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Barriers and Facilitators of COVID-19 Booster Uptake Among Ethnic Minority Populations in the UK: A Systematic Review

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ABSTRACT

Background:
Ethnic minority populations in the United Kingdom have been disproportionately affected by COVID-19. Addressing disparities in vaccine uptake is essential to ensuring the success of national immunisation efforts. Understanding the factors contributing to lower COVID-19 booster vaccination rates among these groups is critical to meeting both national and global public health objectives.

Objectives:
This systematic review aimed to identify the key factors influencing COVID-19 vaccine booster uptake among ethnic minority populations in the UK.

Methods:
Following PRISMA guidelines, a comprehensive literature search was conducted across MEDLINE, Web of Science, PsycINFO, and CINAHL for epidemiological studies published up to December 2023. Studies were included if they reported on vaccine uptake or explored factors influencing COVID-19 vaccination among ethnic minority groups in the UK. Of 4,382 records screened, 12 studies met the inclusion criteria and were included in the final synthesis.

Results:
All seventeen included studies were assessed as being of acceptable quality. Ethnic minority status was associated with greater vaccine hesitancy and lower uptake compared to White British groups. Key barriers included limited knowledge about vaccine safety, misinformation, inaccessible communication strategies, and logistical challenges. Facilitators included targeted media outreach and culturally sensitive communication delivered by trusted sources within communities.

Conclusion:
Community engagement, supported by trusted healthcare and social networks, is essential to addressing the concerns and information needs of ethnic minority populations. Such approaches can help reduce disparities and improve uptake of COVID-19 booster vaccines.

Keywords: COVID-19; vaccine uptake; booster vaccine; ethnic minority; predictors; facilitators; barriers; United Kingdom

INTRODUCTION

The COVID-19 pandemic, originating in Hubei, China in 2019, marks the fifth major global epidemic since the 1918 influenza outbreak. With over 1.75 million fatalities recorded worldwide by 2021, the pandemic has had a profound impact on public health systems, economies, and daily life (WHO, 2021). Initial responses such as lockdowns, travel restrictions, and social distancing helped mitigate spread but were insufficient to provide a long-term solution. Immunisation emerged as the most promising and sustainable intervention. Historically, vaccines have proven effective in controlling infectious diseases (Hajj et al., 2015), but vaccine acceptance remains a critical determinant of their success. This has been demonstrated in recent outbreaks such as the 2018 measles epidemic in New York City, largely attributed to inadequate vaccination coverage (Yang, 2020).

The development and distribution of COVID-19 vaccines sparked hope globally. However, even the most effective vaccine is powerless if uptake is poor. Despite high initial COVID-19 vaccine acceptance, uptake of

booster doses has been comparatively low, raising public health concerns (Forman et al., 2021). In England, the government's winter strategy for 2021–2022 focused on booster vaccinations, yet uptake lagged significantly behind first and second doses. Factors such as age, gender, ethnicity, and socioeconomic deprivation have been consistently linked to disparities in vaccine uptake (Wang et al., 2021; Kamal et al., 2021a; Crawshaw et al., 2021a).

Public attitudes toward vaccine safety and efficacy remain varied, and although studies confirm the effectiveness of COVID-19 vaccines in preventing severe illness and death (Polack et al., 2020; Haas et al., 2021), immunity wanes over time (Goldberg, 2021), necessitating booster shots. Emerging variants like Omicron have further challenged vaccine efficacy, prompting global health authorities to advocate for booster campaigns (Khan et al., 2022). However, uptake has been inconsistent, partly due to public scepticism, global vaccine inequity, and logistical challenges.

In the UK, notable differences exist in booster uptake between regions and demographic groups. For instance, Newham reported only 27.2% booster uptake compared to Gloucestershire's 67.4%. While demographics partly explain this variation, other factors—such as access to services, trust in authorities, and cultural perceptions—play a role. Ethnic minority groups, who have experienced disproportionately high rates of COVID-19 morbidity and mortality (Sze et al., 2020), also show higher levels of vaccine hesitancy (ONS, 2021a). Structural inequalities, historical marginalisation, and misinformation contribute to this reluctance (Burgess et al., 2021).

Despite high initial vaccination rates, many fully vaccinated individuals remain hesitant about boosters. According to the ONS (2021b, 2021c), 10% of those aged over 70 and 9% of individuals aged 16–29 expressed booster hesitancy. These findings suggest a gap in public health messaging and trust. Notably, ethnic minority communities often face compounded barriers to vaccination, including language differences, lack of culturally tailored communication, and limited healthcare access (Crawshaw et al., 2021b).

This review aims to address these issues by synthesising evidence on the predictors of COVID-19 booster uptake in ethnic minority groups in the UK. By identifying specific barriers and facilitators, the study seeks to inform more equitable public health strategies and contribute to meeting global immunisation goals outlined in the WHO's Immunisation Agenda 2030.

METHODS

Review Aim and Design

This systematic review aimed to explore the factors influencing the uptake of the COVID-19 booster vaccine among ethnic minority populations in the United Kingdom. Specifically, the review sought to identify the key barriers and facilitators of booster dose acceptance, assess variation in uptake among different ethnic subgroups, and compare these findings with existing knowledge on predictors of initial vaccine uptake. The Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) framework was adopted to guide all stages of the review process (Page et al., 2021), ensuring transparency and methodological rigour.

Search Strategy

A comprehensive literature search was conducted to capture epidemiological studies examining COVID-19 booster uptake in ethnic minority populations in the UK. Following established practices in previous systematic reviews (Hopia et al., 2016; Kamal et al., 2021b), both quantitative and qualitative studies were included to reflect the multifactorial nature of vaccine behaviour. Four electronic databases—MEDLINE, Web of Science, PsycINFO, and CINAHL—were systematically searched up to December 31, 2023, with no restrictions on publication year.

A combination of keywords and MeSH terms were used to refine the search (e.g., "COVID-19," "booster," "vaccine uptake," "ethnic minority," "hesitancy," "confidence," "acceptance"), with Boolean operators facilitating comprehensive inclusion. The full list of keywords is presented in Table 1.

Table 1. Search Terms and Boolean Strategy

Vaccine-Related Terms (OR)	COVID-19 Terms (AND)	Behavioural Terms (AND)	Population Terms (AND)
vaccin*	COVID-19	uptake	ethnic minorit*
inocul*	SARS-CoV-2	accept*	BAME
immunis*	coronavirus	hesitan*	black*

shot*	novel coronavirus	refus*	Asian*
jab*	pandemic	confiden*	African*
dose*	COVID-19 pandemic	concern*	Caribbean
booster*		intention*	refugee*
revaccin*		attitude*	migrant*
reimmunis*		belief*	Eastern European
mRNA vaccin*		knowledge	rac*
AstraZeneca		motivat*	ethnic group*
Pfizer		trust	minorit* ethnic group*
Moderna		sceptic*	underrepresented group*
Johnson & Johnson		misinformation	disadvantaged population*
Janssen		disinformation	vulnerable population*

This table presents a list of search terms used in the systematic review to identify relevant literature on COVID-19 booster vaccine uptake among ethnic minority populations in the UK. Terms are grouped into four categories: vaccine-related terminology, COVID-19-specific identifiers, behavioural descriptors associated with vaccine attitudes, and population descriptors of interest. Boolean operators (OR within columns, AND between columns) were applied to construct comprehensive and inclusive search strings across databases. An asterisk (*) denotes truncation used to capture word variants.

To supplement the electronic search, reference lists of eligible studies and relevant systematic reviews were hand-searched to identify additional papers.

Eligibility Criteria

Studies were assessed using the Population, Exposure, Outcome (PEO) framework (Moola et al., 2015). Inclusion criteria were as follows:

- Population: Studies involving UK-based ethnic minority populations.

- Exposure: Studies addressing vaccine uptake, psychosocial predictors, or barriers/facilitators related to COVID-19 booster vaccination.

- Outcome: COVID-19 vaccine uptake or intention to receive a booster dose.

Both qualitative and quantitative original research articles were included. Excluded were conference abstracts, non-empirical literature (e.g., opinion pieces, reviews), non-English publications, and grey literature (e.g., theses, policy documents).

Study Selection and Data Extraction

Data were extracted using a structured Microsoft Excel form. Extracted variables included publication details, study design, population characteristics, outcomes of interest, sample size, data collection methods, and findings related to vaccine uptake, hesitancy, and influencing factors.

Quality Assessment

The Mixed Methods Appraisal Tool (MMAT) (Hong et al., 2018) was used to assess the methodological quality of included studies. This tool evaluates studies across qualitative, quantitative, and mixed-methods domains based on criteria such as sampling strategy, data collection, analytical rigour, and integration of findings. A scoring system was applied to quantify study quality on a scale of 1 to 10. Studies were categorised as high (scores 8–10), moderate (6–7), or low quality (≤5). This approach ensured consistency in appraising diverse research methodologies while minimising the risk of bias in interpretation.

Data Analysis

Given the heterogeneity of included studies, a narrative synthesis approach was deemed appropriate (Crawshaw et al., 2022). Quantitative findings on predictors of booster uptake were examined alongside qualitative insights into perceptions, beliefs, and community experiences. The synthesis considered how factors such as age, region, and data collection period influenced vaccine attitudes. Emphasis was placed on the strength and direction of associations between

sociodemographic variables and booster uptake among minority ethnic groups.

The analysis also explored recurring themes such as misinformation, communication barriers, trust in health systems, and structural inequalities. These were contextualised within the broader literature on vaccine hesitancy and behavioural health. Where possible, comparisons were drawn across different ethnic subgroups to assess variations in uptake patterns and identify context-specific challenges or enablers.

Ethical Considerations

As this review relied exclusively on publicly available data from published studies, no ethical approval was required.

RESULTS

Study Selection

A total of 4,382 records were retrieved through comprehensive searches of electronic databases, supplemented by 1,126 additional records identified through manual screening of bibliographic references. Following the removal of 395 duplicates, 5,113 records remained for title and abstract screening. Based on predefined inclusion and exclusion criteria, 3,786 records were excluded during this phase. Subsequently, 1,327 full-text articles were assessed for eligibility. Of these, 1,310 were excluded for not focusing on COVID-19 booster vaccine uptake or relevant behavioural determinants. Ultimately, 17 studies met the inclusion criteria and were incorporated into the qualitative synthesis. No studies were eligible for inclusion in a quantitative synthesis or meta-analysis. A detailed breakdown of the study selection process is presented in Figure 1 (PRISMA Flow Diagram).

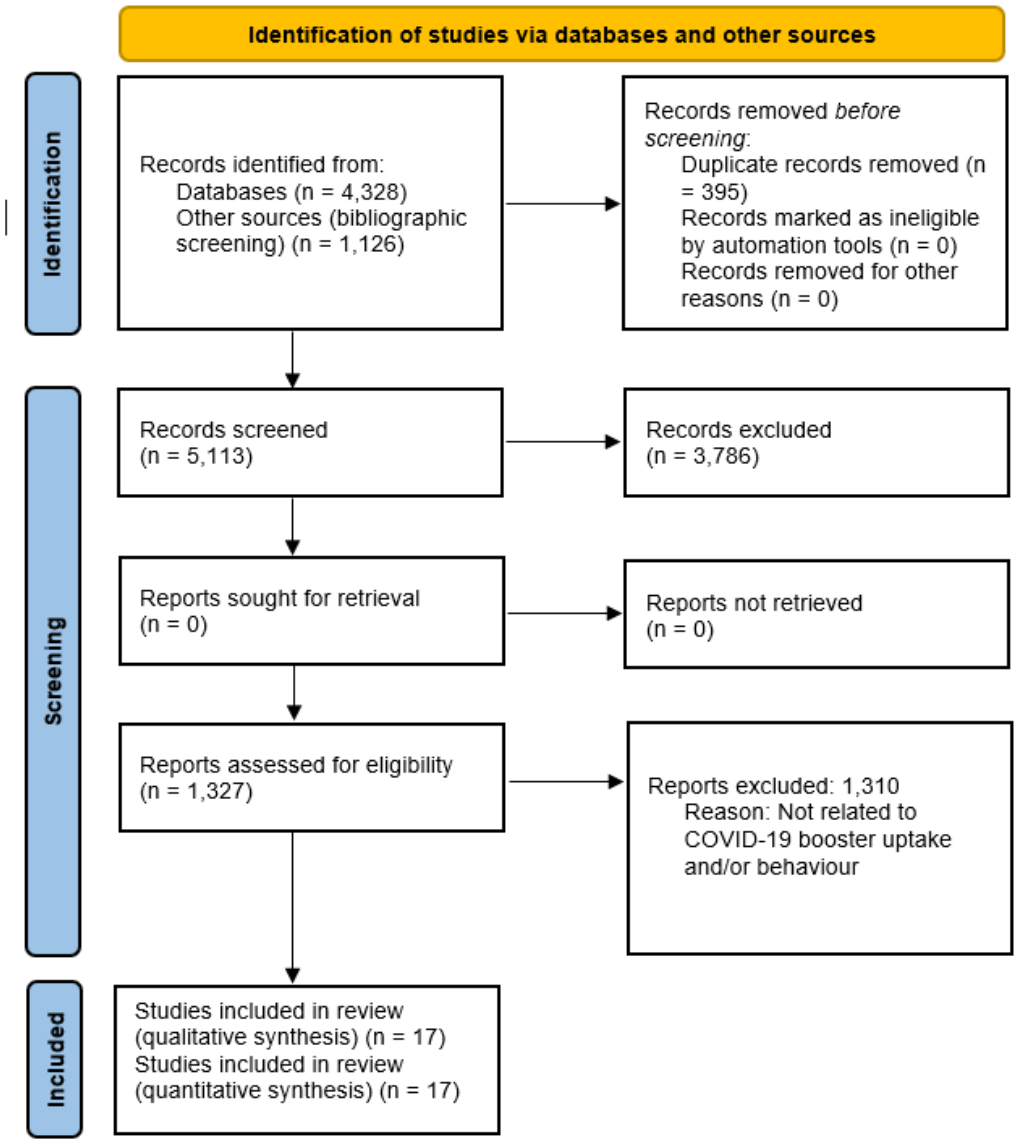

Fig. 1. PRISMA Flow Diagram

Study Characteristics

Seventeen studies were included in the final synthesis. Of these, ten employed quantitative methods, four

utilised qualitative designs, and three used mixed methods approaches. Among the ten quantitative studies, five were cohort studies and five were cross-sectional surveys.

Most of the studies (n = 9) focused on the general population of the UK, while one study was conducted specifically in Bradford (England), another was focused on Scotland, and a third included participants from both England and Wales. Two studies incorporated data collection across both the UK and the US, involving separate cohorts from each country. The research covered diverse population groups, including healthcare professionals, ethnic minority communities, undocumented migrants, and residents from underserved urban areas.

Data Extraction

A structured data extraction process was employed to ensure consistency and comprehensiveness across the included studies. Key information extracted from each article included authorship, country or region of focus, study objectives, research design, data collection timeframe, participant recruitment methods, sample characteristics, outcomes of interest (e.g., vaccine uptake, hesitancy, or attitudes), key findings, and relevant remarks or recommendations. This process facilitated the synthesis of insights across studies with diverse methodologies and population groups. The findings from this stage are summarised in Appendix 1, which presents an overview of the included studies in a comparative tabular format for ease of interpretation.

Themes explored included vaccine uptake, vaccine hesitancy, intentions, attitudinal influences, and rollout logistics. The data extraction also captured the diversity in methodological approaches, which included cross-sectional surveys, longitudinal cohort studies, and qualitative interviews.

Quality Assessment

The quality of the included studies was assessed using the Mixed Methods Appraisal Tool (MMAT), a validated instrument designed to evaluate studies across qualitative, quantitative, and mixed-methods paradigms. Each study was scored on a scale from 0 to 10, with higher scores indicating stronger methodological rigour and lower risk of bias.

Across the 17 included studies, the average MMAT score was 9, reflecting a generally high level of methodological quality. Specifically, ten studies achieved the highest rating of 10 (Excellent Quality), six studies scored 9 (High Quality), and one study was rated 8 (Moderate to High Quality). These scores indicate that the vast majority of studies met rigorous criteria in areas such as sampling, data collection, analysis, and validity of conclusions.

A breakdown of the quality assessment results is provided in Appendix 2, which details the MMAT score assigned to each study along with its corresponding rating classification (e.g., "High Quality" or "Excellent Quality"). Overall, all 17 studies were deemed to be of sufficient quality to be included in the synthesis and analysis.

Integrative Thematic Analysis of Vaccine Uptake and Intention

Due to the heterogeneity of study designs, populations, and outcomes across the 17 included studies, a narrative synthesis was conducted. This allowed for a comprehensive thematic categorisation of factors influencing COVID-19 vaccine booster uptake and intention among ethnic minority groups in the UK. The analysis was guided by an adapted framework using key domains of vaccine behaviour: availability, information, economic and situational access, attitudinal disposition, motivation, beliefs, and external influence.

1. Structural Access and Legal Entitlement

Barriers to physical and legal access were significant in shaping vaccine uptake. Concerns about immigration checks, eligibility for free healthcare, fear of arrest, and prior experiences of discrimination discouraged undocumented migrants, asylum seekers, and refugees from accessing vaccination services (Deal et al., 2021; Knights et al., 2021). Studies noted that confusion about NHS entitlements and the cost of medical care remained widespread, even after policies were relaxed to ensure free vaccination for all (Cook et al., 2023).

Community preferences leaned toward local and accessible settings such as walk-in clinics, food banks, and trusted community spaces. These venues were perceived as safer, more approachable, and logistically convenient (Deal et al., 2021). Participants also requested support with GP registration and clearer pathways to access primary care services.

2. Knowledge Gaps and Communication Challenges

Several studies identified insufficient awareness as a major impediment to vaccine engagement. Participants were often unaware of booster eligibility, the rationale for additional doses, or where and when vaccines were available (Deal et al., 2021; Knights et al., 2021).

Language barriers and a lack of culturally adapted materials were frequently cited (Paul et al., 2022). Misinformation filled the vacuum left by absent or unclear public health communication, contributing to reluctance and confusion (Loomba et al., 2021).

3. Economic and Practical Barriers

Although vaccination was provided free of charge, indirect financial costs (e.g., transportation, unpaid time off work) and rigid appointment systems created perceived burdens (Deal et al., 2021). Participants favoured walk-in appointments, extended hours, and locally delivered services. Accessibility was further constrained by digital exclusion, affecting those with low digital literacy or limited internet access (Woolf et al., 2021).

4. Attitudinal Barriers and Cultural Perspectives

Some participants perceived COVID-19 as a low personal risk or were unconvinced of the vaccine's necessity or effectiveness (Deal et al., 2021; Williams et al., 2021). Cultural beliefs, religious views, and alternative health strategies (e.g., reliance on immunity or home remedies) also influenced attitudes (Freeman et al., 2020; Lockyer et al., 2021). Trust in healthcare providers and the government was often fractured due to historic marginalisation and exclusion from public services (Nguyen et al., 2021; Cook et al., 2023).

5. Community Outreach and Motivational Strategies

Effective "activation"—or nudging towards vaccination—was supported by tailored outreach efforts. These included community champions, door-to-door initiatives, and translated messages delivered by trusted figures such as religious leaders or bilingual health workers (Knights et al., 2021; Woolf et al., 2021). Uniform communication strategies, such as mass SMS alerts, were often ineffective for under-served groups such as migrant Roma populations (Knights et al., 2021).

6. Intention to Vaccinate and Ethnic Variation

Vaccine intention was consistently lower among minority ethnic groups compared to White British participants across eight studies (e.g., Allington et al., 2023; Bell et al., 2020; Nguyen et al., 2021). Migrants and refugees expressed high levels of hesitancy, primarily citing safety concerns and insufficient information (Deal et al., 2021). Some studies found notable within-group variation: Black Caribbean participants were particularly cautious, while Indian and Bangladeshi groups showed relatively higher intention and uptake (Robertson et al., 2021; Woolf et al., 2021).

7. Beliefs, Mistrust, and Safety Concerns

Vaccine scepticism was linked to low institutional trust, belief in conspiracy theories, and the perception that ethnic minorities were being used as test subjects (Lockyer et al., 2021; Loomba et al., 2021). Concerns about rapid vaccine development and the unknown long-term side effects were common. Some delayed vaccination intentionally to observe outcomes among early adopters (Lockyer et al., 2021; Williams et al., 2021).

Distrust was exacerbated by the perceived lack of transparency in messaging and inadequate representation of minority groups in vaccine trials (Murali et al., 2023). These further reinforced beliefs that the health system did not prioritise their safety.

8. Misinformation and Disinformation

Widespread misinformation was a major theme across studies. Participants encountered conflicting information from social media, informal networks, and even overseas contacts (Lockyer et al., 2021; Woolf et al., 2021). Some held beliefs that natural remedies were sufficient, while others feared extreme vaccine side effects. Government and NHS materials were sometimes met with suspicion, especially if they appeared overly polished or uncritical (Loomba et al., 2021).

9. Role of Family and Social Networks

Informal networks played a dual role: they could either amplify misinformation or encourage vaccine acceptance. Several participants reported being more influenced by family, peers, or religious leaders than politicians or officials (Woolf et al., 2021). Trusted relationships and shared community identity were critical to shifting perceptions.

10. Perceived Risk and Prior Experience

Perception of risk was shaped by personal and vicarious experiences of COVID-19 illness or death. Studies found that knowing someone seriously affected by the virus increased acceptance of vaccination (Robertson et al., 2021; Woolf et al., 2021). Conversely, low perceived susceptibility reduced urgency to vaccinate.

11. Intra-Group Differences

While most studies used broad ethnic categories (e.g.,

"Black" or "Asian"), some reported nuanced intra-group distinctions. For instance, Pakistani and Bangladeshi participants expressed more concern about vaccine side effects, while Black British participants were more likely to reject vaccinations entirely (Robertson et al., 2021). The lack of disaggregated data in many studies makes it difficult to comprehensively examine inter-group variability in predictors.

DISCUSSION

This review demonstrates that ethnic minority populations in the UK remain disproportionately hesitant and less likely to engage with the COVID-19 booster vaccination programme compared to the White British majority. This pattern reflects trends observed in previous vaccination initiatives, indicating systemic and long-standing structural inequalities, mistrust in health institutions, and barriers to accessing reliable information among minority communities.

Through synthesising the findings of 17 peer-reviewed studies, including five recent contributions published in 2023, this review highlights a complex interplay of behavioural, structural, legal, cultural, and psychosocial determinants affecting vaccine intention and uptake. Barriers such as lack of trust in health systems, historical neglect, misinformation, language difficulties, inconsistent messaging, and accessibility issues collectively shaped individual and group-level vaccine behaviours.

Particularly notable was the consistently higher level of vaccine hesitancy among Black communities, which may be rooted in both contemporary and historical injustices in healthcare delivery, such as the infamous Tuskegee Study (SAGE, 2020). By contrast, South Asian communities, including Bangladeshi and Pakistani groups, often cited concerns over side effects (Kamal et al., 2021b), which may reflect the combined effect of limited culturally-tailored communication and medical engagement. Similarly, newer migrant groups, such as undocumented migrants and asylum seekers, were often unaware of their legal entitlement to free vaccination and feared exposure to immigration enforcement.

The updated review found that migrants from Africa, the Middle East, Eastern Europe, and parts of Asia were particularly at risk of under-vaccination. This could be partly explained by systemic access issues (Lazarus et al., 2021), including the discontinuation of childhood immunisation services in conflict zones or rural areas prior to migration, and declining confidence in public institutions within their countries of origin. Language, legal status, and unfamiliarity with healthcare systems emerged as key mediating variables.

Legal, logistical, and administrative barriers were found to hinder equitable vaccine delivery. These include difficulties registering with primary care, unavailability of interpreters, and rigid appointment systems that fail to accommodate shift workers or digitally excluded groups. These findings mirror insights from past reviews in the UK and US (Wilson et al., 2018; CDC, 2021), which have emphasised the role of cultural alienation and structural exclusion in perpetuating vaccine inequity.

Furthermore, the studies found that minority groups are more likely to delay engagement with healthcare services due to language barriers and low confidence in official information sources. This often results in reliance on informal networks or social media (Loomba et al., 2021) for health information—channels that can perpetuate vaccine misinformation or conspiracies. In some cases, misleading narratives suggested that ethnic minorities were being used to "test" vaccines, thereby heightening suspicion and fear.

On the other hand, the review also identified promising strategies that have helped increase vaccine uptake. These include community-led outreach, culturally sensitive messaging, and personalised vaccine reminders. Programs delivered by trusted messengers (Woolf et al., 2021; Cook et al., 2023)—such as religious leaders, community health workers, or ethnic minority healthcare professionals—have been shown to build trust and improve confidence. In some cases, translating material and providing information through offline, face-to-face means helped address digital exclusion.

Importantly, policymakers and public health leaders must acknowledge that clear and transparent communication—rooted in public health science rather than political rhetoric (Petersen et al., 2021)—is vital. Evidence suggests that contradictory or overly generalised government messages reduced trust and increased receptivity to conspiracy theories. This was particularly damaging for migrant communities already navigating complex socio-legal environments.

To improve outcomes, vaccination campaigns must employ person-centred approaches that account for community-specific needs (Bell, 2020; SAGE, 2020), rather than assuming homogeneity within or across ethnic minority groups. Categorising all non-White populations as "BAME," for example, masks crucial within-group differences. For instance, Black Caribbean individuals may hold different views on vaccination compared to Black Africans or Black British participants, while Pakistani groups may differ significantly from

Indian or Bangladeshi participants.

The findings of this review call for vaccine strategies that engage ethnic minority communities as partners in health promotion. This includes co-designing interventions, supporting culturally competent health services, and investing in local capacity for outreach and community trust-building. Future work must also assess the generational impact of migration, explore regional variability, and differentiate between vaccine intention and actual uptake, as these do not always align.

From a policy standpoint, it is imperative to increase the visibility and voice of ethnic minorities in vaccine planning, policy development, and public discourse (Razai et al., 2021). Enhancing access to translated materials, embedding cultural competence into health professional training, and improving monitoring systems to disaggregate ethnicity data are essential steps.

While this review synthesised 17 high-quality studies, it also highlights some limitations. Variability in how ethnic categories were defined and used across studies made direct comparison challenging. Some used broad descriptors such as “Asian” or “Black,” while others disaggregated data into specific subgroups. In addition, several studies lacked regional data or age-stratified analyses, making it difficult to assess variations across life course or geography.

Nevertheless, this synthesis offers valuable insights into how vaccine equity can be improved through inclusive, responsive, and community-engaged public health strategies. In sum, COVID-19 vaccination efforts should be expanded through multi-layered approaches that combine community partnerships, evidence-based messaging, and structural reforms to ensure no population is left behind.

CONCLUSION

This review highlights the persistent inequities in COVID-19 booster vaccine uptake among ethnic minority groups in the UK. Addressing these disparities requires coordinated, community-led efforts that go beyond one-size-fits-all strategies.

Community engagement is vital. Misinformation, mistrust, and lack of tailored messaging remain major contributors to hesitancy. Partnering with trusted community leaders, healthcare workers, and organisations can foster open dialogue, correct misconceptions, and ensure health messages are accessible in multiple languages and formats. Campaigns should be co-designed with communities, reflecting their values, beliefs, and lived experiences. Health messaging must emphasise social and emotional benefits of vaccination while avoiding generalisations that risk further alienating minority populations. Including diverse representation in campaigns, providing information in visual and written formats, and promoting culturally relevant narratives can increase relatability and trust. Practical barriers—such as travel costs, inconvenient clinic hours, or digital exclusion—must be tackled through mobile clinics, flexible scheduling, and collaboration with trusted community venues. Financial and logistical support, particularly for those in low-income or precarious employment, should be prioritised.

Healthcare professionals, especially those from ethnic minority backgrounds, should receive targeted training on culturally competent communication and vaccine counselling. They play a key role in building trust and addressing vaccine concerns. Sustainable investment in translation services, outreach programmes, and local partnerships is essential. Ongoing monitoring of uptake data by ethnicity and location can inform adjustments and help target areas of greatest need.

Overall, building trust, improving access, and tailoring public health responses to the specific needs of minority groups are crucial for equitable vaccine coverage. Only by working in partnership with these communities can future immunisation efforts achieve inclusive and long-lasting success.

CONFLICTS OF INTEREST

The authors declare no conflicts of interest.

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APPENDIX

Appendix 1: Extracted Data from Included Studies

Authors & Publication Year	Study Location	Objective of Inquiry	Methodological Approach	Data Collection Period	Participant Profile & Recruitment Strategy	Key Study Variables	Primary Findings	Interpretation & Comments
Allington et al., 2021	United Kingdom	Investigated the influence of conspiracy beliefs, perceived risks, trust in authorities, and social media reliance on attitudes toward general COVID-19 vaccination	Quantitative (Longitudinal survey-based design)	November to December 2020	4,343 UK adults aged 18–75 participated in an online survey conducted between November 21 and December 21, 2020. Linear rank-order modelling was used to assess predictors of vaccine reluctance.	Vaccine hesitancy, vaccine perceptions	Vaccine reluctance was associated with younger age, female gender, lower income, low educational attainment, high reliance on social media, low reliance on traditional media, minority ethnic background, low perceived threat of COVID-19, and limited trust in scientists and healthcare professionals.	Booster vaccine acceptance may be influenced by factors such as belief in misinformation and social trust. However, vaccine attitudes also vary by ethnicity, age, and socioeconomic status, indicating a complex interplay of predictors.
Allington et al., 2023	UK, US	Assessed the potential relationship between social and traditional media use	Quantitative (Cross-sectional study)	June 2020 (Studies 3 & 4)	Stratified online sampling ensured wide regional representation. Two studies were	Vaccine hesitancy, vaccine intention	All four studies reported a positive association between traditional media use	Social media may lack the credibility required for

		and the intention to receive the SARS-CoV-2 vaccine, while controlling for potential confounding variables.			conducted in the US (sample sizes of 1,198 and 3,890), and two in the UK. Data collection spanned multiple national populations.		(broadcast and print) and intention to vaccinate. Social media use was not significantly associated with vaccine intention.	effective health communication, especially among groups with limited trust in traditional media. This supports the view that uncritical social media consumption may contribute to vaccine hesitancy.
Bell et al., 2020	UK	Explored English public perspectives on COVID-19 vaccination and related decision-making processes, using both survey and interview data to gain deeper insights.	Mixed methods (quantitative survey and qualitative interviews)	April – May 2020	Surveys and interviews were conducted to gather a more nuanced understanding of attitudes. The sample was drawn to reflect a broad range of views across English society.	Vaccine hesitancy	Many respondents expressed reluctance to accept the COVID-19 vaccine. Justifications included self-protection, concerns about safety and effectiveness, and general mistrust. Open-ended responses revealed nuanced motivations behind vaccine uptake and refusal.	Clear, transparent communication regarding vaccine development, safety, and efficacy is crucial to improving public trust. Early engagement with communities may help address hesitancy and misinformation.

Cook et al., 2023	UK	Investigated the determinants of COVID-19 vaccine hesitancy within ethnically diverse communities in the UK.	Quantitative (Cross-sectional study)	2023	Participants from diverse ethnic backgrounds across UK communities. Recruited via community organisations and social media.	Vaccine hesitancy, vaccine uptake	Cultural beliefs, misinformation, and perceived risks were major factors linked to hesitancy. Trust in public health systems influenced uptake.	Calls for culturally competent outreach strategies and trusted community leaders to promote vaccine uptake.
Deal et al., 2021	UK	Explored the perceptions and attitudes of undocumented immigrants, refugees, and asylum seekers towards COVID-19 vaccination, including hesitancy and access barriers.	Qualitative	September 2020 – March 2021	Participants were recruited using purposive and snowball sampling. The sample included individuals from five WHO regions with varied migration statuses and an average UK residency of 5.6 years (SD 3.7).	Vaccine hesitancy, vaccine uptake	Among 32 participants, 72% expressed reluctance to accept the COVID-19 vaccine, while 6% had already been vaccinated. Concerns included fear of arrest or immigration checks when accessing vaccination sites.	Access to convenient and trusted vaccination locations—such as foodbanks, community centres, and charities—was viewed as essential for improving vaccine uptake. Fear of immigration enforcement was a significant barrier for undocumented migrants.
Elise &	UK	Explored associatio	Quantitative	Decembe r 2020 to	Data were sourced from	Vaccine hesitancy,	Among respondents,	Findings suggest

Fancourt, 2022		ns between sociodemographic and COVID-19-related factors, such as prior infection, mental health, and social experiences, and individuals' intentions to receive COVID-19 vaccination.	(Cross-sectional study)	March 2021	the COVID-19 Social Study, a population-based panel survey examining psychological and social factors (e.g., depression, anxiety, loneliness) affecting vaccine attitudes.	vaccine uptake	4% were uncertain about receiving a COVID-19 booster, while another 4% expressed unwillingness. Uncertainty or unwillingness toward initial vaccine doses was predictive of future booster hesitancy.	that individuals from lower socioeconomic backgrounds and those who previously experienced COVID-19 adversities are more likely to be hesitant or unable to access booster vaccines — despite being at greater risk of severe illness or transmission.
Freeman et al., 2020	UK	Aimed to estimate prospective COVID-19 vaccine acceptance, identify sociodemographic predictors, and guide communication strategies to improve public understanding and trust in	Quantitative (Cross-sectional study)	September – October 2020	An online survey using non-probability quota sampling recruited 5,114 UK adults between September 24 and October 17, 2020. Sampling ensured representation by age, sex, ethnicity, and income.	Vaccine hesitancy, vaccine attitudes	Findings showed that 16.6% were doubtful, 11.7% were strongly opposed, and 71.7% were willing to be vaccinated. Vaccine acceptance was associated with perceived communal benefit and social responsibility.	Targeted public education efforts that highlight collective benefits of vaccination and debunk misinformation—particularly conspiracy

		vaccination.						theories—may enhance societal trust and increase vaccination rates.
Gaughan et al., 2023	England	Explored factors contributing to differential COVID-19 vaccination rates among ethnic minority populations.	Quantitative (Cohort study using linked data)	2023	Linked NHS, census, and vaccination data across England to assess ethnic variation in vaccine uptake.	Vaccine uptake	Vaccination rates were significantly lower among Black Caribbean, Bangladeshi, and Pakistani groups even after controlling for age, sex, deprivation, and health status.	Trust and accessibility issues persist; interventions must address systemic inequalities.
Knights et al., 2021	UK	Explored the effects of the COVID-19 pandemic on access to primary healthcare among newly arrived migrants in the UK, and its implications for vaccine distribution and uptake.	Qualitative	June – November 2020	Using purposive, convenience, and snowball sampling, participants included 64 staff from primary care practices, administrative personnel, and 17 newly arrived migrants. In-depth telephone interviews were conducted.	Vaccine hesitancy, vaccine roll-out	Key barriers included the closure of GP surgeries, language and communication issues, indirect discrimination, and insufficient access to tailored COVID-19 information and treatment services. Both PCPs and migrants reported these concerns.	Innovative solutions—such as translated digital resources, YouTube counselling templates, and improved digital access—were identified as strategies needing further exploration to address vaccine hesitancy in migrant

								populations.
Lockyer et al., 2021	UK (Bradford, England)	Investigated how individuals respond to and engage with COVID-19-related misinformation, their perceptions of the disease, and attitudes toward vaccination.	Qualitative	September – October 2020	Twenty participants from diverse ethnic backgrounds living in Bradford took part in in-depth telephone interviews during autumn 2020.	Vaccine hesitancy, vaccine beliefs	Findings showed ambivalence: six participants were unwilling to receive the vaccine, five expressed mixed feelings, and nine were willing with certain conditions. Data were not disaggregated by subgroup.	Understanding vaccine hesitancy requires acknowledging the role of misinformation and emotional reactions. Tailored and region-specific communication strategies are needed to counter misinformation effectively.
Loomba et al., 2021	UK	Analyzed the nature of COVID-19 vaccine discourse relating to ethnic minority groups on UK social media.	Qualitative (Social media analysis)	2021	Twitter and Facebook content related to UK ethnic minority COVID-19 vaccination discussion.	Vaccine hesitancy, public sentiment	Prevalence of misinformation and cultural misrepresentation impacted trust in vaccines within minority groups.	Urgent need for targeted online campaigns with culturally appropriate messaging to reduce hesitancy.
Murali et al., 2023	UK	Assessed ethnic minority participation in UK COVID-19 trials	Systematic review and meta-analysis	2023	Reviewed representation data from UK-based COVID-19 vaccine clinical trials.	Trial participation, vaccine confidence	Ethnic minorities were consistently underrepresented in vaccine trials, raising	Need for trial diversity to promote public confiden

		and its implications for vaccine trust.					concerns about equitable evidence base.	ce and vaccine relevance to minority communities.
Nguyen et al., 2021	UK, US	Investigated racial and ethnic disparities in willingness to receive the COVID-19 vaccine, using data from a large cohort across the UK and US.	Quantitative (Cohort study)	March 2020 – February 2021	Participants were drawn from the COVID Symptom Study mobile app, spanning the US and UK. The cohort included over 1.2 million individuals surveyed on vaccine willingness and uptake.	Vaccine hesitancy, vaccine uptake	91% of 73,650 participants in the US and 95% of 1,154,988 UK participants out of 1,228,638 expressed willingness to be vaccinated. Disparities were observed by ethnicity and geography.	Ethnic minority groups were more likely to be hesitant compared to White participants. In the US, Black individuals showed notably lower uptake, reflecting access barriers and mistrust.
Paul et al., 2022	UK	Explored the relationship between racial discrimination, trust, and COVID-19 vaccine uptake in ethnic minority populations.	Quantitative (Longitudinal observational study)	2022	633 UK adults from ethnic minority backgrounds tracked over time.	Vaccine hesitancy, trust in health systems	Low trust in healthcare institutions and experience of racial discrimination were associated with reduced vaccine uptake.	Restoring trust through systemic reform and inclusive messaging is critical.
Robertson et al., 2021	UK	Examined COVID-19 vaccine hesitancy across the UK,	Quantitative (Longitudinal study)	November – December 2020	Participants aged 16+ who had previously completed Understandin	Vaccine hesitancy, vaccine uptake	Overall hesitancy was low (18%). Hesitancy was higher among women	Future research should explore causes of hesitancy

		identifying hesitant subgroups based on demographics and prior participation in the Understanding Society survey.			g Society survey waves were invited to participate in COVID-19-related follow-ups (n = 42,330). Data were gathered via monthly web polls from April to July, followed by additional surveys.		(21.0%) compared to men (14.7%), and more prevalent in younger adults aged 16–24 (26.5%) than in those aged 75+ (4.5%).	in identified groups. Tailored strategies and qualitative studies are needed to address subgroup-specific barriers to vaccination.
Williams et al., 2021	UK (Scotland)	Explored population-level and subgroup variation in vaccine acceptability, with emphasis on sociodemographic factors influencing willingness to receive the COVID-19 vaccine.	Quantitative (Cohort study)	December 2020	A two-wave prospective online survey was administered to assess COVID-19 vaccine intention. 3436 individuals completed the first survey and 2016 completed both waves.	Vaccine hesitancy, vaccine intention	74% of respondents in the initial wave expressed willingness to be vaccinated. Logistic regression identified sociodemographic differences affecting intentions across subgroups.	Effective communication strategies—including those disseminated through social media—should be tailored to address the unique concerns of distinct population segments.
Woolf et al., 2021	UK	Examined SARS-CoV-2 vaccine hesitancy among healthcare professionals in the UK,	Mixed methods	December 2020 – March 2021	The study included a nationwide multi-ethnic cohort of clinical and non-clinical healthcare workers. Participants	Vaccine hesitancy, vaccine uptake	Participants expressed gratitude for being prioritized, trust in coworkers and the NHS, and acknowledged the importance	The findings emphasize the need for confidence-building measures and

		highlighting ethnic disparities in willingness to receive the vaccine.			responded via email invitations or open links shared online and through newsletters.		of accessible health-related data. Inequality and structural injustices were linked to hesitancy.	inclusive messaging to address ethnic disparities in vaccine uptake among HCWs. Strategies must include combating misinformation and fostering trust within ethnic minority groups.

Appendix 2: Quality Appraisal of Reviewed Studies

No.	Citation	Methodological Quality Score (MMAT Rating)
1.	Allington et al., 2021	9 – High Quality
2.	Allington et al., 2023	9 – High Quality
3.	Bell et al., 2020	9 – High Quality
4.	Cook et al., 2023	10 – Excellent Quality
5.	Deal et al., 2021	9 – High Quality
6.	Elise & Fancourt et al., 2022	9 – High Quality
7.	Freeman et al., 2020	9 – High Quality
8.	Gaughan et al., 2023	10 – Excellent Quality
9.	Knights et al., 2021	10 – Excellent Quality
10.	Lockyer et al., 2021	9 – High Quality
11.	Loomba et al., 2021	8 – Moderate to High Quality
12.	Murali et al., 2023	9 – High Quality
13.	Nguyen et al., 2021	8 – Moderate to High Quality
14.	Paul et al., 2022	9 – High Quality
15.	Robertson et al., 2021	10 – Excellent Quality
16.	Williams et al., 2021	10 – Excellent Quality
17.	Woolf et al., 2021	10 – Excellent Quality