

Review

Beliefs, Attitudes and Behaviors of Healthcare Professionals Regarding Seasonal Influenza Vaccination: An Umbrella Review

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Abstract

Background: Seasonal influenza remains a major public health challenge worldwide, causing significant morbidity each year and imposing substantial burdens on individuals, healthcare systems, and national economies. Vaccination is considered the most effective available strategy for prevention; however, uptake rates vary considerably across countries, with many failing to achieve the recommended coverage levels. The aim of this umbrella review is to systematically synthesize and critically appraise the existing evidence on healthcare professionals' beliefs, attitudes, and behaviors regarding seasonal influenza vaccination. **Methods:** This umbrella review was conducted in accordance with the PRISMA 2020 statement. A literature search was conducted in PubMed, the Cochrane Library, and Google Scholar. The following search terms were used: beliefs, attitudes, behaviors, influenza vaccination, flu vaccine, healthcare professionals and primary healthcare. The inclusion criteria were as follows: (1) Reviews, (2) Published after 1 January 2000, (3) English language, (4) Healthcare professionals as the target-population. **Results:** Twenty-five studies met the selection criteria and were included in this review. Twelve out of 25 studies were systematic reviews. Globally, vaccination uptake remains below recommended levels, with reported coverage ranging from approximately 2% to 44% in several settings, while rates can exceed 90% in countries with mandatory vaccination policies. North America demonstrates the highest vaccination coverage, while the lowest coverage is reported in Africa and South America. Overall, low- and middle-income countries show significantly lower vaccination behavior compared with high-income countries. Attitudes and beliefs appear to shape vaccination behavior in high-income countries. The main driver of acceptance is perceived protection of oneself and family, whereas hesitancy is mainly driven by concerns about side effects and vaccine safety. Across studies, non-physician healthcare professionals consistently demonstrated lower influenza vaccine acceptance compared with physicians, while pediatricians and general practitioners were found to receive the influenza vaccine more frequently. In addition, younger physicians and those with fewer years of professional experience showed higher vaccination coverage and a greater likelihood of recommending influenza vaccination to patients. **Conclusions:** Vaccination coverage, worldwide, is lower than what is recommended by the World Health Organization. Healthcare professionals working in hospital settings tend to be vaccinated at



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a higher rate compared with those working in primary care or community-based healthcare settings. The recommendations that healthcare professionals give are influenced by whether they accept influenza vaccines themselves. Beliefs and attitudes seem to influence behavior in countries where structural barriers, such as limited access to primary healthcare and socio-economic status are absent.

Keywords: primary healthcare; prevention; influenza vaccination; attitudes; beliefs; behaviors

1. Introduction

Influenza is a major public health concern responsible for seasonal epidemics worldwide, leading to significant morbidity, mortality, and economic burden [1–13]. Seasonal vaccination remains the most effective preventive strategy, reducing disease severity, transmission, and pressure on healthcare systems [3,4].

Healthcare professionals play a critical role in influenza prevention. Vaccination among this population contributes not only to self-protection but also to the protection of vulnerable patients, including the elderly, immunocompromised individuals, and young children. Furthermore, high vaccination coverage among healthcare personnel is essential for preventing nosocomial outbreaks and maintaining healthcare system functionality, particularly during periods of increased demand [5,14].

In addition, healthcare professionals strongly influence vaccination uptake in the general population through their recommendations and role modelling. Evidence suggests that individuals are more likely to accept vaccination when it is recommended by trusted healthcare providers [5]. Therefore, low vaccination coverage among healthcare professionals may negatively impact public confidence and overall vaccination rates.

Despite the well-documented benefits of influenza vaccination, uptake among healthcare professionals remains suboptimal across regions and professional groups. Barriers such as concerns about vaccine safety and effectiveness, misconceptions, and structural limitations continue to affect vaccination behavior [14,15]. In the context of pandemic preparedness, ensuring adequately protected and trained healthcare personnel is of critical importance for maintaining healthcare system resilience and response capacity.

Although a substantial body of systematic and narrative reviews has examined influenza vaccination uptake among healthcare professionals [16,17], the available evidence remains fragmented across regions, professional subgroups, and conceptual frameworks. Individual reviews typically focus on specific countries, income settings, or professional categories, limiting the ability to derive a coherent global interpretation of beliefs, attitudes, and behaviors. Moreover, the relative contribution of behavioral determinants versus structural and policy-related factors remains inconsistently reported across reviews [18,19]. To address these gaps, the present umbrella review synthesizes evidence from existing reviews to provide a comprehensive, global-level overview of healthcare professionals' beliefs, attitudes, and behaviors regarding seasonal influenza vaccination. By integrating findings across regions, professional groups, and methodological approaches, this review aims to identify consistent patterns, highlight contextual differences, and delineate evidence gaps relevant to infection prevention strategies and vaccination policy design.

The aim of this umbrella review is to synthesize existing evidence on healthcare professionals' beliefs, attitudes, and behaviors regarding seasonal influenza vaccination, and to identify key determinants influencing vaccination uptake across different regions and professional groups.

2. Materials and Methods

This umbrella review follows the PRISMA 2020 statement. A literature search was conducted in three databases: PubMed, Cochrane Library, and Google Scholar. These databases were selected due to their extensive coverage of biomedical and public health literature, ensuring comprehensive retrieval of relevant review-level evidence. The search was performed in December 2025 using specific keywords combined with Boolean operators and asterisks, to ensure comprehensive retrieval of relevant studies. The search query used is the following: (belief* OR attitud* OR behav*) AND (“influenza vaccin*” OR “flu vaccin*”) AND (health OR healthcare OR “health care”).

In this review, the term “healthcare professionals” refers to physicians, nurses, pharmacists, and other health-related personnel (e.g., allied healthcare professionals and administrative staff within healthcare settings) who are involved either directly or indirectly in patient care and public health activities.

Based on the search results, articles that met specific criteria were selected to better address the objectives of the present review. The inclusion criteria were as follows:

- (1) Articles must be reviews.
- (2) Articles must have been published after the following date: 1 January 2000.
- (3) The language of the full text of articles must be English.
- (4) Article should focus on a population of healthcare professionals and record the beliefs, attitudes, and behaviors towards influenza vaccination.

Two reviewers independently screened titles, abstracts and full texts for eligibility and extracted data from included reviews. Any disagreements were resolved by consensus. A protocol was not registered, as no formal requirement exists for umbrella reviews; however, methodological transparency was ensured through adherence to PRISMA 2020 guidelines.

For Google Scholar, the search was conducted using the same query terms, screening the first 200 results sorted by relevance. This approach was applied to enhance the sensitivity of the search and to capture potentially relevant reviews not indexed in traditional databases. In addition, the reference lists of eligible reviews were hand-searched to identify further relevant studies. Reviews were selected because they summarize data from original studies and can provide a more comprehensive picture of the situation. The starting date for the search was set as 1 January 2000, as this date allows for a complete and thorough depiction of the situation. Articles with full text available in English were selected because English is the internationally recognized language and required for publication in major scientific journals.

Although the review targeted healthcare professionals, this population is described heterogeneously across the literature using multiple terms (e.g., healthcare workers, HCWs, health workers). To avoid missing eligible reviews due to terminological variability, automated exclusions were minimized and eligibility was confirmed through manual assessment. This broad and inclusive definition may introduce heterogeneity in the included populations, which should be considered when interpreting the findings. Finally, the inclusion of reviews focusing on healthcare professionals and describing their beliefs, attitudes, and behaviors towards influenza vaccination ensured alignment with the aims of this review. This approach enhances comparability across studies and strengthens the interpretability of the synthesized evidence.

3. Results

3.1. Selection and Characteristics of Included Studies

Following the PRISMA guidelines, a total of 950 records were initially identified (Figure 1). After removal of duplicates and initial screening of abstracts, 55 studies remained

for further assessment. Following full-text screening, 25 studies fulfilling the selection criteria were finally included in this review. A substantial proportion of records were excluded at the full-text stage after verification that the target population did not meet the predefined inclusion criteria. The high number of exclusions observed during the PRISMA flow diagram reflects the methodological decision to apply a sensitive search strategy.

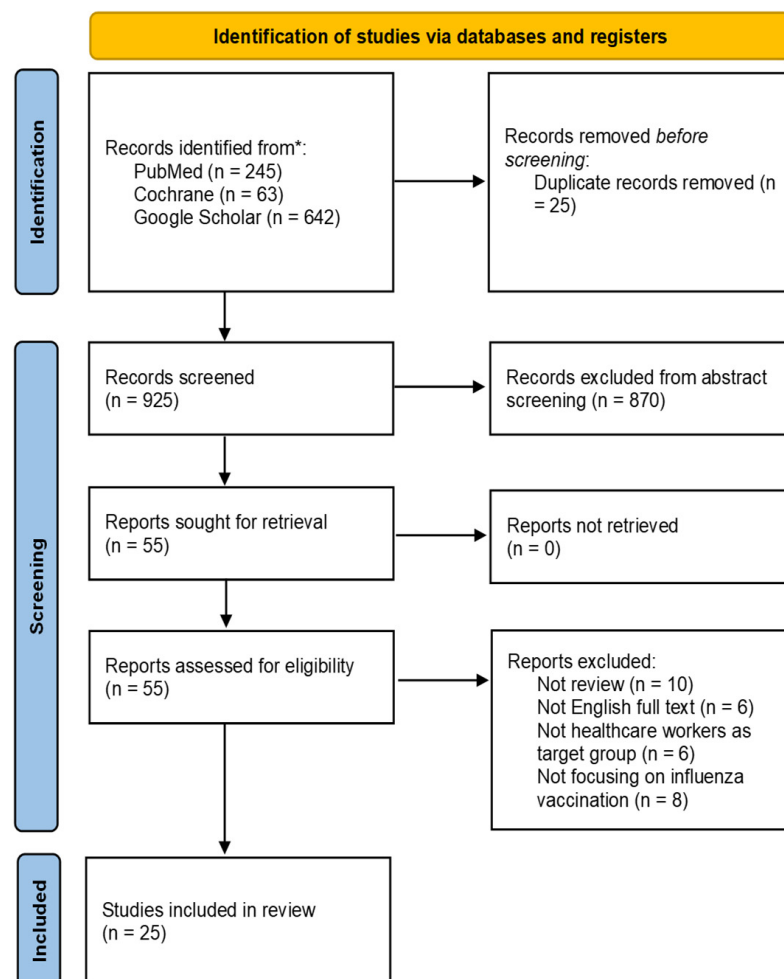


Figure 1. PRISMA flow diagram. * Records were identified from PubMed, Cochrane Library, and Google Scholar.

Regarding risk of bias, out of the 12 systematic reviews assessed for quality using the AMSTAR 2 checklist, 1 was ranked as high quality, 4 as moderate quality, 5 as low quality and 2 as very low quality. The remaining 13 narrative reviews were not formally assessed using AMSTAR 2 and were considered descriptive in nature.

In the following pages, a detailed table with the characteristics of the 25 studies included in this review is presented (Table 1). Authors, publication date, region, health profession, aim, materials and methods and beliefs, attitudes and behaviors regarding seasonal influenza vaccination were collected for each study and are presented in Table 1. The included studies are presented in chronological order based on publication year.

Table 1. Characteristics of included studies.

Authors	Publication Date	Region	Health Profession	Aim	Materials and Methods	Beliefs, Attitudes and Behaviors
Aguilar-Díaz et al. [16]	2011	Worldwide	Healthcare professionals	Identification of factors influencing healthcare workers' influenza vaccination acceptance	A review of PubMed, OVID, and Google Scholar, resulting in the inclusion of 30 studies	Vaccination coverage among healthcare professionals is low. Factors that act as barriers and increase non-acceptance include perceptions of vaccine effectiveness and safety. Factors that enhance acceptance include perceptions of personal and family safety
Alalag et al. [17]	2022	Middle East	Healthcare professionals	An investigation of the factors influencing influenza vaccination coverage	Systematic review of PubMed and Google Scholar resulting in the inclusion of 34 studies	Vaccination coverage among healthcare professionals is higher than that of the general population but remains low relative to the desired levels. The increased risk in healthcare professionals' work environment appears to play some role. Barriers seem to include misconceptions about vaccine safety and effectiveness
Alfouzan et al. [18]	2022	Middle East	Healthcare professionals	A review of the barriers and motivators influencing healthcare professionals' uptake of the seasonal influenza vaccine	A systematic review of PubMed, Web of Science, Google Scholar, EMBASE, Scopus, and the Directory of Open Access Journals, resulting in the final inclusion of 20 studies	Vaccination coverage among healthcare professionals is relatively low, below 50%. This may be due to many varied factors, such as perceived safety and perceived effectiveness. Free availability of vaccines and vaccination within healthcare facilities, combined with educational campaigns to change healthcare professionals' attitudes, can increase vaccination coverage
Bellia et al. [19]	2013	Worldwide	Healthcare professionals	An investigation of the factors that influence healthcare professionals' decisions to undergo influenza vaccination	Review of 250 publications in the Web of Science database	The main factors driving healthcare professionals to receive the influenza vaccine are perceived severity of the disease and perceived vulnerability. Some of the reasons for non-compliance are related to the perception that it is a mild illness and, therefore, vaccination is unnecessary
Bish et al. [20]	2011	Worldwide	Healthcare professionals	An investigation of the factors that determine influenza vaccination coverage	Systematic review of Web of Science resulting in the inclusion of 37 studies	Perceived threat from previous experiences with influenza epidemics or pandemics and perceived effectiveness of the vaccine play an important role in the decision to receive influenza vaccine. Inhibitory factors include the perceived severity of influenza and the perceived safety of the vaccines

Table 1. Cont.

Authors	Publication Date	Region	Health Profession	Aim	Materials and Methods	Beliefs, Attitudes and Behaviors
Dang & Sharma [21]	2020	India	Healthcare professionals	Highlighting vaccination coverage and healthcare professionals' perceptions regarding vaccine effectiveness	Review of 21 publications of PubMed.	Data on vaccination coverage among healthcare professionals in India are limited. However, the increasing incidence of influenza among unvaccinated healthcare professionals indicates low vaccination coverage. The main factors influencing the decision appear to be lack of awareness about availability, doubts about effectiveness, fear of side effects, and perceived risk from the disease
Dardas et al. [22]	2023	Worldwide	Healthcare professionals	An investigation of the factors that influence healthcare professionals' decisions to receive influenza vaccination	Systematic review of: Database of Abstracts of Reviews of Effects (DARE), Cochrane Database of Systematic Reviews (CDSR), PubMed, CINAHL, PsycINFO, Scopus, Web of Science, EMBASE. Inclusion of 368 studies	Vaccination coverage among healthcare professionals appears to be positively influenced by the perception that influenza vaccines provide protection for themselves and their families, and negatively influenced by concerns about the safety of influenza vaccines
Dini et al. [23]	2017	Worldwide	Healthcare professionals	Investigation of the factors influencing healthcare professionals' decisions to receive the influenza vaccine	Systematic review in 27 databases. Inclusion of 28 studies	Vaccination coverage among healthcare professionals seems to be more often positively influenced by the perception that influenza vaccines will help protect themselves and their families, and negatively influenced by concerns about the safety of influenza vaccines
Diomidous & Isaakidou [24]	2020	Greece, Europe and USA	Healthcare professionals	Investigation of factors influencing healthcare professionals' acceptance of the influenza vaccine	Review of PubMed, Medscape, Scopus, Google Scholar. Inclusion of 10 studies	Influenza vaccination coverage among healthcare professionals is low. Healthcare professionals working in health centers and community centers have higher vaccination coverage compared to those working in hospitals. A sense of responsibility toward colleagues and patients appears to positively influence healthcare professionals' attitudes toward vaccination

Table 1. *Cont.*

Authors	Publication Date	Region	Health Profession	Aim	Materials and Methods	Beliefs, Attitudes and Behaviors
Fan et al. [25]	2023	Worldwide	Healthcare professionals	Assessment of influenza vaccination coverage among healthcare professionals and identification of the factors that determine it	Systematic review of PubMed, EMBASE, CNKI, CBM, Wanfang, and VIP. Meta-analysis conducted. Inclusion of 92 studies	Global vaccination coverage among healthcare professionals is estimated to be approximately 40%. The most frequently reported reasons for vaccination are self-protection and protecting family, while the reasons for non-vaccination are perceived ineffectiveness and concerns about potential adverse effects
Glenton et al. [26]	2021	Worldwide	Healthcare professionals	Investigation of healthcare professionals' perceptions of influenza vaccination and their impact on patients over 50 years of age	Systematic review of MEDLINE, CINAHL, Scopus, Epistemonikos, and grey literature. Inclusion of 11 studies	It appears that whether patients get vaccinated is significantly influenced by healthcare professionals. By having healthcare professionals as role models, patients are affected not only by communication and guidance but also by the actual behaviors of healthcare professionals regarding influenza vaccination
Guillari et al. [27]	2021	Worldwide	Healthcare professionals	Investigation of healthcare professionals' perceptions of influenza vaccination	Review of PubMed and CINAHL. Inclusion of 22 studies	A key factor driving healthcare professionals to get vaccinated is the perception of protecting themselves, their family, and their community. Factors that prevent them from vaccination include fear of illness caused by the vaccines, the perception that they are not at risk, and the belief that their immune system is strong
Hall et al. [28]	2022	Worldwide	Healthcare professionals	Investigation of healthcare professionals' attitudes toward influenza vaccination	Systematic review of CINAHL, PsycINFO, Medline, LILACS, Embase, and Scopus. Inclusion of 75 studies	Vaccination coverage among healthcare professionals is lower than the desired levels globally. The decision may be influenced by perceived susceptibility to influenza, perceptions of vaccine effectiveness and safety, and a history of previous influenza infection
Herzog et al. [29]	2013	Developed countries	Healthcare professionals	Investigation of the impact of healthcare professionals' beliefs, attitudes, and behaviors regarding vaccination on their recommendations	Systematic review of PubMed, EMBASE, CINAHL, and CENTRAL. Inclusion of 15 studies	It appears to be a connection between healthcare professionals' beliefs, attitudes, and behaviors and their recommendations for vaccination to the general population. Low vaccination coverage among healthcare professionals may, to some extent, also shape the vaccination coverage of the general population

Table 1. Cont.

Authors	Publication Date	Region	Health Profession	Aim	Materials and Methods	Beliefs, Attitudes and Behaviors
Hollmeyer et al. [30]	2009	Worldwide	Healthcare professionals	Investigation of factors influencing healthcare professionals' acceptance of the influenza vaccine	Review of PubMed. Inclusion of 25 studies	The perception of personal protection and protection of one's family were key factors promoting acceptance of influenza vaccines. Misconceptions and incorrect knowledge regarding vaccine effectiveness and safety were major barriers leading to non-acceptance
Jędrzejek & Mastalerz-Migas [31]	2022	Worldwide	Healthcare professionals	Highlighting the impact of influenza on healthcare professionals and emphasizing the protective effect of influenza vaccination	Review of PubMed. Inclusion of 12 studies	Global influenza vaccination coverage among healthcare professionals is estimated to range from 2% to 44%, while the recommended rate is 90%. This is partly due to gaps in the global literature regarding the clarity of the benefits of influenza vaccination for healthcare professionals. Interventions aimed at changing healthcare professionals' attitudes may contribute to improving coverage
Lorenc et al. [32]	2017	Worldwide	Healthcare professionals	Investigation of healthcare professionals' perceptions of influenza vaccination	Systematic review of MEDLINE, EMBASE, and CINAHL. Inclusion of 25 studies	Healthcare professionals get vaccinated to protect themselves and their patients. Reasons that deter vaccination include doubts about the effectiveness and safety of vaccines and the perception that influenza is not a serious illness
Nowak et al. [33]	2015	USA	Healthcare professionals	Investigation of healthcare professionals' perceptions regarding influenza vaccination	Review of 29 unpublished studies supported by the CDC	Vaccination coverage among healthcare professionals is higher compared to the general population but does not reach the desired levels. There are still many misconceptions among healthcare professionals regarding the effectiveness, safety, and accessibility of vaccines, as well as the severity of influenza

Table 1. Cont.

Authors	Publication Date	Region	Health Profession	Aim	Materials and Methods	Beliefs, Attitudes and Behaviors
Prematunge et al. [34]	2012	Worldwide	Healthcare professionals	Investigation of factors influencing healthcare professionals' acceptance of influenza vaccination.	Systematic review of MEDLINE, PubMed, EMBASE, PsycINFO, CINAHL, AMED, Cochrane Library, ProQuest, and grey literature sources. Inclusion of 20 studies	Vaccination coverage shows a huge variation, spanning almost the entire percentage range. The main reasons contributing to acceptance are perceived effectiveness and safety, as well as a history of severe influenza illness
Seale & Macintyre [35]	2011	Australia	Healthcare professionals	Investigation of influenza vaccination coverage among healthcare professionals within the Australian healthcare system	Review of MEDLINE and EMBASE. Inclusion of 10 studies	Vaccination coverage among healthcare professionals ranges approximately from 15% to 60% and does not reach the desired levels. Coverage is higher in facilities where health promotion interventions for influenza vaccination were implemented. These programs shape healthcare professionals' beliefs, attitudes, and behaviors
Sheldenkar et al. [36]	2019	Asia	Healthcare professionals	Investigation of influenza vaccination coverage among healthcare professionals in Asia and the determinants influencing it	Systematic review of PubMed and LISTA EBSCO. Inclusion of 83 studies, of which 32 referred to healthcare professionals	Vaccination coverage among healthcare professionals is the highest recorded in the Asian population, approaching 40%. The main factor contributing to acceptance is perceived effectiveness, while the primary barrier is perceptions regarding vaccine safety
Silva et al. [37]	2023	Worldwide	Healthcare professionals	Application of the Health Belief Model to interpret influenza vaccination coverage among healthcare professionals	Review of PubMed. Inclusion of 11 studies	The dimensions of the Health Belief Model that appear to be related to healthcare professionals' vaccination behavior are perceived susceptibility, perceived severity of the disease, perceived benefits, and perceived barriers

Table 1. Cont.

Authors	Publication Date	Region	Health Profession	Aim	Materials and Methods	Beliefs, Attitudes and Behaviors
Sydnor & Perl [38]	2014	Worldwide	Healthcare professionals	Highlighting the significance of healthcare professionals' attitudes and behaviors regarding vaccination	Review of 62 studies in PubMed and EMBASE	Influenza vaccination coverage among healthcare professionals is low. Some of the barriers leading to non-acceptance of vaccination include the perception that influenza is not a serious illness, concerns about vaccine effectiveness and safety, and a lack of awareness about vaccination recommendations
To et al. [39]	2016	Worldwide	Healthcare professionals	Highlighting influenza vaccination coverage among healthcare professionals and the factors that determine it	Review of 74 studies in PubMed	Vaccination coverage varies significantly by region as well as across different facilities within the same region. Although the benefits of vaccination are evident, coverage is low where it is not mandatory. The main factors hindering healthcare professionals' vaccination appear to be perceptions regarding the benefits, risks, and effectiveness of vaccines
Waszkiewicz et al. [40]	2025	Worldwide	Pharmacists	Pharmacists' knowledge, attitudes, and beliefs regarding influenza and pneumococcal vaccinations	Review of Medeline, Embase and Cochrane library. Inclusion of 24 studies	Pharmacists have unsatisfactory knowledge about influenza and pneumococcal vaccinations. Shortcomings in attitudes and beliefs about vaccination safety were also present, along with deficiencies of promotion of vaccinations.

3.2. Materials and Methods Used for Data Collection in Included Studies

This section presents the methodological tools, main design elements, and theoretical models used in the 25 studies included in this umbrella review, in order to provide a clearer understanding of their design and methodological approaches. Twelve of the 25 included studies were systematic reviews (Figure 2). All systematic reviews followed the PRISMA 2020 guidelines. Most studies conducted structured searches in major scientific databases, with MEDLINE being the most frequently used source; specifically, 20 studies retrieved data from this database. Only two studies incorporated sources from the so-called “grey literature” [27,34]. All studies aimed to document the beliefs, attitudes, and behaviors of healthcare professionals, as well as the factors influencing them. However, only two studies applied a specific theoretical framework, namely the Health Belief Model [21,37].

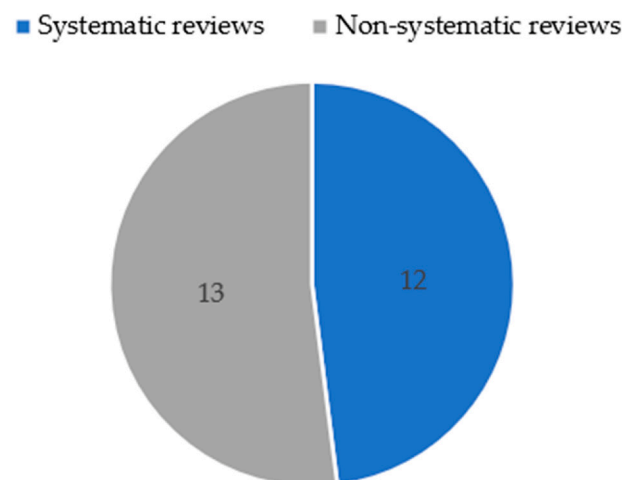


Figure 2. Distribution of included reviews by design.

3.3. Knowledge, Attitudes, Beliefs and Behaviors of Healthcare Professionals Around the World

The percentage of healthcare professionals across all continents who accept influenza vaccination shows marked variation (Figure 3). Across the included reviews, reported uptake ranges from approximately 2–44% in several settings without mandates, with pooled estimates around 40% globally, while coverage can exceed 90% where mandatory policies are implemented [17,31,39]. The vaccination behavior of healthcare professionals appears to influence their recommendations, as it is observed that their advice regarding vaccination of the general population often aligns with whether they themselves accept influenza vaccination or not. Regardless of what the exact vaccination coverage rates are, in all continents these rates are significantly lower than the recommended, desirable levels.

Regarding the beliefs and attitudes of healthcare professionals, it appears that they influence the formation of both the intention to vaccinate and the final vaccination behavior. The strength of this influence seems to be greater in developed countries and weaker in developing countries due to the lack of access to healthcare services in developing countries. Beliefs about protecting oneself and one’s family from the influenza virus were the most reported factors positively influencing vaccine acceptance (Table 2). Additionally, attitudes supporting the effectiveness of the vaccine in preventing influenza transmission were also factors leading to acceptance. The two main barriers leading to non-acceptance were perceptions that influenza vaccines cause adverse side effects, making them unsafe, and beliefs that influenza vaccines are ineffective and unnecessary (Table 2). Although the included reviews consistently report similar determinants, the relative weighting of these factors cannot be quantitatively assessed due to the heterogeneity of reporting and the lack of standardized metrics across studies. However, based on the frequency of reporting

across reviews, perceived protection (of self and family) and concerns about vaccine safety emerge as the most consistently identified determinants, whereas other factors appear to be less frequently reported.

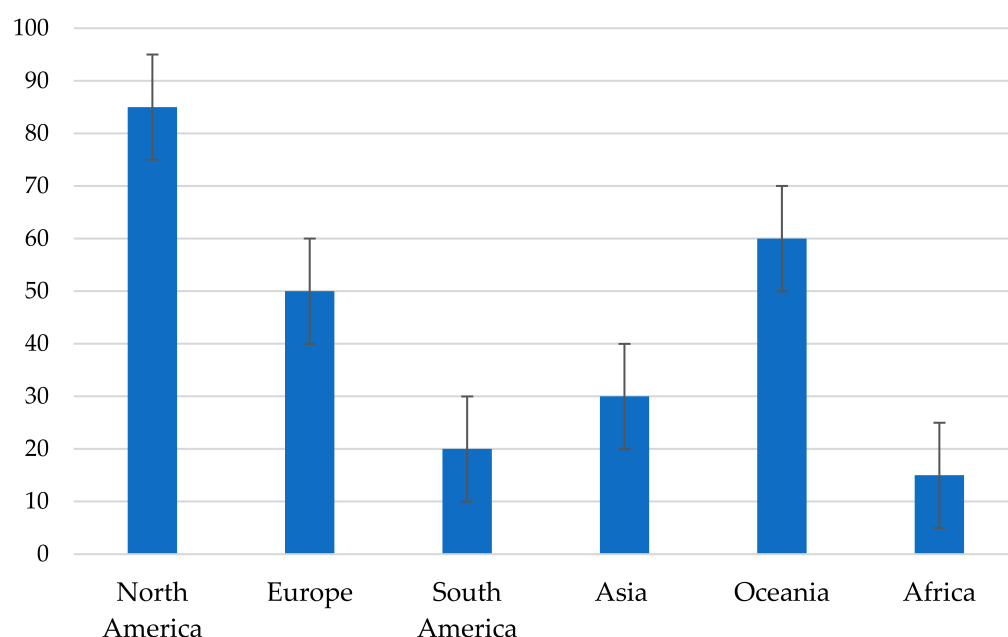


Figure 3. Percentage of vaccination coverage in each continent.

Table 2. Key attitudes and beliefs influencing vaccination acceptance and hesitancy.

Beliefs and Attitudes Associated with Increased Vaccine Acceptance	Beliefs and Attitudes Associated with Vaccine Hesitancy
Protection of self and family	Lack of safety and side effects
Effectiveness in preventing transmission	Ineffectiveness and unnecessary
Safety of administration	No risk of severe illness
Fear of severe illness	Not a priority in daily schedules
Role model for general population	Vaccines are not easily accessible

3.4. Differences Identified Among Healthcare Professionals

The intention to vaccinate and actual influenza vaccination coverage appear to be higher among healthcare professionals working in clinical practice compared with those in non-clinical roles (Figures 3 and 4). In contrast, those working in primary healthcare settings, with the exception of general practitioners, tend to demonstrate lower vaccination intention and coverage than expected.

With regard to age and professional experience, younger healthcare professionals with fewer years of work experience show a higher likelihood of intending to be vaccinated, ultimately receiving the vaccine, and recommending vaccination to their patients, compared with older and more experienced professionals.

Overall, the findings of this umbrella review indicate considerable variability in influenza vaccination uptake among healthcare professionals, influenced by professional role, specialty, and healthcare setting. Physicians generally demonstrate higher vaccination intention, coverage, and frequency of recommending influenza vaccination compared with other healthcare professionals. Among medical specialties, pediatricians and general practitioners were more frequently reported as having higher vaccination uptake compared

with other specialties across several included reviews [41,42]. These findings suggest that both professional role and specialty play a key role in shaping vaccination behavior.

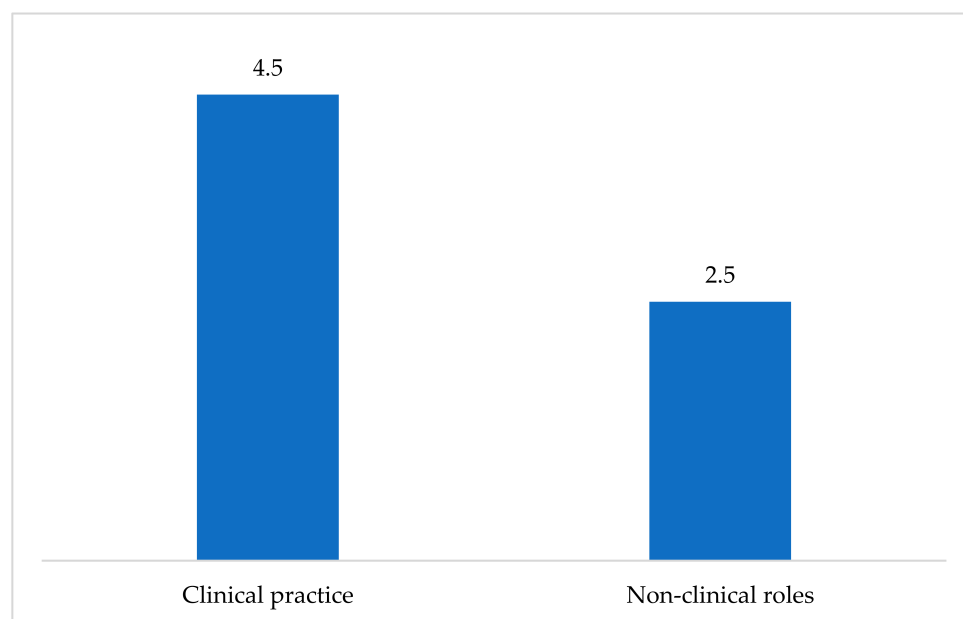


Figure 4. Comparison of influenza vaccination acceptance (%) between healthcare professionals in clinical and non-clinical roles. The y-axis represents percentage of vaccination acceptance.

4. Discussion

This umbrella review aimed to capture the prevailing situation regarding the knowledge, beliefs, attitudes, and behaviors of professionals in healthcare concerning the acceptance or refusal of the influenza vaccination. Through the review, a limited availability of data was observed from many low- and middle-income countries in the continents of South America and Africa, as well as some low- and middle-income countries in Asia. This is also evident in other research efforts in the available literature and may be due to insufficient record-keeping observed in most countries of these continents, and the limited resources for the epidemiological investigation of influenza, because these resources are allocated to other, more significant and life-threatening health issues that exist in each respective region [43,44].

Regarding the vaccination behavior of healthcare professionals, the highest vaccination coverage is observed in North America. This finding is also consistent with other studies [45,46]. One of the key factors contributing to higher vaccination coverage in this region is the implementation of mandatory vaccination policies for healthcare professionals in several U.S. states and in Canada. While such policies may raise considerations related to individual autonomy and may be associated with varying levels of hesitancy or public debate, evidence consistently indicates that they are highly effective in achieving and sustaining high vaccination coverage among healthcare professionals [39,47]. Policy and implementation considerations are summarized in Section 4.1.

In addition to mandatory vaccination policies, structural factors such as employer-based vaccine provision and cost coverage play a critical role in shaping vaccination uptake among healthcare professionals. In several high-income settings, including the United States and Canada, influenza vaccination is often offered free of charge and may be linked to occupational requirements, thereby reducing financial and logistical barriers. This contrasts with lower-resource settings, where vaccine cost, availability, and access remain important limiting factors. Therefore, differences in vaccination uptake across regions

cannot be attributed solely to beliefs and attitudes but also to structural and policy-related determinants [39,46,47].

In contrast, the lowest influenza vaccination coverage among healthcare professionals is observed primarily in African countries and, subsequently, in South American countries, as is also shown by other researchers [48–50]. These countries are, mostly, low- and middle-income countries. The availability of resources to meet health needs is limited and primary healthcare services are underdeveloped. Moreover, limited healthcare workforce and urgent health needs essential for survival, lead to substantial gaps in the recording of influenza cases and vaccinations, as well as significant difficulties regarding the cost coverage of vaccines, their availability, and access. As a result, the epidemiological data available for these regions are limited. Nevertheless, low vaccination coverage is consistently reported, which further complicates the public health situation in these areas [51–53].

Influenza vaccination coverage among healthcare professionals in Europe and Oceania is similar. Lower than North America's, but comparatively higher than Africa's and South America's [54–57]. In Europe, as in Oceania, there are no laws mandating influenza vaccination. For this reason, the guidelines concerning the desired vaccination levels for healthcare professionals serve as recommendations rather than obligations. This provides flexibility and freedom of choice; however, it comes at a cost in terms of achieving high levels of vaccination coverage [58–60].

Regarding Asia, influenza vaccination coverage among healthcare professionals shows the greatest variability, as it consists of both low- or middle-income and high-income countries [58,61]. Vaccination coverage is higher than South America's but lower compared to Oceania's and Europe's. The Middle East region has the higher vaccination coverage when compared to other countries of Asia. This finding is also reflected in other research efforts [62–64].

Overall, the vaccination behavior of healthcare professionals for influenza is lower than recommended levels. This pattern is observed across all regions. In areas where income is lower, vaccination behavior is even more limited [65,66]. It seems that socioeconomic conditions are important in covering health needs. The inability to cover the cost of healthcare services and the deficiencies in primary healthcare limit access to primary healthcare services. Instead, the emphasis is placed on urgent issues necessary for human survival. As a result, priorities are shaped in such a way that certain public health needs—such as influenza vaccination—are overlooked, even among healthcare professionals [67–70].

Several studies attempt to document knowledge, beliefs, and attitudes to approach the factors shaping behavior [71–73]. In low- or middle-income regions, a divergence is observed between attitudes, beliefs and actual behavior, reducing their usefulness in both predicting and shaping behavior [71,74]. Limited vaccine availability, cost, and lack of access may all contribute to low vaccination coverage. For this reason, although knowledge, attitudes, beliefs, and intention to vaccinate support vaccination behavior, the functional barriers mentioned earlier are responsible for preventing attitudes and beliefs from being reflected in behavior as well as in recommendations to the general population [71,75,76].

Beyond structural and contextual determinants, temporal factors may also influence vaccination attitudes and behaviors. Although this umbrella review did not perform a formal temporal stratification of studies, some evidence suggests that the COVID-19 pandemic has influenced healthcare professionals' attitudes toward vaccination [16,17]. Studies conducted during or after the pandemic indicate increased awareness of infectious disease risks and, in some settings, improved vaccination uptake. However, this effect appears to be heterogeneous and context-dependent, with other studies reporting persistent hesitancy driven by safety concerns and vaccine fatigue. Given that review articles inherently include

data collected prior to publication, the extent of post-pandemic shifts should be interpreted with caution.

Within this context, consistent with the findings presented in the Results section, the most frequently reported facilitators of influenza vaccination among healthcare professionals include perceived protection of oneself and family, which strongly motivates both vaccine uptake and recommendation to patients [66,77]. They also report the belief that vaccines are an effective method for preventing influenza and infections in general [78,79]. Overall, a sense of immediate risk to oneself and to close family members leads to quicker compliance with the guidelines [77]. Moreover, confidence in vaccine effectiveness is strongly associated with both personal uptake and the likelihood of recommending vaccination to patients [79].

As for the attitudes and beliefs that act as barriers and lead healthcare professionals to refuse influenza vaccination, the perception of risk prevents individuals from undergoing that intervention, regardless of their level of knowledge about its mechanisms of action [80,81]. Another barrier often mentioned is the belief that influenza vaccines are ineffective in preventing the transmission of the influenza virus, and therefore, do not need to be administered. In contrast to beliefs and attitudes supporting effectiveness, when an intervention is perceived as ineffective, the following question naturally arises: “Why should I undergo or recommend this intervention?” Consequently, individuals who do not consider influenza vaccines effective do not believe it is necessary to receive or recommend them [82,83].

With regard to the differences observed among various healthcare professionals, those who are actively engaged in clinical practice and come into daily contact with patients tend to think more about protecting themselves and their patients [41]. In contrast, healthcare professionals in administrative roles have much less frequent contact with patients. For this reason, having reduced exposure to patients, it is reasonable that they exhibit comparatively lower vaccination intention and behavior [84].

Regarding the different specialties among primary healthcare professionals, it was observed that vaccine acceptance is higher among medical professionals compared with other healthcare professionals. One explanation is the variation in knowledge between physicians and nurses or other professionals concerning the mechanisms of action of influenza vaccines [85]. Physicians, having received the most specialized training among healthcare professionals, are better able to understand how influenza vaccines work, the process of immunization, the duration of protection, and the need for booster doses. As a result, they are more likely to accept, receive, and recommend influenza vaccination [86].

Another factor contributing to higher vaccination intention and coverage among healthcare physicians is their role as examples of healthy and protective behaviors in the eyes of the public. The general population relies on physicians when making health-related decisions [87]. Physicians can influence healthcare users through their own behavior. For this reason, by considering both physicians’ specialized knowledge about influenza vaccines and their responsibility as healthcare role models, the comparatively higher rates of vaccination intention, coverage, and recommendation observed among physicians can be explained [88–90]. The highest rates of vaccination coverage and frequency of vaccine recommendation are observed in the specialties of pediatrics and general medicine [41,42].

The findings of this umbrella review support several actionable strategies to increase influenza vaccination coverage among healthcare professionals and strengthen downstream effects on patient uptake.

4.1. Implications for Public Health Policy and Practice

Based on the findings of this umbrella review, several practical implications for public health policy and practice can be identified:

- Communication and role modelling: Vaccinated healthcare professionals are more likely to recommend vaccination to patients, reinforcing their role as trusted role models and amplifying impact at the population level [27,29,38].
- Targeted education: Interventions addressing misconceptions about vaccine safety and effectiveness can increase uptake, particularly among non-physician healthcare professionals, where acceptance is typically lower [22,41,79].
- Convenient access: On-site and free-of-charge vaccination within healthcare facilities improves uptake, especially in settings with lower baseline coverage [35,54].
- Mandates and governance: Mandatory vaccination policies are consistently associated with the highest coverage, often exceeding 90%, compared with voluntary programs [39,46,47].

Key strengths of this umbrella review include the comprehensive literature search, the inclusion of high-level evidence from systematic reviews and meta-analyses, and the global synthesis of behavioral determinants across regions and professional groups.

A further methodological limitation relates to the potential overlap of primary studies across the included reviews. Given that umbrella reviews synthesize evidence from multiple reviews, such overlap is likely [20]. The absence of a formal overlap assessment (e.g., corrected covered area) may result in double-counting of evidence and potential overrepresentation of certain findings.

4.2. Limitations

This umbrella review has several limitations that should be considered when interpreting the findings. A key limitation relates to the methodological heterogeneity of the included studies, as the sample comprised both systematic and non-systematic reviews. Systematic reviews, which follow predefined protocols and standardized methodological frameworks, are generally considered to provide higher-quality evidence [20]. However, most of the systematic reviews included in this umbrella review were assessed as being of moderate or low methodological quality. In contrast, narrative reviews tend to be more inclusive but are not subject to the same level of methodological rigor, which may affect the consistency and strength of the synthesized evidence. Taken together, these factors may have influenced the overall strength and reliability of the findings [20].

Remaining within the methodological considerations, an additional limitation relates to the heterogeneity of the studies included in the reviews examined in this umbrella review. Different research designs provide varying levels of evidence strength, and the inclusion of diverse study types may affect the overall robustness of the findings.

Furthermore, the inclusion of systematic reviews of varying methodological quality, as assessed using the AMSTAR 2 checklist, may influence the strength and reliability of the synthesized evidence. Therefore, the findings should be interpreted with caution, particularly where conclusions are derived from reviews rated as low or very low quality.

A further limitation concerns the variability in how beliefs, attitudes, and intentions toward influenza vaccination are measured and reported. While vaccination behavior can be more directly reflected through coverage rates and recommendations, underlying cognitive and behavioral determinants are influenced by multiple contextual factors and assessed using heterogeneous methods. This variability limits comparability across studies and may reduce the overall consistency and interpretability of the findings.

4.3. Future Research Directions

Future research should address several important gaps identified in this umbrella review, with the aim of advancing understanding of beliefs, attitudes, and behaviors toward seasonal influenza vaccination among healthcare professionals. In particular, there is a notable lack of data from low- and middle-income regions, highlighting the need for increased research activity in these settings to support more robust and generalizable conclusions.

In addition, future studies should move beyond treating healthcare professionals as a homogeneous group and instead focus on differences between specific professional subgroups, such as physicians, nurses, pharmacists, and community health workers. A more granular approach would allow for a better understanding of subgroup-specific determinants of vaccination behavior and support the development of more targeted and effective interventions.

5. Conclusions

Considering the evidence synthesized in this umbrella review, influenza vaccination uptake among healthcare professionals remains suboptimal across most regions. The highest coverage levels are observed in North America, likely reflecting the impact of mandatory vaccination policies, whereas the lowest levels are reported in African and other low- and middle-income regions, where resource constraints and limited access to vaccines remain key barriers.

Vaccination behavior varies across professional groups. Higher uptake is generally observed among those working in clinical and hospital settings, as well as among younger professionals with fewer years of experience. Some evidence suggests that pediatricians and general practitioners may demonstrate higher vaccination uptake compared with other specialties, although this finding is not consistently reported across all studies. In contrast, other primary healthcare professionals tend to exhibit lower vaccination levels.

Vaccination acceptance is strongly influenced by knowledge, attitudes, and beliefs. Perceived protection for oneself and family is a key driver of vaccine uptake, whereas concerns about safety and adverse effects act as major barriers. Importantly, healthcare professionals play a critical role in shaping public attitudes, as their recommendations are closely linked to their own vaccination behavior and are highly influential within the general population.

Strengthening influenza vaccination uptake among healthcare professionals is therefore essential not only for individual and patient protection, but also for improving public confidence and enhancing vaccination coverage at the population level.

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