



# BMJ Open Behavioural and social drivers of COVID-19 vaccination in Vietnam: a scoping review

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## ABSTRACT

**Background** Understanding of the behavioural and social drivers (BeSD) of vaccination is key to addressing vaccine hesitancy and accessibility issues. Vietnam's national COVID-19 vaccination programme resulted in high uptake of primary doses among adults, but lower booster doses for adults and primary doses for 5–11 years. This scoping review assessed BeSD influencing COVID-19 vaccine uptake in Vietnam to design interventions on reaching the national vaccination targets.

**Method** We conducted a scoping review by searching PubMed, MedRxiv, LitCOVID, COVID-19 LOVE platform, WHO's COVID-19 research database and seven dominant Vietnamese language medical journals published in English or Vietnamese between 28 December 2019 and 28 November 2022. Data were narratively synthesised and summarised according to the four components of the WHO BeSD framework. The drivers were then mapped along the timeline of COVID-19 vaccine deployment and the evolution of the pandemic in Vietnam.

**Results** We identified 680 records, of which 39 met the inclusion criteria comprising 224 204 participants. Adults' intention to receive COVID-19 vaccines for themselves (23 studies) ranged from 58.0% to 98.1%. Parental intention to vaccinate their under 11-year-old children (six studies) ranged from 32.8% to 79.6%. Key drivers of vaccination uptake were perceived susceptibility and severity of disease, perceived vaccine benefits and safety, healthcare worker recommendation, and positive societal perception. Commonly reported COVID-19 vaccines' information sources (six studies) were social and mainstream media (82%–67%), television (72.7%–51.6%) and healthcare workers (47.5%–17.5%). Key drivers of COVID-19 uptake remained consistent for both adults and children despite changes in community transmission and vaccine deployment.

**Conclusion** Key enablers of vaccine uptake for adults and children included perceived disease severity, perceived vaccine benefits and safety and healthcare worker recommendations. Future studies should assess vaccine communication targeted to these drivers, national policies and political determinants to optimise vaccine uptake.

## INTRODUCTION

COVID-19 vaccines have been a key factor in reducing mortality and morbidity due to

## STRENGTHS AND LIMITATIONS OF THIS STUDY

- ⇒ This review comprehensively searches for articles published in English and local language and included grey literatures.
- ⇒ Findings guide local decision-making and campaign design to improve booster doses for adults and primary series for children.
- ⇒ The scoping review is limited to studies conducted in Vietnam.
- ⇒ A small number of evaluated the willingness of parents to vaccinate children aged 5 years and under.
- ⇒ A limitation is unexploration of political determinants.

COVID-19 infection globally.<sup>1–3</sup> COVID-19 vaccination was estimated to have prevented around 14.4 million deaths globally during the first year of vaccine administration.<sup>4</sup> However, concerns about vaccine safety and effectiveness have been a barrier to rapid and high uptake of COVID-19 vaccines in many countries.<sup>1 4 5</sup> Other factors that have been found to influence vaccine acceptance include lower health literacy and education, reduced access to healthcare services and social instability,<sup>6</sup> and social, cultural and religious factors.<sup>7</sup>

Vietnam is a populous Southeast Asian nation of 100 million people which experienced substantial challenges due to widespread community transmission that began in mid-2021. COVID-19 vaccines were introduced in Vietnam on 8 March 2021.<sup>8</sup> Due to a limited supply of COVID-19 vaccines, the country prioritised vaccines for nine groups that were considered at higher risk during the pandemic, including front-line health workers, people participating in the task force against COVID-19, and people aged 65 and above.<sup>9</sup> A mass vaccination campaign was implemented 4 months later prioritising vaccine allocation to provinces with high rates of COVID-19 transmission, key economic and industrial zones, and international border



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areas.<sup>10</sup> In addition, vaccination campaigns targeting pregnant women over 13 weeks gestation and children aged 12–17 years were rolled out in September and November 2021, respectively<sup>11 12</sup> and a further campaign targeting 5–11 years was implemented in April 2022.<sup>13</sup>

During the first year of vaccine distribution, the Vietnamese Government faced threefold challenges in increasing the vaccine uptake, namely a rapid growth in transmission of a highly infectious SARS-CoV-2 variant, a limited supply of vaccines and hesitancy among those eligible. Subsequently, Vietnam was slow to reach its national targets of vaccine coverage among adults (100% coverage of third dose by the second quarter of 2022) and experienced delays in reaching the national target of vaccinating two primary doses for 12–17 years (100%) by April 2022 and for 5–11 years (100%) by June 2022.<sup>14</sup> Despite vaccine hesitancy slowing down progress towards national COVID-19 vaccination targets in Vietnam, the country still managed to achieve high vaccine uptake among both adults and children by late 2022. As of 6 November 2022, a total of 262 307 909 doses had been administered in Vietnam, the coverage of the first and second doses were 91.7% and 86.0% of the total population aged 5 years, respectively.<sup>15</sup> The coverage rates were lower among children aged 5–11 years (first dose: 83.3%; second dose: 58.1%) compared with the national target of 100% coverage of primary doses for this age group.<sup>14 15</sup>

This scoping review was undertaken to assess behavioural and social drivers (BeSD) influencing COVID-19 vaccine uptake in Vietnam to design interventions on reaching the national targets. We aimed to map the published evidence regarding the BeSD of COVID-19 vaccine uptake in Vietnam and the patterns of change in these drivers during the timeline since the pandemic began.

## METHODS

### Protocol and registration

We conducted and reported this scoping review following the Preferred Reporting Items for Systemic Reviews and Meta-Analyses (PRISMA) extension for Scoping Reviews.<sup>16</sup>

### Search strategy and selection criteria

We searched five international databases (PubMed, MedRxiv, Lit COVID, COVID-19 LOVE platform and WHO's COVID-19 database) and seven dominant Vietnamese medical journals (online supplemental appendix 1). Medical Subject Headings (MeSH) terms and search terms drawn from the WHO BeSD framework of COVID-19 vaccine uptake were used.<sup>6</sup> Search strategies were agreed on among a group of experts working in the area of vaccinology and immunology. The WHO BeSD framework has four domains, namely: (1) thinking and feeling about vaccines, (2) social processes that drive or inhibit vaccination, (3) motivation or hesitancy to seek vaccination and (4) practical issues involved in seeking and receiving vaccination that all impact the uptake of vaccines.<sup>17</sup>

We combined MeSH and free terms of relevant concepts. For the English language search, the population included people living in Vietnam, including adults and children, older people, pregnant women, vaccine-hesitant populations, people with immunosuppressive disorders, people with comorbidities, people with chronic diseases, marginalised groups, vulnerable groups, foreigners and ethnic minorities. The intervention comprised any nationally licensed vaccine against COVID-19. The outcomes of interest included: (1) vaccine acceptance, refusal, delay and consent; (2) thinking and feeling: perceived disease risk, vaccine confidence, perceived benefits, safety, trust, attitudes, beliefs, knowledge and awareness; (3) social processes: social norms, health worker recommendations, gender equity and rumours; (4) motivation: intention, readiness, willingness and hesitancy and (5) practical issues: availability, convenience, cost, service quality, barriers and difficulties. We used simplified search terms on COVID-19 research databases (see online supplemental appendix 1 for all search details and results).

We conducted a simplified search for Vietnamese journals combining the terms of “Covid\*” and “vaccin\*”, on account of the more limited available search functions. We also searched the grey Vietnamese literature, including research reports, policy briefs and presentations, by contacting the project partners. In addition, we handsearched the reference lists of included articles after the full-text screening was complete (see online supplemental appendix 1 for all search details and results).

This scoping review included primary studies which used quantitative, qualitative or mixed-method approaches, and which reported on at least one of the four domains of the BeSD framework and were published or produced between 28 December 2019 and 28 November 2022 in English or Vietnamese. Press reports, articles with full texts that were not accessible, articles regarding non-COVID-19 vaccines and studies of Vietnamese populations resident outside of Vietnam, were excluded.

### Screening and data synthesis

We (LT and MN) screened the titles, abstracts and full-text articles. Duplicate titles were removed. A data extraction form was developed based on components of the BeSD model and the extracted information included: (1) study information, including study design, sample size, setting, time and population and (2) study findings related to the BeSD components. Data were subsequently categorised into four main themes and subthemes of the BeSD framework (online supplemental appendix 2). Finally, we mapped key drivers of COVID-19 vaccine uptake along the timeline of the COVID-19 vaccine deployment and the spread of the pandemic in Vietnam.

LT and TD independently completed data extraction. When consensus regarding selection of included studies or data extracted could not be achieved, a third reviewer (TAN) adjudicated. Data extraction and synthesis were managed and analysed using NVivo software and a spreadsheet using Microsoft Excel. Descriptive data were used to

present patient intention to be vaccinated and the confidence in vaccine benefits and safety. Data pooling was not attempted owing to heterogeneity between populations and data sources. A quality assessment of the included studies was not performed.

### Patient and public involvement

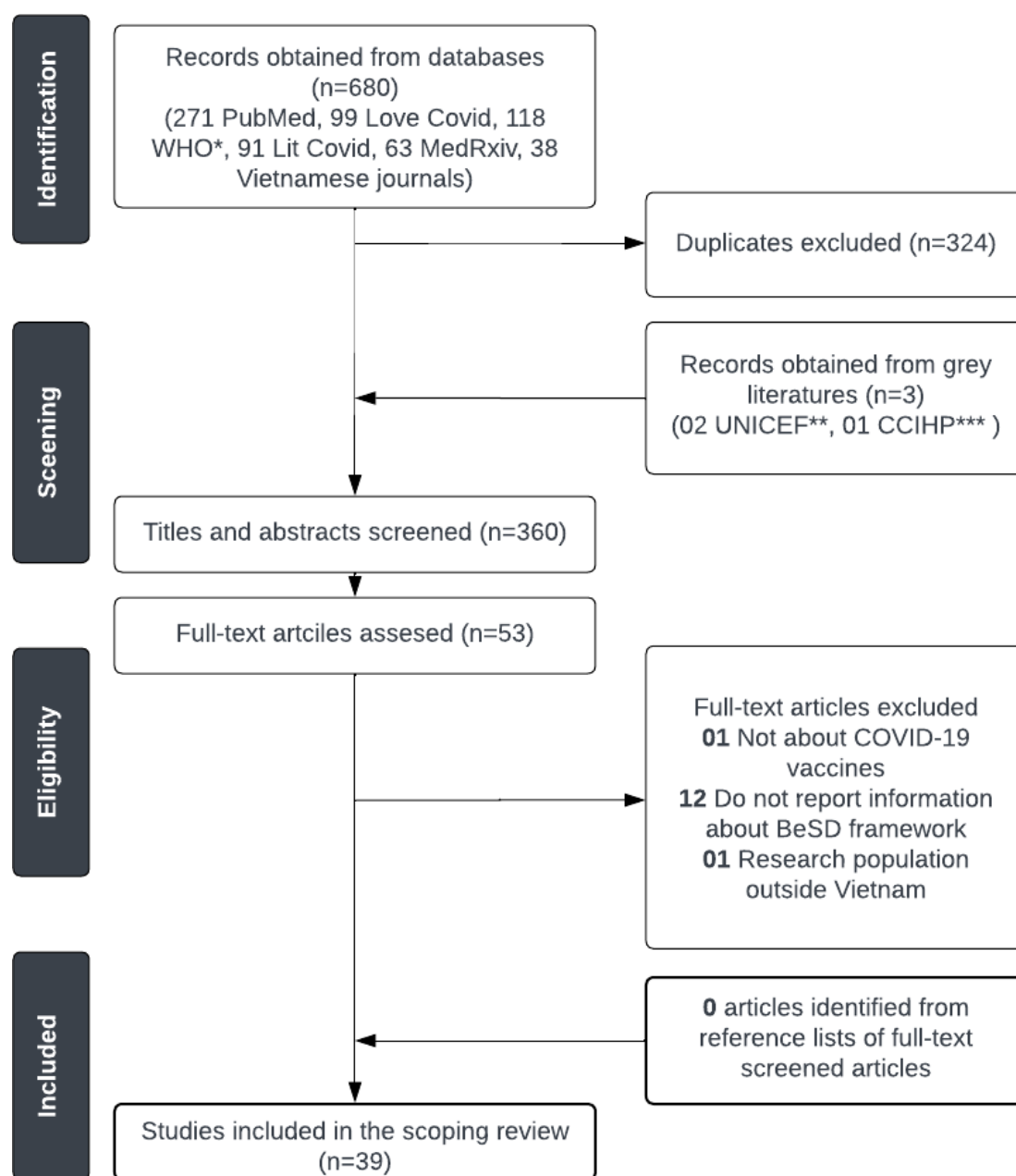
Neither patients nor the public were involved in this study.

### RESULTS

A total of 680 unique records were identified from 5 electronic databases and 7 Vietnamese medical journals. Three additional records were obtained from grey

literature. After excluding duplicates and screening titles and abstracts, we excluded 629 records, resulting in 53 records being eligible for full text screening. Of the full-text records assessed, 14 records were subsequently removed due to: no description of COVID-19 vaccines (n=1), no information or data regarding BeSD framework's domains reported (n=12) and population outside Vietnam (n=1), leaving a total of 39 articles and reports that met the inclusion criteria for the final analysis (figure 1).

The 39 included studies reported data collected from a total of 224204 participants within the general adult population, including pregnant women, healthcare



**Figure 1** PRISMA flow chart of search strategy and selection of studies for inclusion in the scoping review. \*COVID-19 research resource by WHO, \*\*The United Nations Children's Fund, \*\*\*Centre for Creative Initiatives in Health and Population. PRISMA, Preferred Reporting Items for Systemic Reviews and Meta-Analyses.

**Table 1** Characteristics of included studies (n=39)

	Number of studies n (%)
Languages of publication	
English	32 (82.1)
Vietnamese	7 (17.9)
Study participants, according to publication	
General adult population	18 (46.2)
Health workers	4 (10.2)
Health science students	6 (15.4)
Parents with children under 18	7 (17.9)
Pregnant women	1 (2.6)
Others	3 (7.7)
Studies reporting data related to the BeSD framework	
Thinking and feeling	38 (97.4)
Confidence in vaccine benefits and safety	37 (94.9)
Perceived risk-self	20 (51.3)
Trust in health workers or authorities	3 (7.7)
Social processes	18 (46.1)
Family and peer norms	7 (17.9)
Health worker recommendation	7 (17.9)
Social norm and prosocietal perception	11 (28.2)
Religious leader norms	1 (2.6)
Motivation	36 (92.3)
Intention to get vaccinated	34 (87.2)
Vaccine confidence brand	11 (28.2)
Practical issues	25 (64.1)
Affordability	25 (64.1)
Ease of access and locations to receive vaccines	11 (28.2)
The quality of services	1 (2.6)

BeSD, behavioural and social drivers.

workers, students and parents of children under 18 years. Seven studies were multicountry studies which included Vietnam. Thirty-eight (97.4%) of the included studies applied quantitative methods and one study applied qualitative methods. All studies were cross-sectional. A summary of key characteristics of the included studies is provided in [table 1](#).

[Table 2](#) references all the studies contributing relevant data to each BeSD domain and presents the key findings of a sample of the largest studies. Study characteristics and findings from other studies are presented in online supplemental appendix 2. A summary of key drivers to COVID-19 vaccine uptake is presented in [figure 2](#).

### Thinking and feeling

Of the 37 studies reporting information within the domain of thinking and feeling, all addressed the confidence in vaccine benefits and safety, 18 (46.2%) addressed the perception of COVID-19 risks and only 3 (7.7%) explored the trust in health workers. Study subjects generally had a

positive view of COVID-19 vaccine benefits and safety. The confidence in vaccine benefits and safety were measured differently in the studies, details can be found in online supplemental appendix 2. Of 19 studies reporting the confidence in the safety of vaccine, the degree of confidence was relatively high if vaccine recipients were adults (52%–98%, 12 studies) ([figure 3](#)),<sup>18–37</sup> less if recipients were children aged 5–11 years (51%–80%, 4 studies),<sup>38–41</sup> and significantly lower if recipients were children aged under 5 years (33% and 44%, 2 studies).<sup>42 43</sup> Slightly lower rates of confidence in vaccine safety compared with vaccine effectiveness were reported in each study.

Key drivers of COVID-19 vaccine uptake included (1) the positive perception of vaccine effectiveness leading to protection of individuals and communities or controlling the pandemic, (2) a perception of the safety of vaccines even with minor side effects, (3) perceived susceptibility and severity of COVID-19 and (4) perceived vaccine benefits outweighing adverse effects following immunisation



**Table 2** Key findings grouped according to the four themes of the BeSD model (n=39)

Source/data collection timeline	Targeted study population (Study respondents)	Key findings
Thinking and feeling (confidence in vaccine benefits and safety, <sup>18–55</sup> perceived risk-self, <sup>18 20–22 24 29–32 34 38 41–43 46 48 51–53</sup> trust in health workers or authorities <sup>18 24 35</sup> (n=37))		
UNICEF 2021 (Vietnam) A nationwide online survey on behavioural and social drivers of 38 506 participants. <sup>50</sup> January–February 2021	Adults (Adults)	Respondents expressed a medium to a very high level of confidence in the safety (61%) and protection of vaccines (98%). There was a high concern about serious adverse effects following immunisation (AEFI), the rate was higher among female participants compared with males (55% vs 39%). Most respondents (70%) trusted health staff or vaccine service providers.
Duong <i>et al</i> 2022 (Vietnam) A cross-sectional online study on 5357 parents with children aged 5 to 11 years. <sup>38</sup> February–March 2022	Children aged 5–11 (parents)	47.8% of the parents worried about infection and re-infection with COVID-19 among immunised children. Around two-thirds of parents were concerned about vaccine side effects. Sufficient knowledge about vaccine, herd immunity and perception of children's risk of COVID-19 infection were positively associated with parental acceptance of vaccinating their children.
Nguyen <i>et al</i> 2022 (Vietnam) A nationwide cross-sectional online study on 8602 parents with children aged 5 years and under. <sup>41</sup> April 2022	Children aged under 5 (parents)	Less than 50% of the parents perceived COVID-19 vaccines were effective and safe. Approximately 95% of the parents were concerned about the safety, the long-term effects of vaccine on children's health, AEFI, the effectiveness and origins of the vaccines regarding their decision of vaccination for their children.
Social processes ((family and peer norm, <sup>31 32 34 36 49 51 52</sup> social norm and decision autonomy, <sup>18 20–23 30–32 34 51</sup> health worker recommendation, <sup>20 25 26 30 31 34 49 55</sup> and religious leader norms <sup>49</sup> (n=17))		
Pham <i>et al</i> 2021 (Vietnam) A cross-sectional online study on 462 students. <sup>32</sup> April 2021	Adults (healthcare workers)	Mean scores of subject norms including influences from families and relatives, social pressure and influences from people who were important to participants (OR 2.9, 95% CI 1.25 to 6.68, p=0.02)* and cues to action including positive attitudes towards vaccines and society and health worker recommendation (3.0, 95% CI 1.19 to 7.65, 0.013) positively predicted the acceptance of COVID-19 vaccines.
Let <i>et al</i> 2021 (Vietnam) A nationwide cross-sectional survey among 17 176 teachers. <sup>23</sup> June 2021	Adults (teachers)	Health workers (72.4%), television (47.3%), online newspapers and the Internet (35.3%) and authorities (27.6%) were reported as the most trusted sources of information. While, the most popular sources of information were television (69.7%), the internet and online newspapers (68.4%), healthcare staff (47.5%) and friends and colleagues (35.5%).
Motivation (intention to get vaccinated, <sup>20–32 34–47 51–55 62</sup> vaccine confidence-brand <sup>19 37–43 53</sup> (n=34))		
Wong <i>et al</i> 2021 (17 countries) A global cross-sectional online survey of 19 714 respondents. <sup>37</sup> January–March 2021	Adults (adults)	88% of respondents were willing to accept COVID-19 vaccination. People who ever delayed or refused vaccination (weighted OR 3.14, 95% CI 2.65 to 3.27, <0.001) and those with the highest educational level of secondary school or lower presented higher odds of vaccine hesitancy (weighted OR 3.14, 95% CI 2.65 to 3.27, <0.001).
Nguyen <i>et al</i> 2022 (Vietnam) A nationwide cross-sectional study on 41 478 parents with children aged 5–11 years. <sup>39</sup> August–September 2021	Children aged 5–11 years (parents)	62.7% of respondents were willing to vaccinate their children. Parents were less likely to vaccinate the children if the latter suffered from a chronic health condition, were underweight and had a history of allergies. Parents who lived in remote areas, who were aged 40 and above, and male were significantly more likely to accept COVID-19 vaccination for their children.

Continued

Table 2 Continued

Source/data collection timeline	Targeted study population (Study respondents)	Key findings
Huynh <i>et al</i> 2021 (Vietnam) An online cross-sectional survey on 410 healthcare workers. <sup>21</sup> January–February 2021	Adults (healthcare workers)	76.1% of respondents were willing to get vaccinated. Vaccine acceptance was positively associated with perceived susceptibility and severity of COVID-19 (2.45, 95% CI 1.48 to 4.06, <0.05), perceived benefits of vaccination (4.36, 95% CI 2.35 to 8.09, <0.001), and cues to action (health worker recommendation and prosocial attitude) (5.49, 95% CI 2.84 to 10.61, <0.001).
Practical issues ((affordability, quality of services <sup>52</sup> (n=24))		ease to access and locations to receive vaccine, <sup>19 25 26 32 34 41–43 49 57</sup> the
Nguyen <i>et al</i> 2021 (Vietnam) A cross-sectional study among 651 pregnant women. <sup>29</sup> January–February 2021	Adults (pregnant women)	82.6% of the pregnant women were willing to pay for COVID-19 vaccines with the mean amount of willingness to pay of US\$15.2 (SD±27.4). Women who had children, earned higher income, perceived higher risks of COVID-19 infection and perceived risk to friends were more likely to accept and pay for COVID-19 vaccines.

\*Hereafter means (2.9, 95% CI 1.25 to 6.68, 0.02).  
BeSD, behavioural and social drivers.

(AEFI) ( $p<0.05$ ).<sup>20 22–24 30 32 33 44–47</sup> This was demonstrated in people with a good level of knowledge about the risk and severity of COVID-19 and the benefits of vaccination being 2.45 (95% CI 1.48 to 4.06, 0.001) and 4.36 (95% CI 2.35 to 8.09, <0.001) times more likely to accept vaccination ( $p<0.000$ ).<sup>21</sup> These determinants were identical between the three groups including general population, children aged 5–11 years and children under 5 years, but the extent of influence of these determinants on decision-making varied. For example, the level of concern about the safety and efficacy of vaccines was extremely high among parents with children under 5 years. More than 90% of parents (four studies) rated the safety of the vaccine and relevant characteristics as the most influential factor behind the decision on whether they would vaccinate their children.<sup>39 40 42 43</sup> This rate was lower if the recipients were members of the general population.<sup>30 31 37 48 49</sup> Reported outcomes that were relevant to the safety of vaccines included concerns regarding harmful long-term effects on children's health, the vaccine being perceived as unsafe due to a rapid development process, AEFI, insufficient information on the safety of vaccines given to children.<sup>39 40 42 43 50 51</sup> Reinfection after vaccination and

loss of protection after vaccination concerned the participants the most regarding vaccine efficacy. A misunderstanding of unnecessary vaccination after infection with SARS-CoV-2, waiting to observe others postvaccination and negative misinformation about vaccines on social and mainstream media were the main determinants holding back eligible groups from participating in primary or booster doses.<sup>52</sup> Duong *et al* commented that a postvaccination fatality case and descriptions of severe adverse events postimmunisation posted on social media could potentially lead to mistrust in vaccines previously established in the population.<sup>52</sup> Social media was one of the most popular sources of information over mainstream media, television, health workers, and families and friends. Some articles raised concerns that misleading information on social media might have a negative effect on an individual's willingness to take up the vaccine for them or their children.<sup>23 28 39 40 50 53</sup> Perceived risk from SARS-CoV-2 infection positively affected people's perception of the vaccine ( $\beta=0.49$ ,  $p<0.001$ ) and hesitancy ( $\beta=0.69$ ,  $p<0.001$ ), vaccine perception was negatively associated with vaccine hesitancy ( $\beta=-0.20$ ,  $p<0.001$ ). These studies showed that social media mediated the link between risk

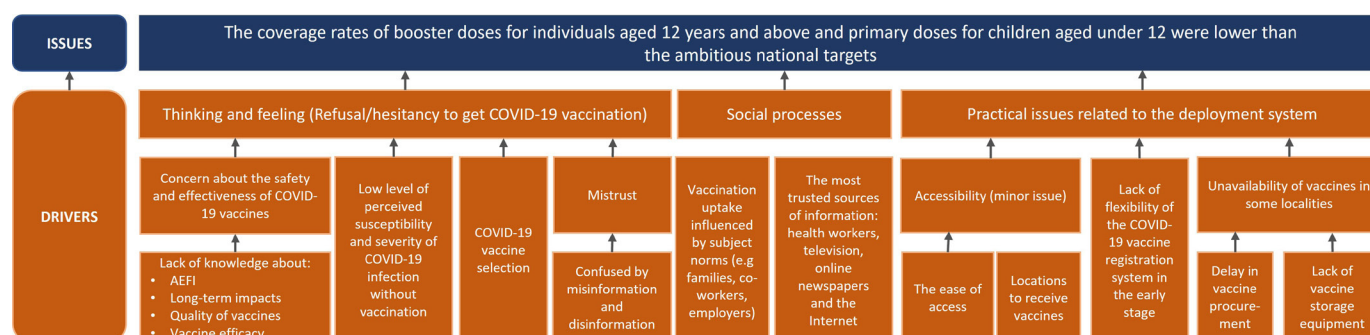
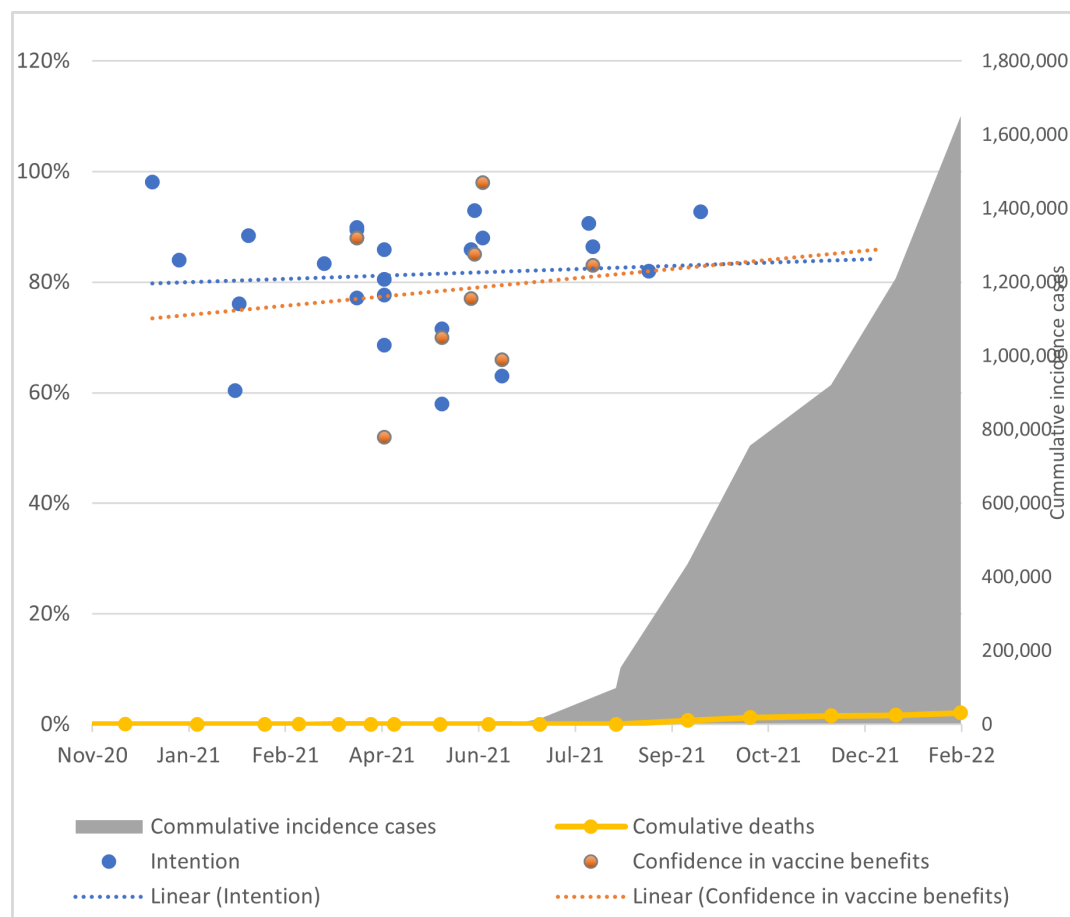


Figure 2 A summary of key social and behavioural drivers of COVID-19 uptake.



**Figure 3** Reported intention to get vaccinated and the confidence in vaccine benefits among adults along with the timeline of COVID-19 pandemic. The rates of adults' intention to vaccinate and their confidence in the benefits of vaccines were reported in the included studies. The cumulative incidence of COVID-19 cases reported during the study period was extracted from reports by the WHO (COVID-19 Vietnam Situation Report).

perception and vaccine hesitancy. The authors explained that the more information people accessed through social media, the more positive the perception of the COVID-19 vaccine they had.<sup>48</sup> The authors recommended the government should take control of misinformation and disinformation to gain the trust of people about vaccination against COVID-19.<sup>48 52</sup>

### Social processes

Eighteen (46.1%) studies reported on factors influencing vaccination uptake under the theme of social processes, 7 (17.9%) addressed drivers of subject norms and health worker recommendation, 11 (28.2%) addressed positive attitudes of vaccines and society and decision autonomy and 1 (2.6%) explored religious leader norms.

Most respondents could decide whether they would get vaccinated. The decision was influenced by subject norms such as families, coworkers and employers to a certain extent with mixed findings reported across studies. A national survey carried out by UNICEF estimated that 77% of the respondents believed they would decide to vaccinate without the input of others, while 18% reported that their decision could be affected by a spouse or partner (63%).<sup>50</sup>

There would be a greater chance for individuals to decide to receive vaccines if it was recommended by a health worker. Governmental entities and health workers were rated as the most trusted source of information about COVID-19 and vaccination in several studies. Following health workers, television, online newspapers and the internet, and authorities were the second, third and fourth trusted source of information reported by respondents.<sup>23 28 39 40 50 53</sup> The internet, television, health workers, and family and friends were the most popular sources of information.<sup>23 28 39 40 50 53</sup> Infographics on social media and web (30%), video clips (26%) and short videos on social media (20%) were considered as the most accessible materials, according to a survey conducted by UNICEF (n=38 506).<sup>50</sup> Duong *et al* estimated that the respondents would accept an invitation of vaccination if they were contacted by the government (89%), physicians (86%), pharmacists (45.5%), nurses (44.7%) and employers (42.4%).<sup>49</sup> The frequency dropped to 28% and 18% if the recommendation was given by a senior family member or a religious leader, respectively.<sup>49</sup> Positive attitudes towards vaccination and society such as promotion of public health or willingness to protect the

community were significant drivers to accepting vaccination.<sup>20</sup> One unit increase in 'cues to action'—a healthcare worker recommendation and a willingness to get vaccinated (5-point Likert scale) to promote public health, increased the odds of vaccination 3.2-fold (adjusted odds ratios (AOR) 3.2, 95% CI 1.7 to 5.8, <0.001).<sup>20</sup>

## Motivation

Regarding adults' intention to receive COVID-19 vaccines, 36 studies (92.3%) described participants' motivation to get vaccinated. Intention to receive an adult COVID-19 vaccine was reported in 23 studies and ranged from 58% to 98.1%.<sup>19–24 26–28 30–32 34–37 44 47 50 54</sup> We found a slightly upward trend in intention to receive the COVID-19 vaccine among adults between December 2020 and February 2022 (figure 2).

A few demographic factors were reported as positive predictors of an individual's intention to receive a COVID-19 vaccine dose including rural and mountainous residency,<sup>27 28</sup> being aged above 40 years,<sup>9 48</sup> having a reduced income due to the pandemic,<sup>34</sup> being a business owner<sup>34</sup> and having children.<sup>29</sup> The association between sex and marital status and COVID-19 vaccine uptake presented mixed findings—females,<sup>28</sup> males,<sup>23 27</sup> unmarried<sup>27</sup> and married.<sup>53</sup> These demographic variables did not vary over time. A large study among 17176 teachers in Vietnam reported that 88% of participants were willing to get vaccinated and 70.4% were willing to pay for it. The ORs of vaccination intention of teachers aged above 30 years were higher compared with those aged between 18 and 29 years: 30–39 years (1.65, 95% CI 1.41 to 1.93, <0.0001) and 40–49 years (1.96, 95% CI 1.67 to 2.29, <0.0001). Teachers who had a chronic health condition were 4.13 times (95% CI 2.67 to 6.37, <0.0001) less likely to accept vaccination.<sup>12</sup>

Parents' intention to vaccinate their children aged 5–11 years was between 56.6% and 79.6% (four studies).<sup>39–41 49</sup> A lower percentage (32.8% and 34.5%, two studies) of parents who had children aged 5 years and under reported they intended to vaccinate their child when the vaccine was made available to them.<sup>42 43</sup>

Concerning parents' intention to vaccinate their children, those with the highest educational accomplishment at high school, who regularly vaccinated their children with routine vaccines, who were aged above 40 years and single parents had higher odds of accepting COVID-19 vaccination. These factors were reported as significant predictors to COVID-19 vaccine intention in five studies with  $p < 0.05$ .<sup>39–41 45 49 50</sup> Children's demographic characteristics significantly predicted parents' hesitancy to vaccinate their children, with higher rates of hesitancy if the children had a history of allergies or severe AEFI from any vaccine, chronic diseases and past COVID-19 infection ( $p < 0.05$ ).<sup>38–42 55</sup> One example of this includes a large-scale national survey conducted among parents with children aged 5–11 years ( $n = 41\,478$ ) where it was found that the odds of parents living in rural and mountainous areas intending to vaccinate their children were 2.87

(95% CI 2.72 to 3.02, <0.0001) and 2.48 (95% CI 1.83 to 3.35, <0.0001) times higher, respectively, compared with parents living in urban areas.<sup>40</sup> A study surveyed 8602 parents with children aged under 5 years estimated that parents who completed tertiary or postgraduate education were less likely to vaccinate their children by 0.44 (95% CI 0.39 to 0.50, <0.0001) and 0.29 (95% CI 0.24 to 0.35, 0.0001) units. The odds regarding the likelihood of parents' intention were reduced by 0.67 (95% CI 0.38 to 0.53, <0.0001) and 0.40 (95% CI 0.54 to 0.85, 0.007) units if their children had a history of allergies and a chronic disease, respectively.<sup>42</sup>

Confidence in the brands of the vaccine was reported in 10 studies (25.6%) as a motivation for vaccine acceptance. Vaccines manufactured in the USA and Europe were preferred to those manufactured in other countries as they were perceived to be safer and more effective for both adults and children.<sup>27 53</sup> A large number of participants (71%–83%, three studies) were willing to accept a domestically produced vaccine<sup>28 41 53</sup> and 82% (one study) trusted its safety and effectiveness once the made-in-Vietnam vaccine was licensed to use.<sup>28</sup> Refusal to vaccinate due to the lack of availability of the preferred vaccines was not assessed in the studies.

## Practical issues

Twenty-five (64.1%) studies reported on practical issues influencing COVID-19 vaccination acceptance, all addressed the affordability of vaccines, 10 (25.6%) addressed the ease of access and locations to receive vaccines, and 1 (2.6%) reported on the quality of services.

The cost of vaccines to patients was not found to be a key barrier preventing an individual from getting vaccinated. Despite free vaccination being preferred, most respondents were willing to pay for vaccines, 69% and 82%, among the general population and pregnant women, respectively.<sup>23 29 56</sup> Several studies included the cost of vaccines to estimate a mean score of perceived barriers towards vaccination, average or lower mean scores were reported in most studies.<sup>20 22 23 30 32 51</sup> Despite not being a key driver, free vaccines were a positive contributor to the decision to take up a vaccination. In one study among 1470 respondents in Can Tho, Vietnam reported being willing to be immunised if the vaccine was freely available (82%) while the figure was only 59.7% if people had to pay for it.<sup>36</sup> Around 60% of participants reported fees could affect their willingness to get vaccinated,<sup>39 49</sup> while other studies reported a small percentage, between 10% and 17%. The cost of the vaccine appeared less important if the vaccination subjects were children.<sup>25 25 39 41</sup> However, the cost was an important determinant among minorities and those living in rural and mountainous areas.<sup>52</sup> The distance to vaccination sites and waiting time were not reported as significant hindrances to vaccination (one study).<sup>49</sup>



### The pattern of key BeSD of COVID-19 vaccination over time

Key BeSD of COVID-19 vaccine uptake remained stable during the timeline of high community transmission, before and after COVID-19 vaccines were officially deployed in Vietnam. These drivers included level of knowledge of COVID-19 and the vaccine, positive perception of vaccine benefits and safety, perceived susceptibility and severity of infection with COVID-19, recommendation by a health worker and prosocial attitudes such as vaccination to promote public health. The key factors behind vaccine hesitancy remained almost unchanged and included uncertainty regarding the safety and efficacy of vaccines, a perception of low risk with COVID-19, concerns regarding the potential impact vaccines have on health in the long term and waiting to observe reactions from those vaccinated. The degree of hesitancy was higher among parents of children aged 11 years and under. Family, peer and workplace norms influenced the decision to get vaccinated among the general population to a degree. After the official deployment of vaccines, observed reinfection of COVID-19 among vaccinated people became a negative influence on the willingness of both parents and non-parents to proceed with vaccination.

### DISCUSSION

This is the first scoping review of BeSD of COVID-19 vaccine uptake in Vietnam, analysing 39 studies within the 4 domains of the BeSD model. Most studies reported on determinants of COVID-19 vaccine motivation and hesitancy under the theme of thinking and feeling. More than half of the studies described social processes and practical issues influencing an individuals' COVID-19 vaccine decision-making. A stable pattern of driving factors associated with the COVID-19 vaccine willingness among the general population and parents of under 12-year-old children was observed. The six key drivers that impacted COVID-19 vaccine decision-making included (1) confidence in vaccine safety and effectiveness, (2) perception of susceptibility and severity of COVID-19 infection, (3) health worker recommendation, (4) positive attitudes towards vaccines and society, (5) subjective norms and (6) receiving effective communication about the pandemic and vaccines.

An individual could both have a certain degree of concern regarding the safety and efficacy of vaccines, but they would still choose to receive the vaccine if their perceived benefits of vaccination outweigh the perceived AEFI or if they had a good knowledge of COVID-19 and the severity of infection.<sup>30 55</sup> Hoang *et al* reported a similar level of concern about vaccine efficacy and safety and AEFI between immunised and unimmunised groups.<sup>45</sup> We found that the willingness to get vaccinated was higher among the general population, less to significantly low among parents of children aged 5–11 years and children aged 5 years or under receiving COVID-19 vaccines. The national COVID-19 vaccine coverage in Vietnam

was remarkably high among targeted populations: the primary COVID-19 dose for adults and children aged 12 years and older reached almost 100%, the percentage of the children aged 5–11 years who completed their first and second doses of COVID-19 vaccines was roughly 86.4% and 69.3%, respectively, as of February 2023.<sup>57</sup> Generally, people appeared to exhibit more positivity towards vaccination when they had sufficient time to observe its effectiveness and that could explain why the motivation trending line slightly increased while the pattern of drivers of COVID-19 uptake remained stable over time. Risk perception was associated with both vaccine hesitancy and vaccine motivation.<sup>58</sup> Van Nguyen and Nguyen described that people who worried about the probability of acquiring COVID-19 chose to search for more information about COVID-19 and vaccines, and if those seeking information ended up perceiving COVID-19 vaccines more positively, then they became more motivated to vaccinate.<sup>48</sup>

The data show that despite the high vaccine uptake for many cohorts, Vietnam failed to reach its national target for 100% coverage of COVID-19 vaccination of children aged 5–11 years by the end of June 2022 and first boosters for adults.<sup>14</sup> A high degree of concern regarding the long-term consequences of COVID-19 vaccines on child health could partly explain the parents' hesitancy or refusal. Additionally, reinfection with COVID-19 among people who were previously vaccinated may have also created parent suspicion of the vaccine efficacy. Children have had a much lower incidence rate of COVID-19 infection compared with adults. If children acquired COVID-19, their symptoms were often asymptomatic or minor, hence parents were indecisive regarding the need to vaccinate their children against COVID-19.<sup>59</sup> The country started to provide vaccination to children aged 5–11 years in April 2022, a time by which the pandemic was under control and there was relatively low mortality.<sup>60</sup> Parents were more likely to want to vaccinate their children if the mortality rate associated with COVID-19 infection rose, following the introduction of new COVID-19 variants.<sup>61</sup> Addition to AEFI, parents expressed a high level of concern about the rapid development of vaccines (>80%) and perceptions that vaccination was unnecessary, resulting in hesitation or refusal,<sup>45 46</sup> which suggests that Vietnam needs to develop a tailored communication strategy in the new context of the pandemic—low infection and mortality rates and high perceived AEFI—if the country plans to roll out national vaccination against COVID-19 for children aged 5 years and younger.

We found that parents were open to vaccinating adolescents but were more cautious about vaccinating younger children. Deployment timing played an important role as for COVID-19 vaccines, the participants were more willing to be immunised if they felt they were being exposed to higher risk of infection and mortality.<sup>24 25</sup> Mass vaccination for adolescents and general populations occurred in July and November 2021 respectively, during the fourth wave when the highly infectious and lethal Delta variant

spread throughout Vietnam. These circumstances could have contributed to higher vaccination uptake among the two groups.

Decision-making was influenced by recommendations given by health workers or health authorities, subject norms and information about the pandemic and vaccines. Vietnam succeeded in risk communication regarding COVID-19 with diversified communication of information through various channels, including television, online newspapers, social media and broadcasts.<sup>24</sup> We found that most respondents would get vaccinated if they were recommended by a health worker, which is similar to UNICEF's findings that health workers were rated as the most trusted source of information.<sup>50</sup> Individuals with better information access (6–16 channels and daily) were more likely to accept all types of available vaccines. Sufficient access to information regarding the pandemic and vaccines allowed people to understand the danger of the virus and the protection provided by vaccines.<sup>62</sup> How communication and government trust influenced a person's decision-making on vaccination was not discussed in the included studies. A high desire to vaccination among the Vietnamese population and even higher vaccine uptake may have been possible if large national campaigns led by the government, importantly with the active involvement of the Prime Minister, were deployed. 'The best vaccine is the one that has been licensed for use and arrives at the earliest' was a slogan widely used by authorities and media. This could explain why preferred vaccine manufacturers did not appear as a decisive factor in Vietnam, despite a certain reluctance to receive Sinopharm, Janssen and Sputnik V.<sup>19</sup> In the context of Vietnam, trust in the governmental choice of vaccines might be a credit that the participants expressed positively about vaccines.<sup>49</sup>

Family, friends and social norms were positively associated with vaccine uptake. People who thought that vaccination programmes promoted public health or would return life to normal more quickly were more likely to participate in vaccination.<sup>21 31</sup> We found that most of the participants decided independently whether they would get vaccinated,<sup>50</sup> while a number of people felt under social pressure to vaccinate against COVID-19.<sup>32</sup> Not only could social pressure induce 'reluctant adults' to agree to vaccinate but also it could lead to parents agreeing to let their children be vaccinated. In addition, rules such as vaccination being required for boarding schools also led to increased uptake of vaccination in children.<sup>63</sup> None of the included studies discussed how national policies influence 'reluctant people' to get vaccinated, which would be a suitable topic for future research.

Our review has some limitations. First, the scoping review is limited to studies conducted in Vietnam, the interpretation and application of findings from this study should take into account the context of the pandemic and other social contexts. Second, we did not explore political determinants on the COVID-19 uptake due to limited evidence from included studies. Third, we did

not conduct critical appraisal of the quality of included studies. A small number of studies evaluated the willingness of parents to vaccinate children aged 5 years and under, hence, suggestions regarding how to increase the uptake of COVID-19 within this group are limited. The strengths of this review include the comprehensive search without language restrictions and the adherence to PRISMA guidelines for scoping reviews.

Parental intention to vaccinate their children against COVID-19 was lower compared with adults' intention in Vietnam, particularly for parents of under 5-year-old children. Key enablers of vaccine uptake for both adults and children included perception of disease severity, perceived benefits and safety of vaccines, a healthcare worker recommendation and positive community perception of vaccines. Future studies should assess vaccine communication targeted to these drivers to optimise vaccine uptake.

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