Asian countries, thus, recognizing and respecting the unique contributions and perspectives that they bring to the academic conversation. To address inequity in global health research practices due to power differences between researchers from HICs and LMICs, a double-blind peer review could be implemented. Lastly, the diversification of editorial boards and reviewers will help address the issue of racial disparity in the acceptance of journal articles and ensure fairness in the publication process with more transparency and accountability [36].

5. Strengths and limitations

This bibliometric review has reported data using an accepted method of research, involving a reproducible systematic process of hand-searching with clear inclusion criteria and an unbiased interrater agreement of validating the data [37,38]. The result of this search process from simulation-specific journals has yielded data that is innovative and pioneering and holds a strong scope for future research.

The main limitation of this study is the restricted inclusion of English-language journals, considering that a majority of Asian countries do not use English as their first language [6]. Further, the current study focused on healthcare simulation-specific journals, therefore simulation literature published in other healthcare journals (e.g., in the respective authors discipline-specific journals rather than simulation-specific journals) may have been missed. The majority of the included articles were published in Clinical Simulation in Nursing and Simulation in Healthcare, which were both established in 2006 as compared to other journals only recently established (e.g., BMJ STEL was established in 2018 and Advances in Simulation in 2016). These journals were considered important for inclusion as they are leading journals in the field.

Finally, inferential statistics was not performed for the second research question regarding 'characteristics of research.' Initially, the conduct of chi-square tests of association was planned to examine the distribution of the research characteristics over time across the journals, which would indicate whether a significant association between each characteristic and year category [33]. However, given the small number of included articles, many of the extraction categories contained low numbers (e.g., within 'Region', there was only one article from 'South Asia' in the 2012–2016 category). Chi-square requires no more than 20% of the expected counts to be less than 5 [39]. Therefore, a decision was made to report descriptive statistics (i.e., n, %) instead.

6. Future research

The data collected and presented in this review offers a wide range of opportunities to further

investigate the facilitating and limiting factors for conducting research in Asian countries [26]. There is a significant need to explore the perceptions of Asian academics to determine why Asian countries are lagging behind in Simulation-related research and publications. Scholarly output from these low to middle-income countries is crucial in sustaining the use of simulation in these regions and helping to overcome the challenges and barriers faced by these countries [25].

7. Conclusion

Healthcare simulation is rapidly gaining acceptance due to its role in patient safety and quality of care [27]. This bibliometric review shows that research from Asia in this area is lacking even though there is an increasing trend globally that needs to be addressed as scholarly outputs have an impact on educational practice and policy making [6,16]. This study has explored the characteristics of the existing simulation research in Asia and provides valuable information into the areas that were most targeted and other areas that were least explored. Hopefully, this review will serve as a guide to enable further research in this direction.

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Nil.

Ethical approval

Granted.

Other disclosure

None.

Conflict of interest

Nil.

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References

[1] Merriam Webster Dictionary. Definition of simulation. Available at: https://www.merriam-webster.com/dictionary/simulation. Accessed July 17, 2022.
[2] Aebersold M. The history of simulation and its impact on the future. AACN Adv Crit Care 2016;27(1):56–61.
[3] Bradley P. The history of simulation in medical education and possible future directions. Med Educ 2006;40(3):254–62.
[4] Okuda Y, Bryson EO, DeMaria S, Jacobson L, Quinones J, Shen B, et al. The utility of simulation in medical education: what is the evidence? Mt Sinai J Med 2009;76(4):330–43.
[5] McGaghie WC, Issenberg SB, Petrusa ER, Scalese RJ. A critical review of simulation-based medical education research: 2003-2009. Med Educ 2010;44(1):50–63.
[6] Walsh C, Lydon S, Byrne D, Madden C, Fox S, O'Connor P. The 100 most cited articles on healthcare simulation. Simulat Healthc J Soc Med Simulat 2018;13(3):211–20.
[7] Cant RP, Cooper SJ. Bibliometric scan of the 100 most cited nursing simulation articles. Clin Simul Nurs 2019;36:1–7.
[8] Issenberg SB, McGaghie WC, Petrusa ER, Lee Gordon D, Scalese RJ. Features and uses of high-fidelity medical simulations that lead to effective learning: a BEME systematic review. Med Teach 2005;27(1):10–28.
[9] Andreatta P. Healthcare simulation in resource-limited regions and global health applications. Simulat Healthc J Soc Med Simulat 2017;12(3):135–8.
[10] Rosen KR. The history of medical simulation. J Crit Care 2008;23(2):157–66.
[11] Lydon S, Madden C, De Bhulbh Á, Maher S, Byrne D, O'Connor P. Do gender-based disparities in authorship and editorship exist in healthcare simulation journals? A bibliometric review of the research. Simulat Healthc J Soc Med Simulat 2021;16(2):136–41.
[12] Majumder MA. Issues and priorities of medical education research in Asia. Ann Acad Med Singapore 2004;33(2):257–63.
[13] Tutarel O. Geographical distribution of publications in the field of medical education. BMC Med Educ 2002;30(2):3.
[14] Horton R. North and South: bridging the information gap. Lancet 2000;355(9222):2231–6.
[15] Madden C, O'Malley R, O'Connor P, O'Dowd E, Byrne D, Lydon S. Gender in authorship and editorship in medical education journals: a bibliometric review. Med Educ 2021;55:678–88.
[16] Dedeilia A, Sotiropoulos M, Hanrahan J, Janga D, Dedeilias P, Sideris M. Medical and surgical education challenges and innovations in the COVID-19 era: a systematic review. In Vivo 2020;34(3 Suppl):1603–11.
[17] Tabatabai S. COVID-19 impact and virtual medical education. J Adv Med Educ Prof 2020;8(3):140–3.
[18] Hallinger Philip, Wang Ray, Chatpinyakoop Chatchai, Nguyen Vien-Thong, Nguyen Uyen-Phuong. A bibliometric review of research on simulations and serious games used in educating for sustainability, 1997–2019. J Clean Prod 2020;256:120358.
[19] An investigation of research trends in healthcare simulation journals-A bibliometric review: masters thesis in healthcare simulation and patient safety NUIG.
[20] Lefebvre C, Glanville J, Briscoe S, Littlewood A, Marshall C, Metzendorf M-I, et al. Searching for and selecting studies. Cochrane Handbook for Systematic Reviews of Interventions version 6.2. In: Higgins JPT, Thomas J, Chandler J, Cumpston M, Li T, Page MJ, et al., editors. Cochrane handbook for systematic reviews of interventions version 6.2. Cochrane; 2022. Available from: www.training.cochrane.org/handbook.
[21] Geaney F, Scutaru C, Kelly C, Glynn RW, Perry IJ. (2015) Type 2 diabetes research yield, 1951-2012: bibliometrics analysis and density-equalizing mapping. PLoS One 2015;10(7):e0133009.
[22] McHugh ML. Interrater reliability: the kappa statistic. Biochem Med 2012;22(3):276–82.
[23] Graneheim UH, Lundman B. Qualitative content analysis in nursing research: concepts, procedures and measures to achieve trustworthiness. Nurse Educ Today 2004;24(2):105–12.
[24] World Atlas. Five regions of Asia. Available at: https://www.worldatlas.com/articles/the-four-regions-of-asia.html. Accessed July 17, 2022.
[25] Gheza F, Oginni FO, Crivellaro S, Masrur MA, Adisa AO. Affordable laparoscopic camera system (ALCS) designed for low- and middle-income countries: a feasibility study. World J Surg 2018;42(11):3501–7.
[26] Yin Mar OO, Nataraja RM. The application of simulation-based medical education in low- and middle-income

countries; the Myanmar experience. Semin Pediatr Surg 2020;29(2):150910.
[27] Naik VN, Brien SE. Review article: simulation: a means to address and improve patient safety. Can J Anaesth 2013; 60(2):192–200.
[28] Pietersen PI, Bjerrum F, Tolsgaard MG, Konge L, Andersen SAW. Standard setting in simulation-based training of surgical procedures: a systematic review. Ann Surg 2022;275(5):872–82.
[29] Subedi S. A review paper on "current status of allied health courses in south East Asia region (WHO)". Health Prospect 2012;10:95–7.
[30] Kassutto SM, Baston C, Clancy C. Virtual, augmented, and alternate reality in medical education: socially distanced but fully immersed. ATS Sch 2021;2(4):651–64.
[31] Ghani M, Hurrell R, Verceles AC, McCurdy MT, Papali A. Geographic, subject, and authorship trends among LMIC-based scientific publications in high-impact global health and general medicine journals: a 30-month bibliometric analysis. J Epidemiol Glob Health 2021;11(1):92–7.
[32] Young J, Chen R, Choi S, Hayes IB, Bain PA, May C. Evaluation of low- and middle-income country authorship in the global orthopaedic literature. J Am Acad Orthop Surg Glob Res Rev 2023;7:e22.00168.
[33] Pingray V, Ortega V, Yaya S, Belizán JM. Authorship in studies conducted in low-and-middle income countries and published by Reproductive Health: advancing equitable global health research collaborations. Reprod Health 2020; 17(1):18.
[34] Yom S, Lor M. Advancing health disparities research: the need to include asian American subgroup populations. J Racial Ethn Health Disparities 2022;9(6):2248–82.
[35] Smith E, Hunt M, Master Z. Authorship ethics in global health research partnerships between researchers from low or middle income countries and high income countries. BMC Med Ethics 2014;15:42.
[36] Karvonen KL, Bonachea EM, Burris HH, Fraiman YS, Lee HC, Proaño A, et al. Addressing bias and knowledge gaps regarding race and ethnicity in neonatology manuscript review. J Perinatol 2022;42(11):1546–9.
[37] van Raan A. The use of bibliometric analysis in research performance assessment and monitoring of interdisciplinary scientific developments. TATuP 2003;12(1):20–9.
[38] Cronin B. Bibliometrics and beyond: some thoughts on web-based citation analysis. J Inf Sci 2001;27(1):1–7.
[39] Field A. Discovering statistics using IBM SPSS statistics. 4th ed. SAGE Publications; 2013.