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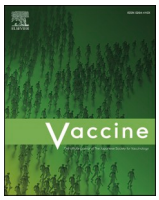

Review

Facilitators to strengthening vaccine uptake post-pandemic amongst underserved populations considering social norms and health beliefs: a global systematic review

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ABSTRACT

Reasons for low vaccine uptake include personal, physical, and societal barriers, which are not well understood for specific underserved communities, particularly ethnic minority and migrant groups. We reviewed gaps to understanding low vaccination uptake in underserved populations globally and summarise key determinants associated with vaccination uptake considering social norms and health beliefs.

Methods: Published literature was searched using PubMed, MEDLINE, EMBASE; PSYCHINFO and Web of Science from 2020 to 2024 for primary research, with no restrictions on language; to understand uptake of COVID-19 and other vaccinations considering social norms and health beliefs in underserved groups. 55, 925 papers were screened, and 37 studies included from regions including Europe, USA, UK, African, South-Asian, and South-East Asian regions.

Findings: A total of 37 studies were included. Four themes pertinent to behavioural outcomes were identified in relation to vaccine uptake across ethnic groups, ethnic minority, and underserved groups, including: Influences of Health Belief Systems, Behaviours and Vaccine Uptake; Role of Social and Cultural norms, and Vaccine Uptake; Provision of Information and Vaccine Uptake; and Trust and Vaccine Uptake. We found vaccine uptake was linked with socio-demographic factors, particularly age, gender and ethnicity. There were similarities between first generation migrants and ethnic minority groups from USA or UK, and those from other regions. Younger, male and individuals from rural regions from their own native countries were also less likely to take up vaccination. Societal influences and norms were found to be significant predictors of vaccine uptake.

Discussion: We reviewed, how social norms and health beliefs interplay with vaccine uptake in underserved groups and report facilitators to overcome vaccine hesitancy across these population groups. There is a need to provide adequate, tailored information to combat misinformation, through trusted messengers or gatekeepers to overcome the misconceptions around vaccine, by gaining the trust of underserved groups.

Discussion: This review provides an overview of how social norms and health beliefs interplay with vaccine uptake in underserved and ethnic groups. It reports facilitators to overcome the barriers associated with vaccine hesitancy across these population groups. There is a need to provide and spread adequate and tailored information to combat misinformation, through trusted messengers or gatekeepers, which in turn could overcome misconceptions around vaccination, by gaining the trust of underserved groups, through support programmes facilitating vaccine uptake.

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1. Introduction

Barriers to vaccine uptake (involving a range of both personal, physical, and societal barriers) are not well understood for specific underserved communities [1]. Notwithstanding vaccine hesitancy amongst some wealthy white groups, low vaccine uptake is particularly relevant to those from ethnic minority and migrant groups. Study reports identified several factors contributing to low vaccine coverage including low education and health literacy; less access to healthcare services; region of residence (living in remote or rural areas); distrust of health system or authorities; low perception of risk of disease or importance of vaccination and culture. Behavioural and Social drivers of vaccination is a framework used to define beliefs and experiences specific to vaccination that are potentially modifiable to increase vaccine uptake [1,2]. These have been grouped to include four domains: 1. Thinking and feeling about vaccines (for example, including stigma around specific vaccines due to health beliefs); 2. Social processes that drive or inhibit vaccination (for example, community and social norms); 3. Motivation (or hesitancy) to seek vaccination (for example, preference of natural remedies, or natural immunity); 4. Practical issues involved in seeking and receiving vaccinations (for example, vaccination not recommended by a trusted source (community gate keeper or healthcare provider, or low access to healthcare services) [1,3].

Findings from American and European studies demonstrate the significant differences in vaccination uptake in certain groups of people, particularly COVID-19 vaccines [4–6]. Female participants, and individuals from Black or Black British ethnic groups but also Pakistani and Bangladeshi groups were less likely vaccinated. Additionally, there is lower uptake amongst people from low-income communities, including homeless groups, refugee, and migrant populations [4,7].

Research exploring how the COVID-19 pandemic has shaped experiences, views, and perceptions of vaccinations remains important for underserved groups. This is particularly relevant for those from ethnic minority, migrant populations, and those from low-income backgrounds. The WHO immunisation agenda states the importance of making progress towards universal health coverage [2]. Key areas for policy consideration are ensuring universal and equitable access to vaccines for all refugees and migrants. There is an ongoing need to address low vaccination uptake that persists post-pandemic, also affecting other vaccine-preventable diseases. This can be achieved through understanding factors that interact with vaccination uptake amongst these population groups considering social norms and health beliefs [8]. Health behaviours and attitudes are heavily influenced by behaviours and attitudes of peers (i.e., social norms); such individuals refusing vaccines often hold deeply rooted ideologies or health beliefs influenced by religious and cultural views, leading to insular communities both in physical and online spaces, which are highly resistant to change [9].

Therefore, we performed a systematic review to gain better insight into 1) how different underserved populations vary in vaccination uptake; 2) to what extent and how social norms predict vaccination uptake; and 3) to what extent and how health beliefs and behaviours influence vaccination uptake in underserved population groups.

2. Methods

In this paper, underserved communities include those from ethnic minorities, those who are migrants or socioeconomically deprived persons (refer to Box 2 for definition). To increase vaccine coverage within such groups, it is vital to understand the reasons why uptake is low.

2.1. Theoretical framework

We applied specific theoretical frameworks to identify certain determinants to help understand individual perceptions of vaccine uptake; and how factors such as social norms and health beliefs predict uptake behaviours. We applied Health Belief Model (HBM) and Common-Sense Regulatory Model (CS-SRM) [10], as they have previously been used to understand health-related behaviours of similar groups including underserved and minoritised groups.

The HBM will assist in understanding why patients do not engage in preventive health behaviours, and their views regarding symptoms and prescribed regimens; whilst the CS-SRM considers the emotional processes related to health beliefs. Determinants from both models will draw upon factors associated in underserved groups and vaccine uptake behaviours, such as stigma, fears, anxieties, cultural norms and values.

Constructs of these frameworks have been presented as sequential framework (Fig. 1) to show how certain variables overlap and can be applied, to understand individual beliefs, perceptions and how people make sense of vaccinations and vaccine uptake.

We conducted a systematic review according to PRISMA guidelines and registered the protocol to the international register of systematic reviews, PROSPERO (ID: CRD42022355986). The Search strategy has been shown below (Diagram 1).

2.2. Inclusion/exclusion criteria

Inclusion and exclusion criteria alongside elements of the PICO framework are listed below (Table 1).

2.3. Search strategy and selection criteria

We searched PubMed, MEDLINE, EMBASE; PSYCHINFO and Web of Science and retrieved articles between 13/10/2020 and 16/04/2024. Free text terms and subject headings were combined relating to underserved populations, vaccination, social norms, and health beliefs. A full search strategy is included in Table 2 (Appendix 1).

Two reviewers (TC and PT) carried out title/ abstract and then full-text screening. TC and PT also extracted data from the papers assessed the quality of all studies in duplicate. Grey literature sources such as publications by the government and health organisations were included to fully map the available evidence, and to provide a broad overview of the topic of interest. Additionally, reference lists were also screened for other relevant papers. Research Articles had to be peer-reviewed and indexed in English for inclusion. To maximise results there were no restrictions to the language in which the papers were published in, nor to study setting or region. We included studies with a broad definition of

Box 2
Definition of Key Terms.

Underserved Individuals
Vulnerable, and special needs populations including minority members or individuals who have experienced health disparities [5].
Health Beliefs
Individual's ideas or perceptions about their health, what they think constitutes their health, what they consider the cause of their illness, and ways to overcome an illness [6]
Social Norms
Implicit or explicit rules that a group uses to determine values, beliefs, attitudes, and behaviours [7,8].

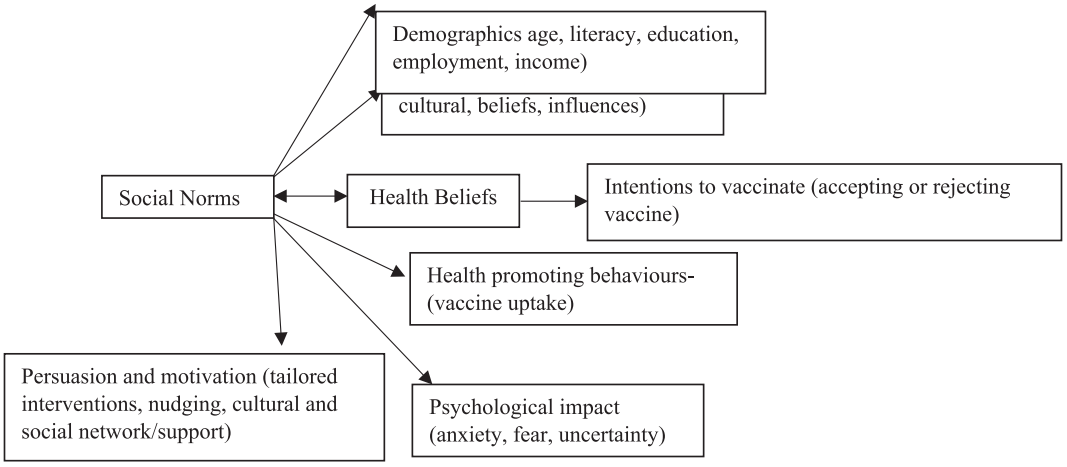

Fig. 1. Key Theoretical Determinants pertinent to Vaccine Uptake Behaviours.

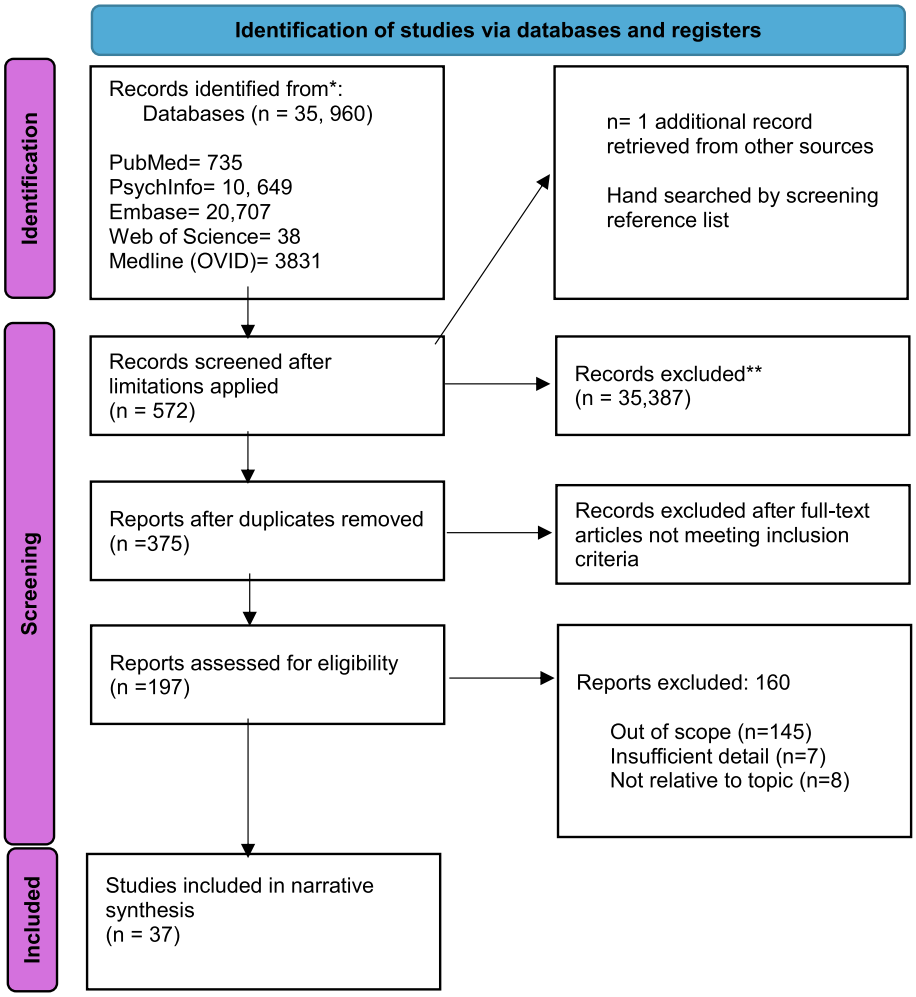

Diagram 1. PRISMA Diagram Presenting Overview of Search and Papers Retrieved.

underserved, encompassing populations from a broad range of minority groups (Table 1).

2.4. Data synthesis and extraction

Data were independently extracted by two reviewers (TC and PT) using a customised data extraction sheet developed and piloted for the review (Table 3, Appendix 2). This included location and year of study, study methods, strengths and limitations, as well as main concluding points. Discrepancies at any stage were resolved by consensus.

Extracted data were tabulated and results presented as reported in the studies. Both qualitative and quantitative data were synthesised narratively. Data synthesis and analysis were carried out by two reviewers (TC and PT) in consultation. Concepts and determinants of the

Table 1
Inclusion Criteria.

	Inclusion	Exclusion
Population	Underserved groups- ME, Migrants, and low-income groups (vaccinated not vaccinated); Participants from different ethnic or native groups within their countries	Paediatric or adolescent populations (<18 years); participants from general populations, with high income, as the focus is on adult decision-making processes.
Intervention	Vaccination	NA
Comparison/ control	Populations that are Caucasian with non-Caucasian, high-income groups with low-income groups and those who have been vaccinated with those not vaccinated	NA
Outcome	Understanding uptake of COVID-19 and general vaccinations considering social norms and health beliefs	NA
Study Design	Primary research- quantitative and qualitative studies	Professional/ specialist opinion, Dissertation, Non-academic Journal
Other	Published in any language, Peer-reviewed papers, reports, and grey literature, published on relevant topic between 2022 and 2024	Papers that did not explore views and experiences in regards to vaccine hesitancy considering social norms and health beliefs

CS-SRM and the HBM [10,11] helped identify relevant themes to elicit and demonstrate how factors such as social norms and health beliefs influence vaccine uptake behaviours across underserved groups.

2.5. Quality assessment

All studies were quality-assessed using the Critical Appraisal Skills Programme (CASP) [9],

a well-recognised tool aimed to develop an evidence-based approach in healthcare, to analyse the best available research [9,10]. The CASP framework was used alongside the NICE (2016) [11] methodology checklist, for a more focused critique of the evidence on the topic.

Both qualitative and quantitative studies were scrutinised separately; to make sense of the research evidence and to identify a dearth in literature concerning this topic of interest. Sample judgement was determined by sampling framework, participant selection, recruitment methods, number of participants recruited and representativeness of target population; whilst, method judgement included methodology description of fieldwork, data collection methods and analysis framework.

Quality assessment indicators were used to give judgement using three categories- low (−), medium (+) or high quality (++) (Table 4, Appendix 3). We did not exclude any papers based on quality. Some studies scored average due to their small sample size and purposive sampling technique used for recruitment [28,36]. However, the majority of studies scored highly featuring robust methods addressing their study aims [22,23].

3. Results

3.1. Overview of included studies

A total of 37 primary research papers were retrieved and scored on quality and rigor (Table 3, Appendix 2) [15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26,27, 28, 29, 30, 31, 32, 33, 34, 35, 38, 39 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55]. The PRISMA diagram below presents an overview of the search, selection process and the papers included.

Both qualitative and quantitative studies were included in the review. Questionnaires, surveys and validated instruments were commonly used to collect demographical data and Likert-scales to assess experiences of vaccine uptake; whilst interviews and focus groups were used to explore experiences of uptake.

Out of the 34 quantitative studies, 31 were cross-sectional studies, assessing determinants of COVID-19 vaccine acceptance, particularly health beliefs and social norms. Two of the 34 quantitative studies used a barrier analysis, a rapid assessment tool to identify behavioural determinants to better understand specific factors of COVID-19 vaccine hesitancy and acceptance. There were only three qualitative studies [27,28] exploring patient experiences and perceptions regarding vaccine uptake. These studies used interviews and focus group discussions to gain insight into COVID-19 vaccination beliefs, attitudes, and behaviours. Three studies also employed mixed methods complimenting both methods, to gaining a more insightful understanding of vaccine uptake behaviours within the target group.

Papers reported on underserved groups based in the USA, UK, and Europe, as well as ethnic or native groups from Asian and African regions. The study settings and sample selection are included in supplement table 3 (Appendix 2).

Many studies presented large and representative samples [18–24], including six studies that recruited multisite samples [25,26]. For those studies where sufficient quality and rigor existed, the results could be generalised across the different population groups from different countries [27,28]. Most studies were of high quality ($n = 36$), with only one of medium quality [17]. COVID-19 vaccine uptake correlated with varied socio-demographical characteristics.

3.2. Determinants of vaccine uptake in underserved groups

Although, this review focuses on social norms and health beliefs influencing vaccine uptake,

papers described varied determinants for vaccine, which are relevant to the theoretical frameworks applied. Studies identified vaccine uptake linked with socio-demographic factors in different regions, including age, gender, ethnicity, education levels, and cost and/or affordability [24–26]. Similarities were reported amongst first generation migrants and ethnic minority groups from USA or UK, as well as those from African, South-Asian, and South-East Asian regions [27–29].

Younger, male and individuals from rural areas of their native countries were less likely to take up vaccination for COVID-19. Societal influences and norms were found to be significant predictors of vaccine uptake [12–14]; for example, there was a tendency to use alternative home or natural remedies instead, which they believed improved COVID-19 symptoms more effectively than the vaccine; although, no remedy has been listed within the studies [23].

Several variables associated with vaccine acceptance and health-related beliefs; social and behavioural determinants, and barriers relative to vaccine hesitancy were explored across the literature. These factors have been extracted as key themes and discussed in further details below.

In line with the HBM and CS-SRM, behavioural determinants associated with COVID-19 vaccine acceptance in certain regions included: perceived social norms, safety of COVID-19 vaccines and trust in them, perceived risk/susceptibility, perceived self-efficacy, perceived positive and negative consequences, access, and perceived divine will [13–15]. A summary of social norms and health beliefs influencing vaccine uptake has been provided below in Table 4, (Appendix 5).

Specific themes were identified related to these which were found to be pertinent to behavioural outcomes in relation to vaccine uptake across ethnic groups, ethnic minority, and underserved groups. These are listed and discussed below:

- Influences of Health Belief Systems, Behaviours and Vaccine Uptake [23,25,26].
- Role of Social and Cultural norms, and Vaccine Uptake [28–31].
- Provision of Information and Vaccine Uptake [24,36,40].

- Trust and Vaccine Uptake [31,38,45].

3.3. Influences of health belief systems, behaviours and vaccine uptake

Common themes regarding health beliefs and vaccine acceptance across the literature included: fear, faith, and issues with trust. These were not discussed in detail, and many of the studies were cross-sectional, and not exploratory in nature. The themes identified are interlinked and reduce COVID-19 vaccination likelihood. Studies suggested certain beliefs about vaccines to have shaped concerns related to vaccine hesitancy, particularly during the COVID-19 pandemic where certain people were finding it difficult to accept that a "flu-like illness" could be life-threatening and vaccine-preventable [16,23,24]. During the first roll-out in 2020, individuals from younger population groups found internet websites and social media forums to be responsible for the spread of misinformation, leading to fear of side effects or mistrust. This was mainly due to information coming from unreliable sources, from those who had limited experience, or those who did not have a healthcare background.

Stated reasons of fear and mistrust was mainly prompted by fear of adverse effects to a newly developed vaccine being used too soon after roll-out, as well as economic and political motives linked to the vaccine being developed to advance in vaccine sales [25,26]. This association was significant in western countries, including in the UK and USA [20,23,25]. Faith and religious beliefs also resulted in vaccine refusal as some participants considered health and immunity to come from God, not the vaccine.

In summary, health beliefs were pertinent to decision-making processes and intentions of getting vaccinated. The findings show underserved groups did not regard the vaccine as a protective measure, instead they believed it to be ineffective causing adverse effects, which resulted in low uptake.

3.4. Role of social and cultural norms, and vaccine uptake

Social and cultural norms are closely interlinked with health beliefs as shown in Fig. 1 and influence preventive health behaviours.

Findings from UK and USA studies report that low vaccine uptake was associated with social norms and young age [28,29]. This is due to the behaviours of young adults being strongly influenced by the behaviours and attitudes of their peers [30]. Vaccine uptake of COVID-19 and flu were compared within native university students in Egypt and underserved students in USA; the majority showed greater intentions to get the COVID vaccine (91.6 %) compared to the influenza vaccine. Although this population showed strong intentions to receive vaccines, some authors perceived other young adults (both within and outside of university) may delay uptake as it may not be a priority, for example, some participants linked this perception with being young and immune to the virus [31].

The concept of peer-trust was briefly described in some studies which helped bring people from similar communities together, so they could share experiences, make joint-decisions, and support one another during the vaccine roll-out [32]. For example, some population groups preferred information to be provided by, or the vaccine administered from a healthcare provider from a similar ethnic background [27,49,50]. This was noted in Black-African and South-Asian people; and suggesting trust in those who share common traits, resulting in an effective patient-clinician relationship and increased likelihood of vaccine acceptance [34,39].

Some studies found that there were significant peer influences where family members, particularly parents that decided on behalf of others, whether getting the vaccine was safe or not. This included children and extended to other adult family members [19,21,31–33]. Common reasons for parental refusal were related to concerns with side-effects, lack of information, and perceived low risk in children [30,32,35]. Individuals who were older or those vulnerable due to co-morbidities. were more willing to get vaccinated. However, older adults were also reported to make decisions within the context of their families, many refused to be vaccinated for similar reasons including mistrust and concerns with the accelerated timeline for vaccine development [30,31].

Other normative practices included religious or faith systems. Participants from some US studies cited religious norms and practices as influential factors influencing vaccine uptake. Participants sought support from community gatekeepers or religious scholars. Some Muslims refused the vaccination as they regarded the vaccine to not be 'halal,' which is an Arabic term used to describe what is permissible to consume in Islam [26,36]. There were limited papers found to further support this argument; however, religious leaders and faith systems had varied opinions where some were in favour of the vaccine, and some who were against it [36,37].

3.5. Provision of information and vaccine uptake

Some literature suggests low vaccine uptake may be associated with information access and provision [24,25]. People were more likely to reject vaccines if they had limited information, and misinformation could lead to mistrust, whilst on the other hand too much information was overwhelming leading to an decrease in vaccination uptake [24,36].

Studies reported unaddressed educational and information needs amongst communities including information regarding benefits of vaccines [38–41] Some papers stated that policymakers and health care providers should address vaccination hesitancy by emphasizing factors that support positive attitudes and information seeking behaviours to promote uptake; and refrain from exerting social pressure which participants may feel would counter their health or normative beliefs [38,39]. This was commonly experienced amongst healthcare workers from ethnic minority backgrounds, who had varied reasons for refusal of vaccination, but felt pressured from their peers or colleagues in the workplace. Reasons to not get the vaccine in such groups were mainly due to religious beliefs or beliefs of vaccines being ineffective. Suggestions were made to develop communication materials and access-driven interventions that are tailored to different groups so they can access reliable, accurate, and trusted information [33,35].

Setting and residence were reported to affect both education levels and information seeking behaviours. Persons living in rural regions of South-East Asia had limited healthcare related knowledge and information about accessing vaccines and other therapeutic options, which adversely impacted COVID-19 vaccination and adherence to government prevention measures [23,42–46]. This was noted in participants from low-income countries such as Africa, India, Bangladesh, Philippines and parts of China, Indonesia, Thailand, and Vietnam [28,34,37,43]; mainly due to associated costs to access treatment or vaccines. In comparison, the UK and USA provided better opportunities, access to healthcare services, and information regarding vaccines for underserved groups [17,19; 43, 44, 45].

Difficulties in accessing appropriate information about vaccines led to reliance on second hand information provided by others. This included information from partners, families, or healthcare workers to help understand COVID-19 vaccinations [22,24,27,30]. The circulation of this type of information was one of the main reasons that resulted in misinformation retrieved amongst individuals and communities, leading to low uptake.

3.6. Trust and vaccine uptake

Trust was reported to influence attitudes, views, and beliefs on benefits and risks of the vaccine across multiple studies. There was also the notion of trust being linked with information-seeking behaviours in certain communities as information was being filtered and retrieved by people through other members, considered as "trustworthy" sources within their social network. [41].

Generally, positive attitudes towards getting vaccinated were increased through scientific evidence regarding vaccine development [31,38]. There appeared to be a positive correlation with educational achievement and willingness to get vaccinated [45–49]. Low uptake or non-acceptance was due to concerns about side effects, the long-term effects on health (for example, long-covid), and concerns that the vaccine had not been trialled in ethnic minority groups [28,31,36]. This was common in Black and Asian ethnic minority groups. One study examined this further amongst healthcare workers from these backgrounds, who expressed feeling pressurised to get vaccinated due to front-line work.

Findings suggest trust being undermined by suspicion of systemic racism (e.g. racism in healthcare, in medical research, and government) [20]. This corroborates with other studies which shows mistrust in government and public health bodies due to similar reasons, leading to rejection or low vaccine uptake [21,34,43,44]. The concept of systemic racism is briefly explored in the studies retrieved, as findings demonstrate racial disparities resulting in racially patterned differences in access to healthcare, masks, sanitizers, and vaccinations [50]. Racial and ethnic minority groups received care in under-resourced healthcare systems [28,34,37,43]. Some studies suggested a need for trusted points of access to vaccines for such groups including, community centres, mobile vaccination units and faith-based organisations. Some groups trusted community leaders, and gatekeepers regarding vaccine safety [31,39]; conversely there were religious views that the vaccine was unnecessary [17, 28, 38.

4. Discussion

This review makes a novel contribution to the evidence based on vaccine uptake behaviours; reporting factors that determine COVID-19 vaccination uptake with a specific focus on underserved groups, considering their social norms and health beliefs. The gaps highlight the importance of understanding how health beliefs differ and how they differentially explain vaccine behaviour adopted by varied groups of people and communities. This could then help predict health-related behaviours, and guide health promotion campaigns and programmes to increase vaccine uptake.

Concepts emerged, linked to the influences of health belief systems, social and cultural norms, information provision and trust regarding vaccine uptake. Low uptake was associated with lacking or limited access to information on how vaccinations prevent illness. Misconceptions around efficacy, side effects, and perceived low risk of infectious disease were fundamental barriers amongst underserved and ethnic minoritised groups.

We have grouped themes under important behavioural frameworks such as CS-SRM and HBM to help understand vaccine uptake amongst these population groups considering social norms and health beliefs. Although, such frameworks have not previously been applied to explore vaccination behaviours; similar determinants emerged across the studies [52,53] relevant to ethnic and underserved backgrounds. These included fear and mistrust of vaccine development in minoritised groups, peer-trust in healthcare providers and gatekeepers sharing similar backgrounds, language and literacy barriers, and cultural beliefs that natural, healthy lifestyles are preferable to vaccinations as well as religious reasons.

In our review, information including misinformation is an emerging subtheme explaining low uptake or rejection of the COVID-19 vaccination. A review by Crawshaw et al. [1], reported how migrant populations struggled to communicate with healthcare professionals (HCP) and access or understanding vaccination information, leading to delays in vaccination, or turn to alternative, informal or non-curated sources, including social media. HCPs highlighted the additional burden on their limited consultation time caused by communication barriers and lack of interpreters. Facilitators to vaccine uptake include tailored vaccination messaging (based on specific perceptions, beliefs, or barriers), community outreach, and interventions to nudge behaviour (e.g., personalised reminders) [1,54]. Since the COVID-19 pandemic there are opportunities to engage more effectively with migrants and other marginalised groups around vaccination; future research should identify novel approaches that involves and facilitate uptake in specific migrant and minoritised groups, that can also be embedded in the vaccination programme [53–55].

Evidence shows some governments excluded migrant and ethnic minority groups during the national roll-out of the first wave; resulting in low vaccine uptake in these groups [57,58]. As well as potential refusal to vaccinate, migrants face several, well-documented barriers to healthcare. Some of these barriers are due to longstanding structural inequities, and the high likelihood of living in areas of higher deprivation. Other ethnicity-related factors, including religion, upbringing and beliefs also influence immunisation decisions [56,59,60]. There is a need to actively and meaningfully engage with such groups and communities to understand their concerns or barriers to vaccination and work collaboratively to co-develop tailored approaches to encourage uptake and rebuild trust [60]. Examples include participatory approaches, community engagement and co-production, drawing on existing models of best practice developed by WHO and the European Centre for Disease Prevention and Control (ECDC) to strengthen vaccination initiatives; and to address barriers and leverage drivers of vaccination in populations with sub-optimal vaccination uptake [60].

This review provides an overview of how social norms and health beliefs interplay with vaccine uptake in underserved and ethnic groups. Our findings are embedded in the context of the COVID-19 pandemic but yield lessons to other vaccination programmes and could inform national and regional routine immunisation programmes. Much detailed work remains to be done, including qualitative research to better understand experiences, perceptions and views regarding vaccinations and co-designing tailored strategies for general vaccination uptake together with underserved groups will be needed.

5. Limitations

Our review had some key limitations. Most studies were cross-sectional and collected data from large heterogenous populations. These studies are snapshots which cannot demonstrate causal relationships between important variables such as socio-demographic characteristics with health beliefs, social norms, and vaccine uptake. This limits the interpretation of their findings and draw meaningful conclusions. However, we also included qualitative studies, which provide narratives and insights on experiences, attitudes, and perceptions towards vaccinations amongst underserved groups.

Another limitation is the wide variation of underserved groups included in studies, particularly regarding language, religion, and socioeconomic characteristics. We also noted that not many determinants such as economic, normative, and cultural factors have been explored in any depth; the majority focused other determinants including ethnicity, age, region of residence and education levels; and furthermore, group differences have not been well explored, including family structures, identity, and health beliefs affecting vaccine-related or acceptance health behaviours [13,51]. Further research is needed to examine the commonalities and differences between population groups and their behavioural outcomes; and how best to address these to promote vaccine uptake.

6. Conclusion

Evidence suggests that information amongst marginalised and minoritised communities are socially curated and filtered, which can be a leading cause to the spread of misinformation regarding vaccine uptake. There is a need to improve dissemination of information to combat misinformation. Communication materials tailored to or delivered by a trusted messenger or gatekeeper can help to reach out and gain the trust of underserved groups, for example through family members or

community leaders. The findings of our review have implications for understanding vaccine uptake behaviours, strengthening national and regional routine immunisation programmes, and public health responses to the COVID-19 pandemic and other vaccine preventable diseases.

Authors' contribution

TC conceptualized the review aims and methods inclusion, and exclusion criteria of papers included and analysed. Senior support was provided by DZ, who is also the CI of this study. PT supported the review as second reviewer of the literature searched and papers identified.

TC wrote all drafts of the manuscript with input from DZ, all co-authors listed verified the analysis, commented on the manuscript, and approved for submission.

Consideration of Related Manuscript

None that we know of.

CRediT authorship contribution statement

T. Chaudhry: Writing – review & editing, Writing – original draft, Resources, Methodology, Formal analysis, Data curation. **P. Tum:** Writing – review & editing, Formal analysis, Data curation. **F. Morrow:** Writing – review & editing. **S. Hargreaves:** Writing – review & editing, Conceptualization. **K. Kielmann:** Writing – review & editing. **H. Kunst:** Writing – review & editing. **C. Griffiths:** Writing – review & editing. **N. J.C. Campbell:** Validation, Writing – review & editing. **D. Zenner:** Writing – review & editing, Supervision, Conceptualization, Data curation, Formal analysis, Methodology, Validation, Writing – original draft.

Ethics statement

Not needed for systematic review.

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Declaration of competing interest

The manuscript has not been published elsewhere and is not under consideration by another journal. There is also no conflict of interest to declare.

Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.vaccine.2025.127769.

Data availability

Data extracted and synthesised can be requested by corresponding author (TC).

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