

REVIEW

Mapping COVID-19 related research from Vietnam: a scoping review

THI LOI DAO, MINH MANH TO, THE DIEP NGUYEN, VAN THUAN HOANG
Thai Binh University of Medicine and Pharmacy, Thai Binh, Vietnam

Key words

COVID-19 • SARS-CoV-2 • Coronavirus • Pandemic • Vietnam • Scoping review

Summary

Introduction. *The situation of COVID-19 pandemic is becoming more complex. The research institutes should focus on the most important challenge related to this outbreak at the national level. We aim to realize this scoping review to map publications on COVID-19 in Vietnam in order to guide research priorities and policies in the country.*

Methods. *This study was conducted at the Thai Binh University of Medicine and Pharmacy, from May to August 2020, according to the guidance for conducting systematic scoping review.*

Results. *A total of 72 studies met the inclusion criteria. The most frequent publications were original articles (27.8%), followed by letter to editor/correspondence (26.4%). According to the research priorities for COVID-19 set by the WHO, 41.7% studies*

focused on control and prevention of COVID-19, but none of studies on personal protective equipment or protocol for healthcare workers' safety were conducted. 12.5% studies carried out a thorough investigation into epidemiology of the COVID-19 pandemic in Vietnam. Virology and genomics, natural history of the virus and its transmission in Vietnam were described by 18.1% papers. Only one study was conducted in terms of development for candidate therapeutics.

Conclusion. *We call for national investigation on treatment against SARS-CoV-2 and protocol for medical staff protection. The government and academic institutions should work in collaboration with international stakeholders, including the WHO, to combat together the COVID-19.*

Introduction

In December 2020, the first case of an emerging respiratory infectious disease (COVID-19) due to a novel coronavirus, named SARS-CoV-2 was reported in Wuhan, China [1]. This outbreak is highly contagious with the reproduction number R_0 of SARS-CoV-2 which is estimated up to 3.5 [2-4]. In addition, this can be transmitted directly between humans via droplet, close contact with infected persons and indirect contact with contaminated surfaces or objects [1]. The outbreak has quickly spread out of China and affected the whole world. The World Health Organization (WHO) declared that it was a Public Health Emergency of International Concern on January 30, 2020, and then a pandemic on March 11, 2020 [1]. At the time of writing, the COVID-19 pandemic has affected 213 countries worldwide with 767,346 deaths and 21,564,286 confirmed cases [5].

The situation of pandemic is becoming more complex, and it is increasingly difficult to control diseases in order to reduce both morbidity and mortality rate. The outbreak has overwhelmed most countries in the world, even in high-income countries with modern, advanced medical system. Vietnam is a neighboring country of China with an approximately 1500 km of common border; therefore, the country faces a high risk of a severe COVID-19 pandemic. In addition, Vietnam is middle-income country and has a population density of nearly 100 million people, so this raises more challenges in fighting the outbreak.

The COVID-19 pandemic broke out in Vietnam on January 23, 2020 with the two first cases [6]. As of August 15, 2020, The Ministry of Health (MOH) reported 950 confirmed cases (447 recovered) and 23 deaths [7]. The COVID-19 has caused a complex emergency. The lockdown has seriously affected the domestic economy and the morale as well as quality of life of its citizens. The academic institutions must be primarily responsible for investigating this pandemic from a holistic perspective, including the distribution of asymmetric severity, morbidity, mortality and spread among different geographical areas. Especially in the context of low- and middle-income countries with limited human and economic resources, it is needed to avoid duplication of research topics. However, the research institutes should focus on the most important challenge related to COVID-19 pandemic at the national level. We aim to realize this scoping review to map publications on COVID-19 in Vietnam in order to guide research priorities and policies in the country.

Methods

We realized our scoping review according to the guidance for conducting systematic scoping review proposed by Peters et al. [8]. Development and reporting were followed the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) extension for scoping reviews [9].

We mapped the literature by 5 key steps: i). we identified the research question, then ii). we identified the literature relevant to COVID-19 in Vietnam and iii). We selected only those studies; iv) the data from the articles, including population type, participation of foreign experts, multinational study, hospital affiliation, studied topics and research priorities for COVID-19 set by the WHO were thereafter collected and summarized; v). Finally, we reported the results. The study was conducted at the Thai Binh University of Medicine and Pharmacy, from May to August 2020.

This scoping review was guided by the following questions: “What type of research on COVID-19 was carried out by Vietnamese institutions? What aspects of this pandemic and its impact were investigated in Vietnam?”

The following databases were investigated in all relevant studies published on: PubMed (<http://www.ncbi.nlm.nih.gov/pubmed>), Web of Science (<http://webofknowledge.com>) and Google Scholar (<http://scholar.google.com/>). The most recent search was conducted on July 31, 2020. The topic search terms used for searching the databases were the following:

#1: “COVID-19” OR “COVID19” OR “SARS-CoV-2” OR “nCoV”

#2: “Vietnam” OR “Viet Nam”

#3: #1 AND #2

No language, type of article or date of publication restrictions were applied. Search criteria were developed to capture articles relevant to research regarding COVID-19 pandemic from Vietnamese institutions. The studies which were not conducted in Vietnam and/or not related to COVID-19 were excluded.

Duplicate citations were initially removed in Zotero. All studies related to COVID-19 which were realized in the Vietnamese institutions, and authored by a Vietnamese researcher or a non-Vietnamese researcher were eligible for inclusion. Published and accepted articles in press that were already published online, or preprints were also included.

Two researchers (TLD and VTH) independently performed the screening of the articles. Any discordant result was resolved by agreement. In case of dispute, a third reviewer (MMT or TDN) was consulted for the decision. Reference lists of selected articles were screened to identify studies that might have been missing from the research. After the abstracts had been screened, the full texts of the articles were assessed for eligibility by the same two researchers and selected or rejected for inclusion in the systematic review.

Included publications were abstracted and summarized in Microsoft Excel 2016 using the following items: title, authors, name of the Vietnamese institutions involved in the study, time of publication (month and year), type of study (Original article, review, short communication, letter to editor/correspondence, perspective, commentary, editorial, preprint), studied topics, national or collaborative international, name of the countries in case of multinational studies and funding.

Results

STUDY RESEARCH

The initial search provided 256 papers. Of which 161 duplicate were deleted. After being screened by authors, 23 records were excluded because they did not meet the eligibility following criteria: research not conducted in Vietnam (19) and research not related to COVID-19 but mentioned COVID-19 in their abstract or in the text (4). Finally, 72 studies met the inclusion criteria [6, 10-80]. Figure 1 shows the research strategy according to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) flow diagram.

CHARACTERISTICS OF INCLUDED STUDIES

Table I shows the characteristics of the included papers. The most frequent publications were original articles (20/72, 27.8%), followed by letter to editor/correspondence (19/72, 26.4%), preprints (12/72, 16.7%) and short communication (6/72, 8.3%). Two studies were published early February 2020 on the first cases of COVID-19 in Vietnam. Six, 18, 20, 22 and 4 papers were published from March to August 2020, respectively. The majority of the studies (43/72, 59.7%) were conducted in collaboration with scientists from other countries but only 4 (5.6%) were multinational research. A total of 13/72 (18.1%) studies were affiliated by the authors of hospitals.

The funding was declared in 39 studies (54.2%) with 19 research (26.4%) were funded. Regarding the funding of selected studies, 11 studies were funded by non-government organizations and 8 received a governmental funding.

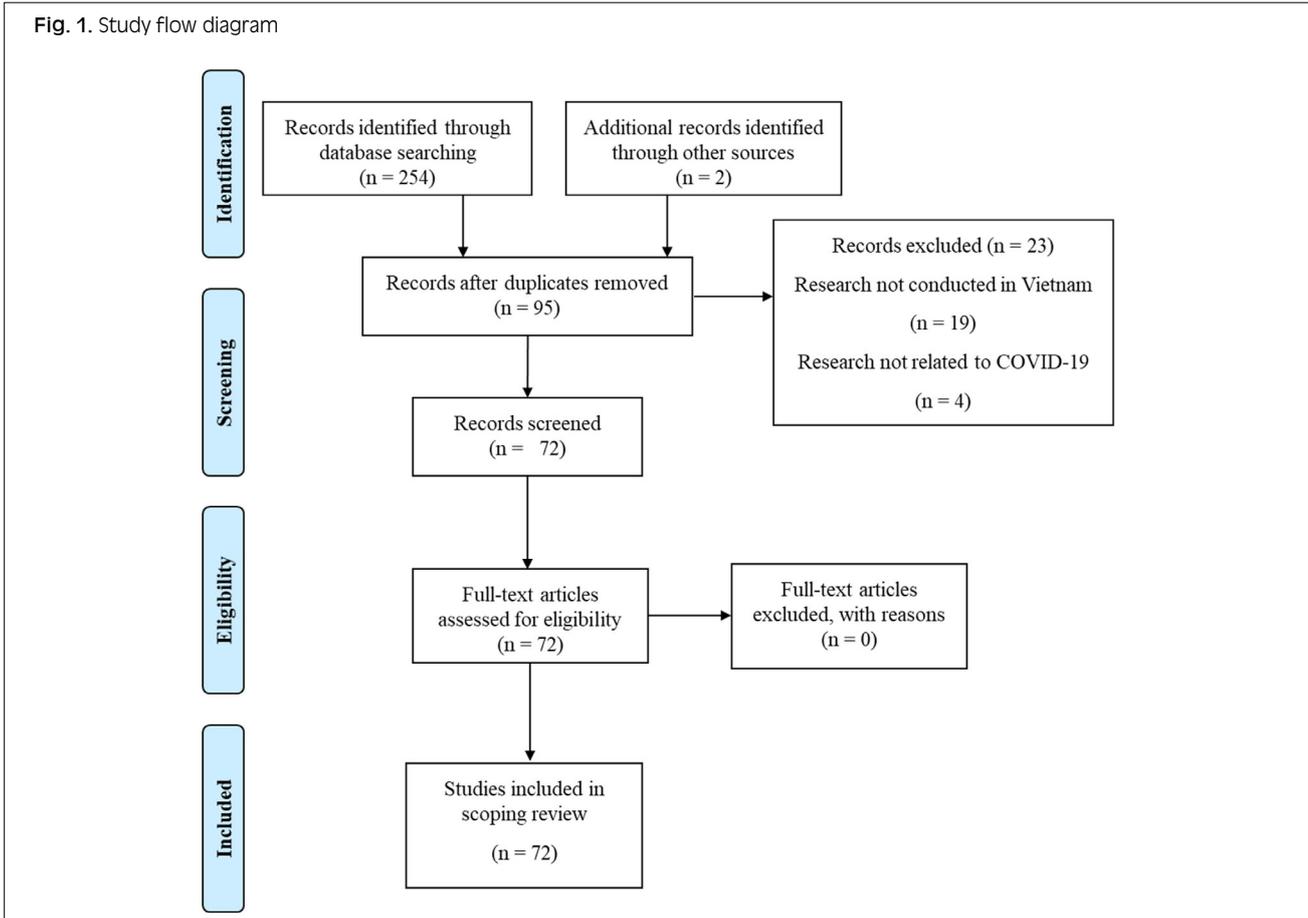
RESEARCH PRIORITIES

According to the research priorities for COVID-19 set by the WHO [81], a total of 30/72 (41.7%) studies focused on control and prevention of COVID-19 but no study on personal protective equipment or protocol for healthcare worker safe was conducted. Nine (12.5%) studies carried out a thorough investigation into epidemiology of the COVID-19 pandemic in Vietnam. Thirteen (18.1%) studied the virology and genomics, natural history of the virus and its transmission in Vietnam. The clinicopathological features of COVID-19 were described by 8 papers (11.1%). Two studies (one original article and one review) concentrated on the treatment of SARS-CoV-2 (Tab. II).

Discussion

Until now, Vietnam has reported three waves of COVID-19 outbreaks. After each wave, the pandemic is increasingly completed, and the new cases are on the increase [7]. Particularly, in the third outbreak which started on July 26, 2020, the rate of spread of this disease is higher than before. A total of 476 autochthonous cases within 3 weeks were recorded (50.1% of all cumulative

Fig. 1. Study flow diagram



cases in the country from nearly 7 months), including medical staff. Furthermore, 23 deaths were recorded in this time [7]. Especially, the source of infection in the community has not been determined. Studies on epidemiology, transmission, preventive measures, and treatment strategies are essential to reduce morbidity and mortality of COVID-19. Especially in poor countries, with limited financial capacity, it is necessary to identify priority studies according to each period of pandemic in the national level.

Our review is useful in the actual context of COVID-19 in Vietnam for fund allocation from the government to support health care and related research. We identified 72 articles, including 12 preprints conducting on the COVID-19 pandemic in the country. Unfortunately, the current published research on COVID-19 in Vietnam seems to be discordant from the epidemic research priorities set by the WHO. This is possible that some of projects are still ongoing and have not been captured in this review, but the current publications do not provide a strong preparation for the country to neither adequately tackle the pandemic nor to accumulate experience for prevention of other outbreaks in the future. The research gap related to COVID-19 identified by the WHO are: i) natural history of SARS-CoV-2, its transmission and diagnosis; ii) animal and environmental research on the origin of the virus; iii) epidemiological studies; iv) clinical characterization

and management of COVID-19; v) infection prevention and control, including health care workers protection; vi) research and development for candidate vaccines and treatment; vii) ethical considerations for research; and viii) integration of social sciences into the outbreak response [81]. These points should be utilized for focusing the topic and planning future research steps in Vietnam.

Most of the included studies in this scoping review were letter to editor and focused on control and prevention aspect. It is important because multiple effective measures have been applied to fight the COVID-19 pandemic in Vietnam such as: early lockdown, a strong political commitment and prompt actions with a multi-sectoral response plan, blanket media coverage of COVID-19 prevention, intensive surveillance, case management and large-scale health quarantine not only for patients, but also for persons in close contact with cases [10-24]. But these articles were narrative and described on experiences and reported views and experimental studies remain limited. Moreover, since the SARS-CoV-2 virus is highly contagious [2-4], safety for all healthcare workers must be ensured to protect themselves and to prevent nosocomial transmission. In fact, several medical staff in Vietnamese health facilities such as Bach Mai and Da Nang hospitals were infected by SARS-CoV-2 [7]. Isolation of infected health workers and colleagues

Tab. I. General characteristics of 72 included papers.

Characteristics	Number of papers	Percentage
Publication type		
Original article	20	27.8
Letter to editor/ correspondence	19	26.4
Short communication	6	8.3
Review	5	6.9
Perspective	3	4.2
Case report	1	1.4
Commentary	1	1.4
Editorial	1	1.4
Viewpoints	2	2.8
Preprints	12	16.7
Other	2	2.8
Participation of foreign experts	43	59.7
Multinational study	4	5.6
Hospital affiliation	13	18.1
Studied topics		
Clinicopathologic	8	11.1
Control and prevention	30	41.7
Economic impact	7	9.7
Epidemiology	9	12.5
Health impact	3	4.2
Medical management	5	6.9
Social impact	3	4.2
Treatment	2	2.8
Virology and genome	11	15.3

who have contact with them aggravates the overload of medical human resources. Therefore, research on personal protective equipment, protocol for its safety and the implementation of designated hospital units for COVID-19 patients are essential [82]. But in Vietnam, research on this field is scarce.

Thirteen included studies in this review investigated the COVID-19 epidemiology in Vietnam, but epidemiological studies focused on viral transmission or health resources utilization remained lacking. We also find that there is a lack of experimental studies and large multicentral, clinical trials inspecting treatment modalities of COVID-19. Only one original article focused on new treatment options. This can be explained

by the poor participation of hospitals, especially central and provincial hospitals, in research.

The funding was declared in 39 studies. Of which, only 8 were Vietnamese government founders, while the remaining funding was raised by non-government organizations. Furthermore, despite the participation of foreign experts in 43 research, only 4 multinational studies were conducted. The government and academic institutions should work in collaboration with international stakeholders, including the WHO, to combat together the COVID-19.

This review has some limitations. We have screened the published papers only on PubMed, Web of Science and Google scholar. Ongoing research projects have not been captured. Finally, we have so far focused on only COVID-19-related studies in Vietnam. But this work shows the gap in research on COVID-19 of the country. It is the first step toward contributing to the development of a national research agenda. It helps government make decisions about prioritizing and allocating resources. We call for national investigation that takes emerging epidemics along with other public health priorities into consideration. In addition, we recommend establishing national capacity and encourage the investment in national companies for laboratory research materials. Furthermore, we strongly encourage hospitals and health facilities to get involved in therapeutic research strategies of SARS-CoV-2. Moreover, leading national universities must conduct projects to come up with solutions in the public health crisis, and provide guidance for the government based on the most scientific evidence. A COVID-19 national research framework with specific research projects should be thoroughly discussed to address critical gaps identified through this scoping review. This can be achieved through a partnership between the government, the Ministry of Health, and researchers in collaboration with WHO and international partners.

Acknowledgements

We thank to medical staff of Thai Binh University of Medicine and Pharmacy, Thai Binh, Vietnam for their support in data collection.

Tab. II. Research priorities for COVID-19 in Vietnam.

Research priorities for COVID-19 set by the WHO	Number of included studies	Percentage
Natural history of the virus, its transmission and diagnosis	13	18.1
Animal and environmental research on the origin of the virus, including management measures at the human-animal interface	0	0
Epidemiological studies	9	12.5
Clinical characterization and management of disease caused by the virus	8	11.1
Infection prevention and control, including best ways to protect health care workers	30	41.7
Research and development for candidate therapeutics and vaccines	1	1.4
Ethical considerations for research	0	0
Integration of social sciences into the outbreak response	15	20.8

Conflict of interest statement

The authors declare that they have no conflict of interest.

Funding

No funding.

Authors' contributions

Thi Loi Dao: Conceptualization, methodology, validation, formal analysis, investigation, resources, data curation, writing – original draft. Minh Manh To: Validation, formal analysis, investigation, resources, data curation, writing – review and editing. The Diep Nguyen: Validation, formal analysis, investigation, resources, data curation, writing – review and editing. Van Thuan Hoang: Conceptualization, methodology, validation, formal analysis, investigation, resources, data curation, writing – review and editing, visualization, supervision, coordination.

References

- [1] World Health Organization. Rolling updates on coronavirus disease (COVID-19). 2020. <https://www.who.int/emergencies/diseases/novel-coronavirus-2019/events-as-they-happen>
- [2] Ribas RM, de Campos PA, de Brito CS, Cavalcanti Dantas RC. 2021 Olympic Games Tokyo: Safety Issues and Protection against COVID-19 Transmission. *J Glob Insect Dis* 2020;12:114-5. https://doi.org/10.4103/jgid.jgid_88_20
- [3] Musa SS, Zhao S, Wang MH, Habib AG, Mustapha UT, He D. Estimation of exponential growth rate and basic reproduction number of the coronavirus disease 2019 (COVID-19) in Africa. *Infect Dis Poverty* 2020;9:96. <https://doi.org/10.1186/s40249-020-00718-y>
- [4] Nabil B, Sabrina B, Abdelhakim B. Transmission route and introduction of pandemic SARS-CoV-2 between China, Italy, and Spain. *J Med Virol* 2020;10.1002/jmv.26333. <https://doi.org/10.1002/jmv.26333>
- [5] Worldometer. COVID-19 Coronavirus Pandemic. <https://www.worldometers.info/coronavirus/>
- [6] Phan LT, Nguyen TV, Luong QC, Nguyen TV, Nguyen HT, Le HQ, Nguyen TT, Cao TM, Pham QD. Importation and Human-to-Human Transmission of a Novel Coronavirus in Vietnam. *N Engl J Med* 2020;382:872-4. <https://doi.org/10.1056/NEJMc2001272>
- [7] Ministry of Health. General information for quick response of national steering committee for epidemic COVID-19 prevention. Available at: <https://ncov.vncdc.gov.vn/>
- [8] Peters MDJ, Godfrey CM, Khalil H, McInerney P, Parker D, Soares CB. Guidance for conducting systematic scoping reviews. *JBIM Evidence Implementation* 2015;13:141-6. <https://doi.org/10.1097/XEB.0000000000000050>
- [9] Tricco AC, Lillie E, Zarin W, O'Brien KK, Colquhoun H, Levac D, Moher D, Peters MDJ, Horsley T, Weeks L, Hempel S, Akl EA, Chang C, McGowan J, Stewart L, Hartling L, Aldcroft A, Wilson MG, Garrity C, Lewin S, Godfrey CM, Macdonald MT, Langlois EV, Soares-Weiser K, Moriarty J, Clifford T, Tunçalp Ö, Straus SE. PRISMA Extension for Scoping Reviews (PRISMA-ScR): Checklist and Explanation. *Ann Intern Med* 2018;169:467-3. <https://doi.org/10.7326/M18-0850>
- [10] Duong DM, Le VT, Ha BTT. Controlling the COVID-19 Pandemic in Vietnam: Lessons From a Limited Resource Country. *Asia Pac J Public Health* 2020;32:161-2. <https://doi.org/10.1177/1010539520927290>
- [11] Dinh L, Dinh P, Nguyen PDM, Nguyen DHN, Hoang T. Vietnam's response to COVID-19: prompt and proactive actions. *J Travel Med* 2020;27:taaa047. <https://doi.org/10.1093/jtm/taaa047>
- [12] Ivic S. Vietnam's Response to the COVID-19 Outbreak. *Asian Bioeth Rev* 2020;12: 341-7. <https://doi.org/10.1007/s41649-020-00134-2>
- [13] Van Nguyen H, Van Hoang M, Dao ATM, Nguyen HL, Van Nguyen T, Nguyen PT, Khuong LQ, Le PM, Gilmour S. An adaptive model of health system organization and responses helped Vietnam to successfully halt the COVID-19 pandemic: What lessons can be learned from a resource-constrained country. *Int J Health Plann Manage* 2020;10.1002/hpm.3004. <https://doi.org/10.1002/hpm.3004>
- [14] Ha BTT, Ngoc Quang L, Mirzoev T, Tai NT, Thai PQ, Dinh PC. Combating the COVID-19 Epidemic: Experiences from Vietnam. *Int J Environ Res Public Health* 2020;17:3125. <https://doi.org/10.3390/ijerph17093125>
- [15] Dao TL, Nguyen TD, Hoang VT. Controlling the COVID-19 pandemic: Useful lessons from Vietnam. *Travel Med Infect Dis* 2020;37:101822. <https://doi.org/10.1016/j.tmaid.2020.101822>
- [16] Tran BX, Dang AK, Thai PK, Le HT, Le XTT, Do TTT, Nguyen TH, Pham HQ, Phan HT, Vu GT, Phung DT, Nghiem SH, Nguyen TH, Tran TD, Do KN, Truong DV, Vu GV, Latkin CA, Ho RCM, Ho CSH. Coverage of Health Information by Different Sources in Communities: Implication for COVID-19 Epidemic Response. *Int J Environ Res Public Health* 2020;17:3577. <https://doi.org/10.3390/ijerph17103577>
- [17] Duc NM, Ha HD, Tuan TA, Bang MTL, Duc PH, Thong PM. From First COVID-19 Case to Current Outbreak: A Vietnamese Report. *Electron J Gen Med* 2020;17:em208. <https://doi.org/10.29333/ejgm/7867>
- [18] Nguyen TA, Nguyen QC, Le ATK, Nguyen HN, Nguyen TTH. Modelling the impact of control measures against the COVID-19 pandemic in Viet Nam. *medRxiv* 2020.04.24.20078030. <https://doi.org/10.1101/2020.04.24.20078030>
- [19] La V-P, Pham T-H, Ho M-T, Nguyen M-H, P Nguyen K-L, Vuong T-T, Nguyen HKT, Tran T, Khuc Q ; Ho MT, Vuong QH. Policy response, social media and science journalism for the sustainability of the public health system amid the COVID-19 outbreak: The vietnam lessons. *Sustainability* 2020;12:2931. <https://doi.org/10.3390/su12072931>
- [20] Van Thang T, Nguyen NPT, Hoang TD, Tran VT, Vu CT, Siewe JN, Colebunders, R Dunneet M. Preventive behavior of Vietnamese people in response to the COVID-19 pandemic. *medRxiv* 2020.05.14.20102418. <https://doi.org/10.1101/2020.05.14.20102418>
- [21] Van Minh H. Proactive and Comprehensive Community Health Actions to Fight the COVID-19 Epidemic: Initial Lessons from Vietnam. *J Rural Health* 2020;10.1111/jrh.12430. <https://doi.org/10.1111/jrh.12430>
- [22] Nguyen THD, Vu DC. Summary of the COVID-19 outbreak in Vietnam - Lessons and suggestions. *Travel Med Infect Dis* 2020;101651. <https://doi.org/10.1016/j.tmaid.2020.101651>
- [23] Huynh TLD. The COVID-19 containment in Vietnam: What are we doing? *J Glob Health* 2020;10:010338. <https://doi.org/10.7189/jogh.10.010338>
- [24] Trevisan M, Le LC, Le AV. The COVID-19 Pandemic: A View From Vietnam. *Am J Public Health* 2020;110:1152-3. <https://doi.org/10.2105/AJPH.2020.305751>
- [25] Nguyen TA, Cuong QN, Kim ALT, Huong TN, Nguyen HN, Fox GJ, Marks GB. Adapting a TB contact investigation strategy for COVID-19. *The International Journal of Tuberculosis and Lung Disease* 2020;24:548-50. <https://doi.org/10.5588/ijtld.20.0169>

- [26] Nguyen HG, Nguyen TV. An epidemiologic profile of COVID-19 patients in Vietnam. *medRxiv*. 2020. doi: <https://doi.org/10.1101/2020.04.10.20061226>
- [27] Tran DC. An open toolbox for generating map of actively confirmed SARS-CoV-2 or COVID-19 cases in Vietnam. *Bulletin of Electrical Engineering and Informatics* 2020;9:2396-3. <https://doi.org/10.11591/eei.v9i6.2621>
- [28] Valencia C, Quang L, Handcock M, Nguyen D, Doan Q, Nguyen TV, Le NH, Truong TL, Do H, Otsu S, Le T, Pham QD, Nguyen TV, Lan PT, Le LV. Asymptomatic and Presymptomatic Transmission of 2019 Novel Coronavirus (COVID-19) Infection: An Estimation from a Cluster of Confirmed Cases in Ho Chi Minh City, Vietnam. 2020. Available at SSRN: <https://ssrn.com/abstract=3630119>
- [29] Tran BX, Nguyen HT, Pham HQ, Le HT, Vu GT, Latkin CA, Ho CSH, Ho RCM. Capacity of local authority and community on epidemic response in Vietnam: Implication for COVID-19 preparedness. *Safety Science* 2020;130:104867. <https://doi.org/10.1016/j.ssci.2020.104867>
- [30] Tran BX, Vu GT, Latkin CA, Pham HQ, Phan HT, Le HT, Ho RCM. Characterize health and economic vulnerabilities of workers to control the emergence of COVID-19 in an industrial zone in Vietnam. *Safety Science* 2020;104811. <https://doi.org/10.1016/j.ssci.2020.104811>
- [31] Phan LT, Nguyen TV, Huynh LKT, Dao MH, Vo TAN, Vu NHP, Pham HTT, Nguyen HT, Nguyen TT, Le HQ, Nguyen TV, Nguyen QH, Huynh TP, Nguyen SN, Nguyen AH, Nguyen NT, Nguyen TNT, Nguyen LT, Luong QC, Cao TM, Pham QD. Clinical features, isolation, and complete genome sequence of severe acute respiratory syndrome coronavirus 2 from the first two patients in Vietnam. *J Med Virol* 2020;10.1002/jmv.26075. <https://doi.org/10.1002/jmv.26075>
- [32] Acosta M, Nestore M. Comparing public policy implementation in Taiwan and Vietnam in the early stages of the COVID-19 outbreak: a review. *SocArXiv* 2020. <https://doi.org/10.31235/osf.io/69hqx>
- [33] Ha TH, Ruano G, Lewis J. Comparison of epidemiological characteristics of COVID-19 patients in Vietnam. *medRxiv* 2020. <https://doi.org/10.1101/2020.06.03.20121467>
- [34] Vo TS, Vo TTTN, Vo TTBC. Coronavirus Infection Prevention by Wearing Masks. *Eurasian J Med* 2020;52:197-1. <https://doi.org/10.5152/eurasianjmed.2020.20056>
- [35] Tong PB, Lin LY, Tran TH. Coronaviruses pandemics: Can neutralizing antibodies help? *Life Sci* 2020;255:117836. <https://doi.org/10.1016/j.lfs.2020.117836>
- [36] Luong T. COVID-19 Dispatches from Ho Chi Minh City, Vietnam. *Anthropology Now* 2020;12:45-9. <https://doi.org/10.1080/19428200.2020.1761209>
- [37] Quach HL, Hoang NA. COVID-19 in Vietnam: A lesson of pre-preparation. *J Clin Virol* 2020;127:104379. <https://doi.org/10.1016/j.jcv.2020.104379>
- [38] Truong, Quang-Thai and Nguyen, Duc Nguyen and Tran, Quynh-Nhu and Al-Mohamad, Somar and Bakry, Walid, COVID-19 in Vietnam: What Happened in the Stock Market? (July 17, 2020). Available at SSRN: <https://ssrn.com/abstract=3654017>
- [39] Nguyen H, Nguyen A. COVID-19 misinformation and the social (media) amplification of risk: A Vietnamese perspective. *Media and Communication* 2020;8. <http://dx.doi.org/10.17645/mac.v8i2.3227>
- [40] Long NN, Khoi BH. COVID-19 Risk Perception and Food Hoarding Intention: Evidence from Vietnam. *Journal of Critical Reviews* 2020;7:1781-90. <https://doi.org/10.29333/ejmrste/8207>
- [41] Minh DNT, Huy TP, Hoang DN, Thieu MQ. COVID-19: Experience from Vietnam Medical Students. *International Journal of Medical Students* 2020;8:62-3. <https://doi.org/10.5195/ijms.2020.505>
- [42] Le HT, Nguyen DN, Beydoun AS, Le XTT, Nguyen TT, Pham QT, Ta NTK, Nguyen QT, Nguyen AN, Hoang MT, Vu LG, Tran BX, Latkin CA, Ho CSH, Ho RCM. Demand for Health Information on COVID-19 among Vietnamese. *Int J Environ Res Public Health* 2020;17:4377. <https://doi.org/10.3390/ijerph17124377>
- [43] Hoang VM, Hoang HH, Khuong QL, La NQ, Tran TTH. Describing the pattern of the COVID-19 epidemic in Vietnam. *Global health action* 2020;13:1776526. <https://doi.org/10.1080/16549716.2020.1776526>
- [44] Le VT, Nghiem MN, Bui TTT, Le TTU, Nguyen TTH, Nguyen TPD, Le NTN, Tran TT, Dinh NHM, Nguyen TP, Tran TH, Nguyen TT, Guy T, Nguyen VVC. Duration of viral detection in throat and rectum of a patient with COVID-19. *medRxiv* 2020.03.07.20032052. <https://doi.org/10.1101/2020.03.07.20032052>
- [45] Long Bui, Truong Nguyen Thanh, Ha Nguyen Ngoc. Early Estimation Of Reproduction Number of COVID-19 in Vietnam. *medRxiv* 2020.03.28.20046136. <https://doi.org/10.1101/2020.03.28.20046136>
- [46] Hoang VT, Pham TD, Dao TL, Nguyen DT, Dang VN, Dao TT, Nguyen VL, Dang QH, Do XC, Nguyen VT, Pham VD, Vu PT, Hoang NT, Gautret P, Nguyen DC. Epidemiological Characteristics of COVID-19 Patients in Vietnam and a Description of Disease Control and Prevention Measures in Thai Binh Province. <https://www.preprints.org/manuscript/202005.0197/v1>
- [47] Bui LV, Nguyen HT, Levine H, Nguyen H, Nguyen TA, Nguyen TP, Nguyen T, Do TTT, Tuan PN, Bui MH. Estimation of the incubation period of SARS-CoV-2 in Vietnam. *medRxiv* 2020. <https://www.medrxiv.org/content/10.1101/2020.05.09.20096800v1>
- [48] My TTA, Loan HTP, Hai NTT, Hieu LT, Hoa TT, Thuy BTP, Quang DT, Triet NT, Anh TTV, Dieu NTX, Trung NT, Hue NV, Tat PV, Tung VT, Nhung NTA. Evaluation of the Inhibitory Activities of COVID-19 of Melaleuca cajuputi Oil Using Docking Simulation. *ChemistrySelect* 2020;5:6312-20. <https://doi.org/10.1002/slct.202000822>
- [49] Thai PQ, Toan DTT, Son DT, Van HTH, Minh LN, Hung LX, Toan NV, Hoat LN, Luong DH, Khue LN, Khoa NT, Huong LT. Factors associated with the duration of hospitalisation among COVID-19 patients in Vietnam: A survival analysis. *Epidemiol Infect* 2020;148:e114. <https://doi.org/10.1017/S0950268820001259>
- [50] Nguyen HT, Do BN, Pham KM, Kim GB, Dam HTB, Nguyen TT, Nguyen TTP, Nguyen YH, Sørensen K, Pleasant A, Duong TV. Fear of COVID-19 Scale-Associations of Its Scores with Health Literacy and Health-Related Behaviors among Medical Students. *Int J Environ Res Public Health* 2020;17:4164. <https://doi.org/10.3390/ijerph17114164>
- [51] Thoi PT. Ho Chi Minh City- the front line against COVID-19 in Vietnam. *City Soc* 2020. <https://doi.org/10.1111/ciso.12284>
- [52] Nguyen THD, Vu DC. Impacts of the COVID-19 pandemic upon mental health: Perspectives from Vietnam. *Psychol Trauma* 2020;12:480-1. <https://doi.org/10.1037/tra0000694>
- [53] Tran PB, Hensing G, Wingfield T, Atkins S, Sidney Annerstedt K, Kazibwe J, Tomeny E, Biermann O, Thorpe J, Forse R, Lönnroth K. Income security during public health emergencies: the COVID-19 poverty trap in Vietnam. *BMJ Glob Health* 2020;5:e002504. <https://doi.org/10.1136/bmjgh-2020-002504>
- [54] Huynh G, Nguyen TNH, Vo KN, Vo VT, Pham LA. Knowledge and attitude toward COVID-19 among healthcare workers at District 2 Hospital, Ho Chi Minh City. *Asian Pacific Journal of Tropical Medicine* 2020;13:260. <https://doi.org/10.4103/1995-7645.280396>
- [55] Than HM, Nong VM, Nguyen CT, Thi Tran NH, Do CD, Pham TN. Management of mild cases of COVID-19 in low-resource countries: An experience in Vietnam. *J Microbiol Immunol In-*

- fect 2020:S1684-1182(20)30106-7. <https://doi.org/10.1016/j.jmii.2020.04.012>
- [56] Luong HT, Jardine M, Thomson N. Mobilizing the police from the top down as public health partners in combatting COVID-19: A perspective from Vietnam. *Journal of Community Safety and Well-Being* 2020;57-9. <https://doi.org/10.35502/jcswb.132>
- [57] Hoang MP, Kanjanaumporn J, Aejumjaturapat S, Chusakul S, Seresirikachorn K, Snidvongs K. Olfactory and gustatory dysfunctions in COVID-19 patients: A systematic review and meta-analysis. *Asian Pac J Allergy Immunol* 2020;38:162-9. <https://doi.org/10.12932/AP-210520-0853>
- [58] Nguyen HV, Tran HX, Huy LV, Nguyen XN, Thanh M, Nguyen N. Online Book Shopping in Vietnam: The Impact of the COVID-19 Pandemic Situation. *Publ Res Q* 2020. <https://doi.org/10.1007/s12109-020-09732-2>
- [59] Thanh HN, Van TN, Thu HNT, Van BN, Thanh BD, Thu HPT, Kieu ANT, Viet NN, Marks GB, Fox GJ, Nguyen TA. Outbreak investigation for COVID-19 in northern Vietnam. *Lancet Infect Dis* 2020;20:535-6. [https://doi.org/10.1016/S1473-3099\(20\)30159-6](https://doi.org/10.1016/S1473-3099(20)30159-6)
- [60] Nguyen HC, Nguyen MH, Do BN, Tran CQ, Nguyen TTP, Pham KM, Pham LV, Tran KV, Duong TT, Tran TV, Duong TH, Nguyen TT, Nguyen QH, Hoang TM, Nguyen KT, Pham TTM, Yang SH, Chao JC, Duong TV. People with Suspected COVID-19 Symptoms Were More Likely Depressed and Had Lower Health-Related Quality of Life: The Potential Benefit of Health Literacy. *J Clin Med* 2020;9:965. <https://doi.org/10.3390/jcm9040965>
- [61] Pham VH, Gargiulo Isacco C, Nguyen KCD, Le SH, Tran DK, Nguyen QV, Pham HT, Aityan S, Pham ST, Cantore S, Inchingolo AM, Inchingolo AD, Dipalma G, Ballini A, Inchingolo F. Rapid and sensitive diagnostic procedure for multiple detection of pandemic Coronaviridae family members SARS-CoV-2, SARS-CoV, MERS-CoV and HCoV: a translational research and cooperation between the Phan Chau Trinh University in Vietnam and University of Bari "Aldo Moro" in Italy. *Eur Rev Med Pharmacol Sci* 2020;24:7173-91. https://doi.org/10.26355/eurrev_202006_21713
- [62] Tran BX, Phan HT, Nguyen TPT, Hoang MT, Vu GT, Thi Lei H, Latkin CA, Ho CS, Ho RC. Reaching further by Village Health Collaborators: The informal health taskforce of Vietnam for COVID-19 responses. *J Glob Health* 2020;10:010354. <https://doi.org/10.7189/jogh.10.010354>
- [63] Van Tan L, Thi Thu Hong N, My Ngoc N, Tan Thanh T, Thanh Lam V, Anh Nguyet L, Nguyen Truc Nhu L, Thi Ha Ny N, Ngoc Quang Minh N, Nguyen Huy Man D, Thi Ty Hang V, Nguyen Quoc Khanh P, Chanh Xuan T, Thanh Phong N, Nguyen Hoang Tu T, Tinh Hien T, Manh Hung L, Thanh Truong N, Min Yen L, Thanh Dung N, Thwaites G, Van Vinh Chau N; for OUCRU COVID-19 research group. SARS-CoV-2 and co-infections detection in nasopharyngeal throat swabs of COVID-19 patients by metagenomics. *J Infect* 2020;81e175-e177. <https://doi.org/10.1016/j.jinf.2020.06.033>
- [64] Le TQM, Takemura T, Moi ML, Nabeshima T, Nguyen LKH, Hoang VMP, Ung THT, Le TT, Nguyen VS, Pham HQA, Duong TN, Nguyen HT, Ngu DN, Nguyen CK, Morita K, Hasebe F, Dang DA. Severe Acute Respiratory Syndrome Coronavirus 2 Shedding by Travelers, Vietnam, 2020. *Emerg Infect Dis* 2020;26:1624-6. <https://doi.org/10.3201/eid2607.200591>
- [65] Tung LT. Social Responses for Older People in COVID-19 Pandemic: Experience from Vietnam. *Journal of Gerontological Social Work* 2020;1-6. <https://doi.org/10.1080/01634372.2020.1773596>
- [66] Tran BX, Ha GH, Nguyen LH, Vu GT, Hoang MT, Le HT, Latkin CA, Ho CSH, Ho RCM. Studies of Novel Coronavirus Disease 19 (COVID-19) Pandemic: A Global Analysis of Literature. *Int J Environ Res Public Health* 2020;17:4095. <https://doi.org/10.3390/ijerph17114095>
- [67] Hoang MV, Nguyen PTN, Tran TTP, Khuong LQ, Dao ATM, Nguyen HV, Djalante R, Tran HTT. The COVID-19 pandemic in the ASEAN: A preliminary report on the spread, burden and medical capacities. *Asian Pac J Trop Med* 2020;13:247-51. <https://doi.org/10.4103/1995-7645.284644>
- [68] Huynh TL. The COVID-19 risk perception: A survey on socio-economics and media attention. *Econ Bull.* 2020;40:758-64. <https://doi.org/10.17632/wh9xk5mp9m.3>
- [69] Le HT, Nguyen LV, Tran DM, Do HT, Tran HT, Le YT, Phan PH. The first infant case of COVID-19 acquired from a secondary transmission in Vietnam. *Lancet Child Adolesc Health* 2020;4:405-6. [https://doi.org/10.1016/S2352-4642\(20\)30091-2](https://doi.org/10.1016/S2352-4642(20)30091-2)
- [70] Van Cuong L, Giang HTN, Linh LK, Shah J, Van Sy L, Hung TH, Reda A, Truong LN, Tien DX, Huy NT. The first Vietnamese case of COVID-19 acquired from China. *Lancet Infect Dis* 2020;20:408-9. [https://doi.org/10.1016/S1473-3099\(20\)30111-0](https://doi.org/10.1016/S1473-3099(20)30111-0)
- [71] Van Le Q, Ngo DQ, Tran TD, Ngo QX. The impact of COVID-19 pandemic on thyroid surgery in Vietnam. *Eur J Surg Oncol* 2020;S0748-7983(20)30649-1. <https://doi.org/doi:10.1016/j.ejso.2020.07.022>
- [72] Nguyen THD, Vu DC. The largest epicenter of the coronavirus outbreak in Vietnam. *Infect Control Hosp Epidemiol* 2020;41:984-5. <https://doi.org/10.1017/ice.2020.128>
- [73] Chau NVV, Thanh Lam V, Thanh Dung N, Yen LM, Minh NNQ, Hung LM, Ngoc NM, Dung NT, Man DNH, Nguyet LA, Nhat LTH, Nhu LNT, Ny NTH, Hong NTT, Kestelyn E, Dung NTP, Xuan TC, Hien TT, Thanh Phong N, Tu TNH, Gekskus RB, Thanh TT, Thanh Truong N, Binh NT, Thuong TC, Thwaites G, Tan LV; OUCRU COVID-19 research group. The natural history and transmission potential of asymptomatic SARS-CoV-2 infection. *Clin Infect Dis* 2020:ciaa711. <https://doi.org/10.1093/cid/ciaa711>
- [74] Tran BX, Hoang MT, Pham HQ, Hoang CL, Le HT, Latkin CA, Ho CS, Ho RC. The operational readiness capacities of the grassroots health system in responses to epidemics: Implications for COVID-19 control in Vietnam. *J Glob Health* 2020;10:011006. <https://doi.org/10.7189/jogh.10.011006>
- [75] Tran T, Hoang A-D, Nguyen Y-C, Nguyen L-C, Ta N-T, Pham Q-H, et al. Toward Sustainable Learning during School Suspension: Socioeconomic, Occupational Aspirations, and Learning Behavior of Vietnamese Students during COVID-19. *Sustainability* 2020;12:4195. <https://doi.org/10.3390/su12104195>
- [76] Long KQ, Hanh HH, Hanh TTT, Quang LN, Van Minh H. Treatment for COVID-19 patients in Vietnam: Analysis of time-to-recovery. *Asian Pacific Journal of Tropical Medicine* 2020;13. <https://doi.org/10.4103/1995-7645.289505>
- [77] Dang H-A, Giang L. Turning Vietnam's COVID-19 Success into Economic Recovery: A Job-Focused Analysis of Individual Assessments on Their Finance and the Economy. *GLO Discussion Paper, No. 566*. <http://hdl.handle.net/10419/218863>
- [78] Dreisbach JL. Vietnamese Public Health Practices in the Advent of the COVID-19 Pandemic: Lessons for Developing Countries. *Asia Pac J Public Health* 2020;32:163-164. <https://doi.org/10.1177/1010539520927266>
- [79] Le LT, Nguyen HT, Nguyen TH, Ho TT, Tran LH, Luu TT, Nguyen TNT, Huynh TKL, Pham DQ, Luong CQ, Cao MT, Nguyen VT, Hoang H, Chu HH, Phan TL, Truong NH. Whole-genome sequencing and de novo assembly of a 2019 novel coronavirus (sars-cov-2) strain isolated in vietnam. *BioRxiv* 2020. <https://doi.org/10.1101/2020.06.12.149377>

- [80] Lan F-Y, Wei C-F, Hsu Y-T, Christiani DC, Kales SN. Work-related COVID-19 transmission in six Asian countries/areas: A follow-up study. *PloS one* 2020;15:e0233588. <https://doi.org/10.1371/journal.pone.0233588>
- [81] World Health Organization. World experts and funders set priorities for COVID-19 research. <https://www.who.int/news-room/detail/12-02-2020-world-experts-and-funders-set-priorities-for-covid-19-research>
- [82] Zhan M, Anders RL, Lin B, Zhang M, Chen X. Lesson Learned from China Regarding Use of Personal Protective Equipment. *Am J Infect Control* 2020;S0196-6553(20)30771-9. <https://doi.org/10.1016/j.ajic.2020.08.00>

Received on December 1, 2021. Accepted January 13, 2022.

Correspondence: Van Thuan Hoang, Department of International Relations and Department of Family Medicine, Thai Binh University of Medicine and Pharmacy, 373 Ly Bon Street, Thai Binh city, 410000 Thai Binh province, Vietnam - E-mail: thuanytb36c@gmail.com - Tel.: 0084.227.38.38.545 Fax: 0084.227.38.47.509

How to cite this article: Dao TL, To MM, Nguyen TD, Hoang VT. Mapping COVID-19 related research from Vietnam: a scoping review. *J Prev Med Hyg* 2022;63:E166-E173. <https://doi.org/10.15167/2421-4248/jpmh2022.63.1.1720>

© Copyright by Pacini Editore Srl, Pisa, Italy

This is an open access article distributed in accordance with the CC-BY-NC-ND (Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International) license. The article can be used by giving appropriate credit and mentioning the license, but only for non-commercial purposes and only in the original version. For further information: <https://creativecommons.org/licenses/by-nc-nd/4.0/deed.en>