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Systematic Review

COVID-19 Vaccine Acceptance and Hesitancy among Teachers and Students: A Scoping Review of Prevalence and Risk Factors

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Abstract: Students' and teachers' acceptance of the COVID-19 vaccination may help boost the uptake of the vaccines in the general population because teachers and students serve as a source of information and campaign mechanisation for vaccination. This review aimed to map evidence on the prevalence and predictors of COVID-19 vaccine acceptance and hesitancy among teachers and students. After removing duplicates, a search in several databases (Dimensions, PubMed Central, JSTOR, Google Scholar, Google, the WHO Library, and HINARI) produced 2060 records. Through screening based on the inclusion criteria, 27 records were used for this review. A relatively high prevalence of vaccine hesitancy was found among teachers and students. Teachers and students in countries such as China, Egypt, the USA, and India however, reported relatively low levels of COVID-19 vaccine acceptance. Vaccine hesitancy depends on perceived adverse effects, safety, efficacy, and benefits among teachers and students, with male teachers and male students being more likely to accept the COVID-19 vaccine than their female counterparts. Moreover, we found that vaccine acceptance could result from trust in the healthcare system and pharmaceutical companies, sources of COVID-19 information, and trust in healthcare providers. Public health experts, academics, other scientists, and health practitioners are required to take a more distinctive, multidisciplinary, and structured approach that focused on communicating effective evidence-based information to combat misinformation concerning COVID-19 vaccines.

Keywords: COVID-19 vaccine; hesitancy; prevalence; predictors; teachers; students

1. Introduction

Three years have passed since the coronavirus disease 2019 (COVID-19) pandemic surprised the world. So far, 775,132,086 COVID-19 cases, including 7,042,222 COVID-19 deaths, have been confirmed globally by the World Health Organisation (WHO) as of 24 March 2024 [1]. Several remedies, including vaccination against COVID-19, were widely recommended. Consequently, about 13.59 billion vaccines have been administered globally [1]. Globally, there are about 63% and 28% coverage rates of full primary and booster vaccination, respectively. However, the recurrent and continuous outbreak of waves has shown that it would be practically impossible to stop the COVID-19 pandemic by gaining herd immunity [2]. Meanwhile, the protective effect of vaccinations is to prevent COVID-19-related complications and mortality rather than preventing the spread of the virus [3]. Thus, COVID-19, like the influenza virus, will co-exist with humans for a long time, especially with the emergence of new variants [1]. Hence, until vaccines that stop the spread of COVID-19 are developed and made available globally, complete vaccination and boosters remain vital to prevent COVID-19-related complications, hospitalisation, and mortality [4,5].

The argument is that the public acceptance of the COVID-19 vaccination safeguards public health and eases the burden on the healthcare system, particularly in resource-

limited environments. However, the unwillingness to receive the COVID-19 vaccine is a widespread problem [1,6,7]. It is considered one of the top ten global public health concerns, although vaccination has been one of the most significant initiatives in the field of public health in the 21st century [6]. The term "vaccine hesitancy", according to Coustasse et al. [7], describes the hesitation or unwillingness to receive a vaccination against an infectious disease even when the safety and efficacy of the vaccine have been confirmed and proven. Vaccine uptake greatly depends on trust [7], which is related to personal beliefs, motivation, perceived risk of exposure, knowledge, and vaccination awareness [8]. Evidence shows that a safe and efficacious vaccine has widespread acceptability [9], whereas a vaccine with low efficacy and safety issues may have a low acceptance rate [9,10]. According to a recent systematic review and meta-analysis, the acceptance rate of the COVID-19 vaccination was only 61% [10]. These findings show that people are showing hesitation toward COVID-19 vaccination.

To boost public confidence in COVID-19 vaccines and to encourage the acceptance it is important to identify and resolve knowledge gaps and myths about these vaccines, especially among critical populations such as teachers and students that serve as a knowledge source for most people in society [11]. Schools are privileged operational environments that disseminate health information and educational messages [11]. Schools' health education programmes, a medium for health communication, can accurately transmit health and medical knowledge among young people and society. Teachers and students may also influence how communities and families decide whether to vaccinate their children against vaccine-preventable infections. Yet, there are a lot of variations in teachers' and students' intentions to receive or accept the COVID-19 vaccine in various countries [12–16]. To close the gap and encourage the uptake of vaccines in such a crucial population, it may be important to map the evidence to understand the prevalence of COVID-19 vaccine acceptance and hesitancy and explore the protective and risk factors of COVID-19 vaccine acceptance and hesitancy among students and teachers.

2. Methods

Study Design, Data Source, and Search Strategy

This scoping review was conducted following the recommendations of Arksey and O'Malley [17], i.e., (1) identifying the objectives or research questions, (2) identifying relevant studies, (3) selecting the studies, (4) collecting data, (5) data summary and synthesis of the results, and (6) consultation. This review was guided by two research questions: (1) What is the prevalence of COVID-19 vaccine acceptance and hesitancy among teachers and students? (2) What are the protective and risk factors of COVID-19 vaccine acceptance and hesitancy among teachers and students?

Several meta databases, like Dimensions, JSTOR, and PubMed Central, were searched for peer-reviewed articles. First, Medical Subject Headings (MeSH) words were used for the PubMed search. These terms were then modified for the search conducted in the other databases. Table 1 presents the search approach, exclusion and inclusion criteria. Further searches for peer-reviewed articles were conducted in Google Scholar, Google, the WHO Library, and HINARI. The last search was conducted on 27 March 2024. The authors carefully examined the records they had obtained, and duplicates were merged using the Mendeley v1.19.8 software. Twelve graduate students were trained and supervised to screen tittles and abstracts for full-text eligible papers using the eligibility criteria. The reference lists of these full-text eligible records were further checked for additional eligible full-text records. MA and JOS independently screen full-text eligible records using the eligibility criteria presented in Table 1.

The characteristics of the peer-reviewed papers extracted during the data charting process included the authors, year of the publication, country where the study was conducted, study design, population, sample size, prevalence, risk and protective factors of vaccine acceptance/hesitancy. The data were extracted independently by MA and JOS and reviewed by EWA and JEH. This process was conducted to improve the reliability and

accuracy of the data extracted. Table 2 presents the details of the extracted data from the reviewed studies. In addition, experts were consulted on the search (chartered librarians) and review process to ensure the accuracy and depth of the data for this scoping review. Consequently, a thematic analysis of the extracted data and synthesis was conducted, and the findings are presented below.

Table 1. Planned Search Strategy.

Item	Search Strategy
Database	Dimensions, PubMed, JSTOR, Google Scholar, Google, the WHO Library, and HINARI
Language filter	English
Date filter	No limits
Spatial filter	Global
Keywords	1. COVID-19 OR Coronavirus disease 2019 OR SARS-CoV-2 OR severe acute respiratory syndrome coronavirus 2 2. Vaccine OR Vaccination OR Shot 3. Prevalence OR Rate 4. Acceptance Or Taking OR Embracing OR Up-taking OR Receiving or Welcoming 5. Hesitancy OR Rejecting OR Hesitation OR Doubt OR Avoiding 6. Risk factors OR determinants OR causes 7. Protective factors OR Facilitators OR Resilience OR Plasticity 8. Teachers OR Lecturers OR Professors OR Teaching Staff OR Educators 9. Students OR Learners OR Pupils
Inclusion criteria	The paper should be: 1. a peer-reviewed article. 2. published in the English language. 3. conducted on teachers and students or both. 4. on COVID-19 vaccine acceptance and hesitancy, prevalence, or risk and protective factors. 5. Conducted between 2021 and March 2024
Exclusion criteria	The paper should be: 1. conducted on individuals other than students and teachers. 2. a report, review, abstract, minutes, commentary, letter to editors, preprint, or literature review. 3. outside the variables of interest.

Table 2. Characteristics of the Reviewed Studies.

Authors and Country	Population	Sample Size	Prevalence (%)		Acceptance/Hesitancy Predictors
			Acceptance	Hesitancy	
Dafogianni et al. [18] Greece	Students, teachers, and professors	3697	NA	NA	Lower personal and general perceived risk due to side effects of the COVID-19 vaccine was significantly associated with lower intention to be vaccinated.
Chen et al. [15] China	College students and teachers	835	NA	31.8 Teachers 23.8 Students	Believed that vaccine safety was low and did not give any attention to vaccine news, with those who suffered from chronic diseases being more hesitant.
Kelekar et al. [19] USA	Dental and medical students	415	NA	34.9	
Xu et al. [20] China	College teachers	251	NA	42.2	Non-decision makers in the family were more hesitant.

Table 2. *Cont.*

| Authors and Country	Population	Sample Size	Prevalence (%)		Acceptance/Hesitancy Predictors
			Acceptance	Hesitancy	
Saied et al. [16] Egypt	Medical students	2133	6	46	Concerns for the vaccine's adverse effects, ineffectiveness, deficient data regarding the vaccine's adverse effects, and insufficient information regarding the vaccine itself.
Cahapay [21] Philippine	High school teachers	1070	20.7	NA	Male gender, high income, and education (graduate level) were associated with intentions to accept vaccines.
Kecojevic et al. [22] USA	College students	457	23	NA	Student healthcare workers, who had a family member who had received the COVID-19 vaccine, had greater positive attitudes towards vaccination, and received the seasonal flu vaccine were more likely to have received the vaccine.
Estrela et al. [23] Portugal	Preschool to higher education teachers	1062	30	10	Concerns about vaccine efficacy and safety increase the risk of hesitancy; a higher perceived risk of being infected, trust in the effectiveness of the vaccine in protecting them against complications of COVID-19, and a higher trust level of information sources were associated with decreased hesitancy.
Gkentzi et al. [12] Greece	Elementary school teachers	399	38.1	NA	Previous influenza vaccine uptake, believing COVID-19 vaccination was mandatory, and believing teachers were at high risk of being infected.
Šorgo et al. [24] Slovenia	Post-secondary school students	5999	39.7	29.2	Fear of COVID-19 played a significant role in the intention to vaccinate.
Shitu et al. [14] Ethiopia	Primary and secondary school teachers	301	40.8	NA	Being a male, a private school teacher, having high perceived susceptibility, high perceived seriousness, and perceived benefits of the vaccine were significant predictors of acceptance.
Sharaf et al. [25] Egypt	Teaching staff of a public university	171	45.6	54.4	Being a female, not intending to travel internationally, and being more anxious about COVID-19 were significantly associated with hesitancy.
Dubik [26] Ghana	Basic and senior high school teachers	421	49	NA	Unconfident about the COVID-19 vaccine, perception of not being susceptible to COVID-19, and feeling uncomfortable to receive the vaccine were associated with unwillingness to take the vaccine. Vaccination against hepatitis B, adequacy of information about the expectation of the COVID-19 vaccine, and not believing that the COVID-19 vaccine will cause illness were facilitators of vaccine acceptance.
Zhou et al. [27] China	Nursing students	1070	51.9	4.7	Positive beliefs towards general vaccination and COVID-19 vaccination, perception of less adverse effects following vaccination, and greater impact of COVID-19 on daily life were associated with intentions to vaccinate. Concerns about the safety of the vaccines and efficacy, the belief that vaccination was unnecessary, and less information about COVID-19 were associated with hesitancy.

Table 2. *Cont.*

Authors and Country	Population	Sample Size	Prevalence (%)		Acceptance/Hesitancy Predictors
			Acceptance	Hesitancy	
Lucia et al. [28] USA	Medical students	168	53	23	Being public health experts and having fewer concerns about side effects increased the willingness to take the vaccine.
Handebo et al., [29] Ethiopia	Primary and secondary school teachers	301	54.8	NA	Education (a Bachelor's degree), perceived susceptibility, perceived benefits, and cues to action significantly influenced intentions to receive vaccines.
Tavolacci et al. [30] France	College students	3089	58	17	The female gender and those studying science were at higher risk of vaccine hesitancy. Knowledge about conventional vaccination and the COVID-19 vaccine and confidence in safety and efficacy were associated with a lower risk of vaccine hesitancy.
Jain et al. [31] India	College students	655	63.8	36.2	Trust in the healthcare system and trust in domestic vaccines were significantly associated with vaccine acceptance.
Scharff et al. [32] Germany	Secondary school students	903	68.3	7	Students under 16 years and at lower education levels showed significantly higher vaccine hesitancy.
Montvidas et al. [33] Lithuania	Health science students	1545	72.6	10	Medicine students, non-infected students, and students who volunteered in COVID-19 wards were more willing to take the vaccine. Negative effects of the vaccine on their income and belief in the future were associated with vaccine hesitancy.
Riad et al. [34] Czech Republic	College students	1351	73.3	7.4	Trust in the pharmaceutical industry, trust in healthcare providers, and perceived knowledge sufficiency predicted higher odds of vaccine acceptance.
Khuc et al. [35] Vietnam	College students	398	83.41	16.59	Concerns about the vaccine's side effects and lack of information were associated with hesitancy.
Hamdan et al. [36] Lebanon	University students	3805	87	10	Perceived vaccine safety was associated with vaccine acceptance or less hesitancy. Those who did not receive the flu vaccine and agreed with the conspiracy theory were more hesitant.
Racey et al. [13] Canada	Public school teachers	5076	89.7	NA	The male gender, a science or engineering education background, the belief that COVID-19 is a serious illness, higher vaccine knowledge, and reliable information sources on vaccination predicted intentions for vaccine acceptance.
Galle et al. [37] Italy	College students	3226	91.9	NA	Previous vaccination against influenza and knowledge were associated with the intention to receive the vaccine.
Watts et al. [38] Canada	Public school teachers	2393	92.7	NA	Valued expert recommendations, perceived susceptibility, accepted routine vaccines, and the perception of higher benefits were associated with vaccine acceptance.
Hossian et al. [39] Pakistan	College students	2865	72.5	NA	Higher education was associated with vaccine acceptance.

Note. NA = not available. All studies adopted the cross-sectional survey design.

3. Results

3.1. Search Results

The search in the four meta-databases databases (PubMed, Central, JSTOR, and Dimensions) produced 2155 records. An additional search in Google Scholar and Google produced an extra 18 records. Thus, 2173 records were produced from the search conducted. A total of 113 duplicates were merged in the Mendeley tool. Also, 2025 records were not relevant to this review and were removed. We further scrutinised 35 full-text records using the eligibility criteria. Moreover, 7 records were additionally identified by checking the reference lists of the selected full-text records, resulting in 42 records. Finally, out of the 42 records, 15 were excluded. Thus, 27 full-text articles were included in the thematic synthesis for this review (see details in Figure 1).
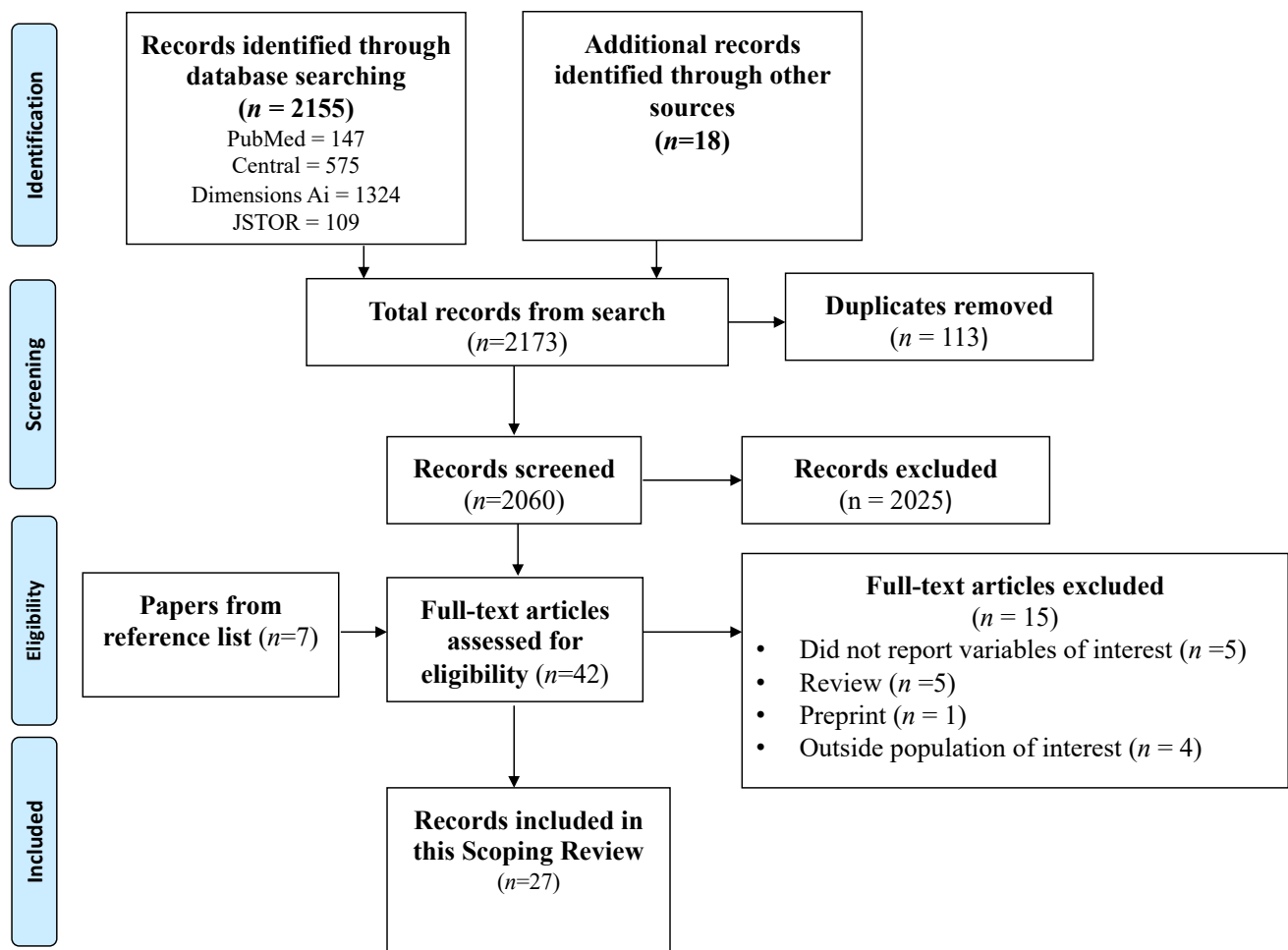

Figure 1. PRISMA flow chart of the screening process.

3.2. Characteristics of the Reviewed Studies

All the reviewed studies adopted the cross-sectional survey design. Moreover, all 27 articles were conducted in only 19 countries across the globe(see details in Figure 2). In addition, 13 of the reviewed studies reported on both vaccine acceptance and hesitancy. Furthermore, two studies [15,18] sampled both teachers and students, whereas 10 and 15 studies sampled only teachers and students, respectively (see details in Table 2). However, 17 of the reviewed studies reported COVID-19 vaccine hesitancy (see Table 3), whereas 23 reported acceptance.
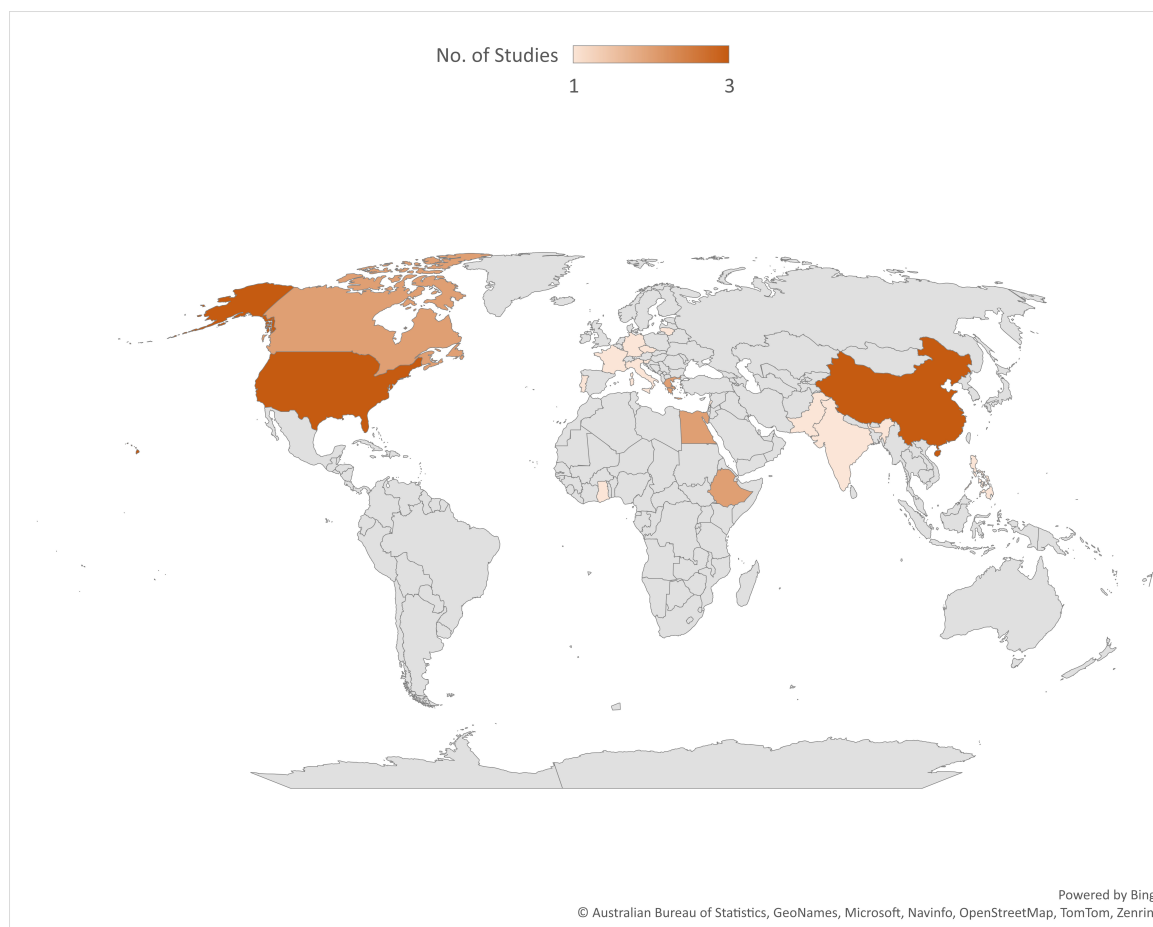
Figure 2. Countries and continents where the reviewed studies were conducted.

3.3. Prevalence of COVID-19 Vaccine Hesitancy

Generally, the prevalence of COVID-19 vaccine hesitancy reported by the reviewed studies included 4.7% in China [27] and 54.4% in Egypt [25]. COVID-19 vaccine hesitancy among teachers was between 10% among preschool and college teachers in Portugal [23] and 54.4% among college teachers in Egypt [25]. Among students, COVID-19 vaccine hesitancy was between 4.7% among nursing students in China [27] and 46% among medical students in Egypt [16]. The highest hesitancy among teachers (54.4%) and students (46%) were all from Africa [16,25]. Studies conducted in Europe produced hesitancy below 20%, except in Slovenia, where students reported a hesitancy prevalence of 29.2% [24]. In Asia, China (42.2%) [20] and India (36.2%) [31] recorded relatively higher rates of COVID-19 vaccine hesitancy. In two studies from the United States, all medical students reported 23% [19] and 34.9% [19] prevalence of COVID-19 vaccine hesitancy. Teachers recorded a higher prevalence than students across various geographical areas. Details of the prevalence of vaccine hesitancy are presented in Table 3.

Table 3. COVID-19 vaccine hesitancy prevalence among the reviewed studies.

Authors	Country	Population	Hesitancy (%)
Zhou et al. [27]	China	Nursing students	4.7
Chen et al. [15]	China	College students	23.8
Chen et al. [15]	China	College teachers	31.8
Xu et al. [20]	China	College teachers	42.2
Riad et al. [34]	Czech Republic	College students	7.4
Saied et al. [16]	Egypt	Medical students	46

Table 3. *Cont.*

Authors	Country	Population	Hesitancy (%)
Sharaf et al. [25]	Egypt	College teachers	54.4
Tavolacci et al. [30]	France	College students	17
Scharff et al. [32]	Germany	Secondary school students	7
Jain et al. [31]	India	College students	36.2
Hamdan et al. [36]	Lebanon	College teachers	10
Montvidas et al. [33]	Lithuania	Health science students	10
Estrela et al. [23]	Portugal	Preschool to higher education teachers	10
Šorgo et al. [24]	Slovenia	Post-secondary school students	29.2
Lucia et al. [28]	USA	Medical students	23
Kelekar et al. [19]	USA	Dental and medical students	34.9
Khuc et al. [35]	Vietnam	College students	16.6

3.4. Prevalence of COVID-19 Vaccine Acceptance

Studies on COVID-19 vaccine acceptance intentions found a prevalence between 6% [16] among medical students in Egypt and 92% [38] among public school teachers in Canada. In Africa, all studies reported COVID-19 vaccine acceptance rate above 40% [14,25,26,29], except that by Saied et al. [16], which reported 6% among medical students in Egypt. In Asia, all studies, which were conducted on students, reported COVID-19 vaccine acceptance above 50%, with 51.9% in China [27], 63.8% in India [31], 72.5% in Pakistan [39], 83.4% in Vietnam [35], and 87% in Lebanon [36]. Moreover, students in Asia were more likely to accept the vaccine than those from Africa. Only students in Italy [37] and teachers in Canada [38] recorded COVID-19 vaccine acceptance above 90%. See Table 4 for summary details.

Table 4. COVID-19 vaccine acceptance prevalence among reviewed studies.

Authors	Country	Population	Acceptance (%)
Racey et al. [13]	Canada	Public school teachers	89.7
Watts et al. [38]	Canada	Public school teachers	92.7
Zhou et al. [27]	China	Nursing students	51.9
Riad et al. [34]	Czech Republic	College students	73.3
Saied et al. [16]	Egypt	Medical students	6
Sharaf et al. [25]	Egypt	College teachers	45.6
Shitu et al. [14]	Ethiopia	Primary and secondary school teachers	40.8
Handebo et al. [29]	Ethiopia	Primary and secondary school teachers	54.8
Tavolacci et al. [30]	France	College students	58
Scharff et al. [32]	Germany	Secondary school students	68.3
Dubik [26]	Ghana	Basic and senior high school teachers	49
Gkentzi et al. [12]	Greece	Elementary school teachers	38.1
Jain et al. [31]	India	College students	63.8
Galle et al. [37]	Italy	College students	91.9
Hamdan et al. [36]	Lebanon	College students	87
Montvidas et al. [33]	Lithuania	Health science students	72.6
Hossian et al. [39]	Pakistan	College students	72.5
Cahapay [21]	Philippine	High school teachers	20.7
Estrela et al. [23]	Portugal	Preschool to college education teachers	30
Šorgo et al. [24]	Slovenia	Post-secondary school students	39.7
Kecojevic et al. [22]	USA	College students	23
Lucia et al. [28]	USA	Medical students	53
Khuc et al. [35]	Vietnam	College students	83.4

3.5. Risk Factors for COVID-19 Vaccine Hesitancy among Teachers and Students

The evidence shows that female teachers [25] and female students [30] were more likely to refuse COVID-19 vaccines. Also, lower education status predicted COVID-19 vaccine hesitancy [32]. Furthermore, teachers with no intentions of travelling internationally were

more hesitant to vaccinate against COVID-19-related complications [25]. In China, it was reported that students and teachers suffering from chronic diseases or with a history of chronic illness were more hesitant to accept the COVID-19 vaccine. Moreover, university students in Lebanon who refused the flu vaccine were more likely to reject the COVID-19 vaccine as well, despite the availability of the vaccine [36]. In addition, the perceived high risk of side effects [16,18,35], low safety [15,23,27,30], and low efficacy [16,23,30] of the COVID-19 vaccine were predictors of hesitancy among teachers and students. Hence, insufficient or lack of data regarding the side effects of the COVID-19 vaccine fueled hesitancy among teachers and students [16,27,35]. Meanwhile, agreeing to COVID-19 vaccine-related conspiracy also accounted for the refusal of the COVID-19 vaccine among college students in Lebanon [36].

3.6. Predictors of COVID-19 Vaccine Acceptance among Teachers and Students

Being a male [13,14,21], knowing a family member who has received the COVID-19 vaccine [22], and having a high income [21] and attaining graduate-level education [21,29,39] were associated with the willingness and intentions to accept the COVID-19 vaccine. Also, medical students [33] and student healthcare workers [22], especially students who volunteered to work in COVID-19 wards [33], were more likely to accept COVID-19 vaccines. Furthermore, teachers and students with high perceived susceptibility to COVID-19 [12–14,23,24,27,29] and benefits [14,29], efficacy [23], and few side effects [26–28,36] of the COVID-19 vaccine were more likely to accept the vaccine. In addition, teachers and students who trusted the health system [31,34], the pharmaceutical industry [34], COVID-19 information sources [13,23], and domestic vaccines [31] were willing to accept the COVID-19 vaccine. Meanwhile, teachers and students with high level of knowledge of COVID-19 [13,30,34,37] and those with adequate information on the COVID-19 vaccine [26] were more likely to be vaccinated against COVID-19-related diseases and complications. Finally, teachers and students who received seasonal flu vaccines [12,22,37] and hepatitis B vaccine [26] and believed the vaccine was mandatory [12,39] were more likely to accept the COVID-19 vaccine.

4. Discussion

Public reactions and behaviours to uptake a new vaccine and gain protection from a specific pandemic disease are the same [40]. Vaccine hesitancy and low or poor initial vaccine uptake prevalence for a particular vaccine, such as the COVID-19 vaccine, are serious threats to global health. This situation may result in complex behavioural patterns. Besides, similar factors were reported during measles outbreaks [41] and flu vaccination [42]. Although introducing and distributing a new vaccine is expensive and time-consuming, vaccine acceptability is the primary factor determining the success of vaccination campaigns as a whole [43]. Hence, understanding the rates and predictors of vaccine acceptance and hesitancy may help develop robust public health vaccination campaigns and policies to reduce vaccine hesitancy gaps affecting existing COVID-19 vaccination programmes and new vaccines that may emerge.

This scoping review reported a relatively high prevalence of COVID-19 vaccine hesitancy in Africa (Egypt). Also, low hesitancy was reported in China and some European countries [44,45]. This high refusal of the COVID-19 vaccine in Egypt may be due to the low prevalence of COVID-19 cases in the country, including fatalities in Africa compared to Asia and Europe [44,45]. Thus, a lack of trust in the health system and pharmaceutical industries in Africa and trust in conspiracy theories against the COVID-19 vaccine may account for high levels of hesitancy in Africa [34]. Inconsistent messages from various sources and health organisations may also have led to the high prevalence of vaccine hesitation among teachers and students in Egypt [46]. Also, the relatively high COVID-19 vaccine acceptance in some African countries, such as Ghana and Ethiopia, may be due to active public health systems and vaccination campaigns and the sufficiency of COVID-19 vaccine-related information [26]. Moreover, in Canada and some parts of Europe, like Italy, Lithuania, and the Czech Republic, the COVID-19 vaccine was made mandatory,

and restrictions placed on unvaccinated people may have resulted in the relatively high acceptance rate reported in reviewed studies [37,38]. In addition, in these areas, teachers and students were required to take the vaccine in schools [38]. However, regardless of how COVID-19 took a toll on China, India, and the USA, COVID-19 vaccine acceptance among teachers and students was relatively low due to the negative attitudes towards vaccination and poor confidence in COVID-19 vaccine safety and efficacy [22,30,31].

Furthermore, students did not demonstrate a notable variation in their attitudes towards vaccine acceptance or hesitancy. In some cases, medical students [33] and student healthcare workers [22], particularly students who volunteered to work in COVID-19 wards [33], were more likely to accept COVID-19 vaccines. Nevertheless, COVID-19 vaccine hesitancy was reported among nursing [27] and medical students [16,28]. This observation underscores the complexity of factors influencing vaccine-related attitudes and suggests that professional training in healthcare disciplines may not inherently lead to an increase in vaccination among students [28]. Thus, factors beyond professional training may play a vital role in shaping vaccine beliefs and behaviours among students. Thus, further exploration is needed into the multifaceted influences on vaccine acceptance within educational settings.

From the synthesis of the reviewed studies, female teachers and female students were more likely to refuse COVID-19, whereas male teachers and male students were more likely to accept the vaccine. This finding may be due to males' greater awareness and perceived susceptibility to COVID-19 risks and hesitancy to agree to COVID-19-related conspiracy theories [44,47]. Moreover, sampling bias regarding sex distribution found in reviewed studies can alter the reported rates. Thus, these characteristics should be considered for an appropriate interpretation of COVID-19 acceptance rates or when gender is being considered as a predictor of hesitancy and acceptance of the COVID-19 vaccine.

The reviewed articles reported that perceived side effects, efficacy, and safety are strong predictors of COVID-19 vaccine acceptance among teachers and students. The evidence shows that the most common influencing factors of vaccine hesitancy in early part of COVID-19 vaccination campaigns are perceived high vaccine safety and efficacy [48,49]. Furthermore, reports of side effects of previous vaccinations hamper the uptake of new vaccines [50]. Then, clear and sufficient information regarding side effects, efficacy, and safety of such vaccines would help boost teachers' and students' trust in COVID-19 vaccines. The trust teachers and students have in the COVID-19 vaccine is necessary to help disseminate accurate, reliable, and sufficient information on COVID-19 vaccines to families, relatives, and the general public. This is because the public relies on teachers and students, especially medical and nursing students, for high vaccine uptake intentions [22,30,31]. Thus, restoring public trust in COVID-19 vaccines may begin with providing teachers and students with enough reliable data on the vaccines' side effects and efficacy.

Conspiracy theories targeting COVID-19 vaccines, a lack of information and trust in vaccine benefits, and a lack of trust in health systems and pharmaceutical and healthcare providers are additional key elements that may interfere with conducting successful vaccination programmes in various nations [46,51–54]. Also, unreliable and incomplete health information may fuel rumours and conspiracy theories against COVID-19 vaccinations among teachers and students [49]. The communication strategies and vaccine delivery methods targeting teachers and students during COVID-19 vaccination and any future vaccination should be transparent, accurate, frequent, and multimodal to ensure vaccine confidence among teachers and students. This is because the general public can source their information from teachers and students [49].

It is also evident that teachers and students who received flu vaccines and hepatitis B vaccines were more likely to accept COVID-19 vaccines. The perceived benefits of vaccines and high susceptibility to COVID-19 and related complications, just as in flu and hepatitis B, have drawn attention to accepting COVID-19 vaccines [53]. Moreover, teachers and students who have received previous vaccines, such as seasonal flu and hepatitis B vaccines, may have a generally positive attitude toward vaccination [52].

4.1. Limitations and Recommendations for Future Research

This review used papers sourced from several databases. However, the included studies in this scoping review were all cross-sectional surveys, whose findings are affected mainly by response bias. In addition, the results of this review might not hold after a specific amount of time because vaccine hesitation and acceptance may alter over time as vaccine efficacy and safety and adverse effects of vaccines manifest among teachers and students. Authors did not carry out quality appraisal of the included articles, which may limit the validity and reliability of our findings. A longitudinal study that accounts for confounders may help explore changes in teachers' and students' attitudes toward COVID-19 vaccine hesitancy and acceptance over time. It is equally important to explore how vaccination status affects long COVID status.

4.2. Policy Recommendations

Teachers and students, just like many educated people, are more worried about the possibility of contracting COVID-19, and many such individuals are more receptive to vaccination [55]. Also, teachers and students have access to various information sources, including social media, academia, personal networks, and health organisations, which are crucial for influencing vaccination in the general public [56]. Teachers and students frequently work to protect vulnerable populations and spread accurate information about vaccinations. Hence, public health systems should focus on these demographics because many teachers and students belong to communities and would be able to improve COVID-19 vaccination uptake [55]. In addition, reputable public health specialists, academics, other scientists, and health practitioners need to take more distinctive, multidisciplinary, and structured approaches that focused on communicating effective evidence-based information to combat misinformation to teachers and students. Perhaps, these are some quick ways to reduce vaccine hesitancy in this population.

5. Conclusions

A relatively high prevalence of vaccine hesitancy was identified among teachers and students. However, teachers and students in countries such as China, the USA, and India reported relatively low levels of COVID-19 vaccine acceptance. Vaccine hesitancy in some African countries, like Egypt, is also high. The high level of vaccine hesitancy may result from perceived adverse effects, challenges with safety, efficacy, and doubt about the benefits of the COVID-19 vaccine. Moreover, male teachers and male students, compared to their female counterparts, were more likely to accept the COVID-19 vaccine. Trust in the healthcare system, pharmaceutical companies, sources of COVID-19 vaccine information, and healthcare providers influence how teachers and students accept COVID-19 vaccines. Finally, clear and sufficient information about the side effects of the COVID-19 vaccine could enhance COVID-19 vaccine uptake intentions. Hence, reputable public health specialists, academics, scientists, and health practitioners should take a more distinctive, multidisciplinary, structured approach focused on communicating effective evidence-based information to these teachers and their students. The need to combat misinformation to teachers and students would be a quick way to reduce vaccine hesitancy and improve vaccine acceptance among these categories of stakeholders in education.

Abbreviations

WHO: World Health Organisation; MeSH: Medical Subject Headings.

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