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Vaccination uptake amongst older adults from minority ethnic backgrounds: a systematic review

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Abbreviations

COVID-19: Coronavirus Disease 2019

Abstract

Background

Older adults from minority ethnic backgrounds are at increased risk of contracting COVID-19, developing severe infection and increased risk of mortality. Whilst an age-based vaccination approach prioritising older groups is being implemented worldwide, vaccine hesitancy is high amongst minority ethnic groups.

Methods and Findings

We conducted a systematic review and convergent synthesis to systematically examine perceptions of vaccinations amongst older adults from minority ethnic backgrounds. We included studies that reported on perceptions, beliefs and attitudes towards vaccinations in older adults aged over 65 years from a minority ethnic background. Vaccinations in investigation or development, studies focused on specific medical conditions, studies where ethnic background or age group was unidentifiable, systematic reviews, editorials and conference abstracts were excluded.

MEDLINE, Embase, Virtual Health Library, Web of Science, Cochrane Library, MedRXIV and PROSPERO databases from inception to 15 July 2021. Risk of bias for studies was assessed using the Mixed Methods Appraisal Tool (MMAT). The quality of evidence of collective outcomes were estimated using the Grading of Recommendations Assessment, Development, and Evaluation-"Confidence in the Evidence from Reviews of Qualitative research" (GRADE-CERqual) framework.. A total of 28 eligible studies conducted between 1997-2020 were included in the final analysis 17 quantitative surveys; 8 focus groups or interviews; 2 mixed-methods studies; and 1 case-control study). The majority were U.S. studies in English or Spanish, except for 5 studies set in Hong Kong, 1 in Japan, 1 in Brazil and 1 multi-centre study (including China, Indonesia, Turkey, South Korea, Greece, UK, Brazil and Nigeria). In total, 28,262 individuals with an estimated mean age of 69.8 years and 63.2% female participants were included. We summarised the common concepts and themes across studies and populations using a convergent synthesis analysis. Thirteen themes categorised as barriers or facilitators were identified and grouped into structural factors: (1) healthcare provider and systems related, (2) patient-related and (3) policy and operational level, and were analysed by

minority ethnic group. The main limitation of the study was the predominance of studies from the U.S. and East Asia.

Conclusions

In this systematic review, we found factors influencing vaccination uptake involve provider and healthcare system, patient-related and governance level factors that are specific to the older ethnic minority community being served. The evidence included in this review is supported by high or moderate certainty and can be translated to practice and policy. A tailored, multi-level approach combining increased education, access and culturally competent discussions with trusted healthcare professionals to address health beliefs, can maximise the potential impact of widespread vaccination policies.

Author summary

Why was this study done?

- Older adults from minority ethnic backgrounds are at increased risk of contracting COVID-19, developing severe infection and at increased risk of mortality.
- Vaccine hesitancy is high amongst individuals from minority ethnic backgrounds, yet no studies have systematically reviewed the factors influencing vaccination uptake amongst older adults from minority ethnic backgrounds who are high priority on current COVID-19 vaccination schedules.

What did the researchers do and find?

- We conducted a systematic review identifying studies examining attitudes towards vaccination uptake amongst older adults (≥65 years) from minority ethnic backgrounds
- We identified and summarised 13 themes, categorised as barriers and facilitators of vaccination uptake amongst older adults from minority ethnic backgrounds that are related to healthcare provider and healthcare system, patient, policy and operational level factors.

What do these findings mean?

- The factors influencing vaccination uptake amongst older adults from minority ethnic backgrounds identified in this review will help healthcare providers, clinicians and policy makers tailor vaccination delivery to ensure adequate impact in this high-risk group, essential to the current COVID-19 pandemic and in future vaccination schedules.
- A tailored, multi-level approach combining increased education, increased access and culturally competent discussions with trusted healthcare professionals to address health beliefs, can maximise the potential impact, equity and success of widespread vaccination policies.

Introduction

Individuals from minority ethnic backgrounds are at increased risk of contracting COVID-19 and severe infection [1, 2] and older adults are at highest absolute risk of COVID-19 mortality [3]. Whilst an age-based vaccination approach prioritising older groups is being implemented worldwide [4], vaccine hesitancy is high amongst ethnic minorities and in South Asian countries [5][6]. Lack of access to vaccines in low and middle income countries, coupled with vaccine hesitancy, could have significant implications for controlling the pandemic and the global economic future [5,6]. Equitable vaccine distribution within high income countries is also important to prevent coronavirus mutation [7]. Achieving high vaccine uptake during the COVID-19 pandemic is a global priority.

The latest UK data shows 86% of people from White backgrounds aged between 70-79 have been vaccinated for COVID-19, compared to 55% of people from Black backgrounds [8]. Inequalities in delivery of healthcare reduce the effectiveness of health policies [9]. There have been studies investigating factors influencing uptake of childhood vaccinations amongst minority ethnic groups [10], and a systematic review by Nagata et al in 2011 examining social determinants of influenza vaccination in older adults, which includes some findings related to minority ethnic groups [11]. There are none to our knowledge specifically examining the views of older adults from minority ethnic groups towards vaccinations, of critical importance to the current COVID-19 pandemic. A recent study investigating predictors of COVID-19 vaccine hesitancy found that although older adults expressed a greater willingness to be vaccinated compared to their younger counterparts, individuals from Black, Pakistani and Bangladeshi ethnic groups had greater reservations [12].

Lack of knowledge of the factors influencing vaccination uptake amongst high-risk older adults from minority ethnic groups limits the potential success of vaccination policies. Therefore, the aim of this review was to (1) examine perceptions of vaccinations amongst older adults from minority ethnic backgrounds, (2) summarise barriers towards and facilitators of vaccination uptake, and (3) provide a resource to support vaccination uptake for use by clinicians and policy makers.

Methods

Search strategy and selection criteria

The search strategies were developed without language restrictions and included the databases of the Medical Literature Analysis and Retrieval System Online (MEDLINE; Ovid), the Excerpta Medica (EMBASE; Ovid), Virtual Health Library (VHL), Web of Science, Cochrane Library, MedRxiv and PROSPERO from inception to July 15, 2021. We used a search strategy combining terms and synonyms from referenced studies for: “older adults”, “vaccinations”, “minority ethnic background” and “views” (see S1 Appendix for the full search strategy). We reviewed reference lists of eligible reports. This study is reported as per the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guideline (S1 Checklist). The study protocol is publicly available on PROSPERO (CRD42021237032)

Three independent reviewers systematically screened publications. Studies were eligible if they reported on perceptions, beliefs and attitudes towards vaccinations in older adults from a minority ethnic background. We included studies from non-White majority populations in their country of origin as these are relevant to the experience of individuals from a minority ethnic background in other settings since ethnic groups are considered to share a common ancestry, culture, and language [13]. “Older adults” were defined as people aged over 65, consistent with previous studies [11]. Vaccinations in investigation or development, studies focused on specific medical conditions, studies where ethnic background or age group was unidentifiable, systematic reviews, editorials and conference abstracts were excluded.

Data screening

Records were downloaded into Endnote (version X9) and duplicates were removed. Using a standardized form, three independent reviewers (CB, DG, UC) each conducted screening of two thirds of the total number of titles and abstracts, and full-texts. The Cohen’s κ statistic using the average across the three pairwise combinations of raters addressed inter-rater agreement regarding eligibility. Online systematic review software (Rayyan, QRCI) was used to facilitate literature screening. The titles were initially screened for title and abstract eligibility; full-text articles were then

retrieved and screened for eligible publications to be included in data extraction. Discrepancies were resolved through discussion if necessary with an adjudicator (KW).

Data extraction and analysis

DG and UC independently extracted data from each article into a specified data extraction table. This included: study design, analysis method, geographical setting, language, sample size, mean age, ethnic background, sex, vaccination type, views towards vaccinations, barriers and facilitators influencing vaccination uptake. A consensus meeting was held with CB to finalise data extraction. The risk of bias for studies was assessed by DG and UC using the Mixed Methods Appraisal Tool (MMAT); a validated tool for appraising methodological quality for use in systematic mixed study reviews [14]. A convergent synthesis approach informed by Pluye et al [15] was used to integrate qualitative and quantitative data. Results from studies that included qualitative, quantitative and mixed methods data were transformed into qualitative findings using thematic synthesis and a matrix was built on resultant themes and patterns agreed by CB, UC and DG. Convergent qualitative syntheses seeks to address complex research questions to understand "what, how and why" [15] relevant to this study question. Structural determinant categories identified in a previous study examining factors influencing vaccination uptake amongst general older adults [11] were drawn on to group themes. The quality of evidence of collective outcomes were estimated using the Grading of Recommendations Assessment, Development, and Evaluation - "Confidence in the Evidence from Reviews of Qualitative research" (GRADE-CERqual) framework.

Results

Included studies

In total, 3068 citations were identified by the search, 2485 citations after duplicates were removed. Following title and abstract screening, 195 potentially eligible articles were retrieved in full text (see Fig 1). 167 full-text articles were excluded: 89 did not examine the intended outcome; 48 were excluded as older adults were unidentifiable in a mixed age population; 12 were excluded as

participants were either not from older age groups or not from a minority ethnic background; 7 studies were systematic reviews; 11 studies were duplicates.

A total of 28 relevant studies conducted between 1997-2020 were included in the final analysis, of which 17 were quantitative surveys, 8 were focus groups or interviews, 2 were mixed-methods studies and 1 was a case-control study. equitable There was substantial agreement between reviewers at the title and abstract stage ($\kappa = 0.77$) and full-text review stage ($\kappa = 0.82$) (reported as an average across three pairwise combinations of raters at each stage). Meta-analysis was not conducted since there was high heterogeneity across the studies in methods, reporting of outcome and populations; few papers had sufficient quantitative data for meta-analysis; and this was not an a priori aim.

The MMAT risk of bias and GRADE-CERqual appraisals are summarised in S1 Appendix. The evidence included is supported by high or moderate certainty.

Fig 1. Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) flow diagram

Study characteristics

Study characteristics of the 28 included studies are summarised in Table 1. The majority were U.S. studies in English or Spanish, except for 5 studies set in Hong Kong and 2 in Japan, 1 in Brazil and 1 multi-centre study (including China, Indonesia, Turkey, South Korea, Europe, Greece, UK, Brazil and Nigeria).. In total, 28,262 individuals with an estimated mean age of 69.8 years and 63.2% female participants were included. 6 studies explored views amongst participants from African American backgrounds, 2 studies in participants from Hispanic or Latinx backgrounds, 6 studies in participants from Hong Kong Chinese backgrounds, 2 studies in participants from Japanese backgrounds, 1 study in participants from Brazilian backgrounds and 12 explored mixed groups of older adults from minority ethnic backgrounds. Most studies explored views related to either the influenza or pneumococcal vaccine.

Table 1 Characteristics of studies

Synthesis

The following themes were identified as barriers towards and facilitators of vaccinations amongst older adults from minority ethnic backgrounds. Themes were grouped according to previously established structural determinants: (i) healthcare provider and system related (ii) patient-related and (iii) policy and operational level [11] (Fig 2).

Fig 2. Barriers towards and facilitators of vaccination uptake amongst older adults from minority ethnic backgrounds

Barriers towards vaccination uptake

1) Misinformation and lack of information on vaccines

A significant lack of information around the need for vaccination, potential benefit and mechanisms underpinning how vaccinations work was identified as an important theme across the studies and populations. Older adults from African-American backgrounds, Hispanic backgrounds, Nigerian and Indonesian backgrounds were more likely to report they were uninformed or unaware the influenza vaccination was recommended for them [20, 37, 24, 17, 34, 26, 28]. Those from Hispanic backgrounds were 12.6% significantly more likely to be unaware that the flu vaccination was needed compared to White Americans [24].

Common barriers amongst African-American communities were a lack of awareness of how vaccinations could prevent disease or benefit health, the perception that influenza is a mild illness that did not require preventative measures [20], a perceived low likelihood of contracting influenza [37] and lack of awareness that older adults are at greater risk of severe illness [20]. Similar views were shared amongst individuals from Western Pacific backgrounds; influenza was considered “easily treatable” [39] and only a third of older adults from Hong Kong Chinese backgrounds felt they were susceptible to influenza or perceived it as a serious illness [26].

2) Perception of good health

The perception of being in good health, and therefore not requiring a vaccine, acted as a common barrier. Older adults from African-American communities perceived vaccinations as irrelevant to "healthy" people and rather indicated for older adults who were sick or suffered with chronic disease [23, 36, 20]. Many associated healthcare use with illness, rather than preventative care.

Similar perceptions were echoed across individuals from Hong Kong Chinese backgrounds, who considered a healthy body an indication of a strong immune system that can protect itself [39, 26, 28]. Reports by Siu et al described views that vaccines are for the "weak" (particularly amongst older men), that experiencing viral illness can strengthen the body, and that a healthy body with a healthy "root" does not require vaccination, reflective of traditional Chinese medicine principles [38]. Participants from Turkey, Canada and the UK shared views that a healthy lifestyle, including sufficient exercise, a balanced diet and good hygiene practices were preferable to protect against influenza [28].

3) Perception vaccine is ineffective

Older adults across the majority of studies and populations believed vaccinations were unlikely to be effective at preventing disease [18, 20, 26, 30, 35, 39].

4) Perception vaccine causes harm

A strong deterrent identified amongst African-American older adults was the belief that vaccinations cause illness, particularly that it would cause the flu [16, 20, 22, 35, 23, 41]. Approximately 32% of unvaccinated African-Americans believed that influenza vaccination causes influenza compared to 18% of White-Americans [22]. A further study reported African-Americans were 10.8% more likely to believe that flu vaccination causes flu [16]. This perception was mirrored in studies exploring the views of mixed populations including individuals from African-American, Hispanic and Western Pacific backgrounds [24, 29, 34, 26, 28, 43] and amongst older adults from Brazilian backgrounds [21]. Older adults from Brazilian backgrounds were concerned the vaccination may even cause death in old age [21].

Older adults from African-American, Hispanic, Brazilian and Western Pacific backgrounds also cited side-effects of vaccination as a major concern [20, 24, 21, 26, 27, 35, 37, 39, 34, 25, 43]. Fear of pain, allergic reactions and generalised symptoms that would interfere with daily life were reported.

Some older adults from Hispanic backgrounds believed vaccines could harm the immune system and would prefer alternative medicines [34].

5) Mistrust in healthcare system

Scepticism of vaccines, mistrust in physicians and the healthcare system was cited frequently by older adults from African-American backgrounds [20, 22, 33, 36, 23]. Harris et al acknowledged that mistrust in medical institutions was a product of historical abuses experienced by African-Americans, historical medical injustice and prior negative experiences with healthcare [23].

Ramanadhan et al described mistrust in vaccines amongst older adults from Hispanic backgrounds, but found they were more likely to be open to persuasion if given further information, compared to older people from African-American backgrounds [33].

Mistrust amongst older adults from Hong Kong Chinese and Japanese backgrounds centred around a scepticism of Western medicine [40, 38]. The studies illustrate perceptions of vaccinations as "unnatural", "chemical" and "strong" compared to traditional Chinese medicine.

6) Access

A significant theme across older Hispanic communities were issues related to vaccination access, including lack of transport, cost, distance to vaccination centres and concern about travelling if unwell [18, 22, 29]. This appeared to be a greater concern compared to other issues, such as mistrust in vaccines, in this community [18]. Approximately 13% of older adults from Latinx backgrounds cited access and cost issues as the main reason for non-vaccination compared to 2% from other racial/ethnic groups [22].

Transport and cost were also cited as barriers amongst individuals from African-American communities [36] ,Western Pacific backgrounds [40, 30] and studies examining mixed populations [28]. Kwong et al highlighted differences in vaccine affordability and availability due to different healthcare finance systems in the multi-centre study [29]. In Turkey, China and Nigeria, where the vaccine is funded by the individual, affordability is a predominant barrier [28]. Availability was a key

barrier in Brazil where the health system relies on the private sector, and vaccine shortage in Greece [28].

Facilitators of vaccination uptake

1) Recommendation from a trusted healthcare professional

A strong theme across many studies was the positive effect of receiving a recommendation or advice about vaccinations from a trusted healthcare professional (HCP). Older adults from African-American backgrounds were less likely to have reservations about vaccinations if recommended or persuaded by a physician [16, 20, 35, 41]. Similar views were shared in studies including older adults from mixed minority ethnic backgrounds [18, 29, 42] Japanese backgrounds [25] and Chinese backgrounds [27]. Lasser et al highlighted the importance of a trusting compassionate relationship with the HCP; cultural competence (e.g. a physician taking the time to assess English literacy before providing vaccination information), empathy ("treating the patient as a person"), and the ability to adapt to individual needs [29].

2) Vaccination reminders

Vaccination reminders were a facilitator of vaccination uptake amongst older adults from African-American backgrounds [31, 36]. Hispanic backgrounds [17, 18], Hong Kong Chinese backgrounds [39], Turkish and South Korean backgrounds [28]. Reminders from a physician were most frequently cited as positive factors (some felt this displayed care from their HCP, increasing trust in the relationship) [17], followed by offers from a clinic, posters, pamphlets and reminders in the media.

3) Supportive community

A consistent theme across most studies was the importance of positive views of vaccinations and encouragement from an older person's social community (including family, friends, cultural and religious leaders). Older adults from African-American backgrounds [31, 36] Hispanic backgrounds [18, 34], Greek backgrounds [28] and Western Pacific backgrounds [40, 39, 27, 28] shared this perspective. Close social contacts and community were perceived as trusted sources. Conversely, negative opinions amongst the older persons' social network acted as a barrier to uptake [36, 34].

4) Fear of developing disease

A fear of developing infectious disease acted as a facilitator of vaccination uptake amongst older adults from Western Pacific backgrounds [26, 27, 28, 30, 40, 43] – with fear of SARS cited in one study [30]. Chen et al found this perception was consistent across African-American, Hispanic, Japanese and Filipino backgrounds and similar across the age ranges amongst older adults [22]. Chen et al reported a significantly greater proportion of Japanese Americans (27%) and Filipino Americans (37%) were very concerned about getting influenza when compared to older adults from White backgrounds (20%) ($p<0.01$) [22]. Older adults from Chinese backgrounds believed cost of developing the disease would far outweigh the cost of vaccination, as a facilitator [28].

5) Knowledge of vaccinations and their mechanism of action

Sufficient information about how vaccinations prevent disease, and awareness that vaccinations are able to reduce the severity and duration of illness were a positive influencer amongst older adults from African-American backgrounds [20, 23, 36] and Western Pacific backgrounds [26, 40, 25]. Older adults from mixed minority ethnic backgrounds in the study by Lasser et al reported that having evidence that a vaccine had long-term effects lasting for more than 6 months was a positive influencer [29].

6) Recognition of age as a risk-factor

The perception of older age as a risk factor for severe infection was a positive influencer of vaccine uptake amongst older adults from African-American backgrounds [23, 36], Hong Kong Chinese backgrounds [26, 43], Japanese backgrounds [25] and Mexican backgrounds [32]. Sengupta et al identified views that the perception of one's health as vulnerable and having multiple comorbidities related to older age, also acted as facilitators amongst individuals from African-American backgrounds [36].

7) Vaccination setting

Preference of vaccination setting varied across the populations examined in the studies. Older people from African-American backgrounds expressed greater trust in traditional medical settings (such as a clinic or hospital) compared to community centres [16]. The majority of older people from Hispanic backgrounds in the study by CDC et al preferred a busier community located setting [18]. For older

adults from Hong Kong Chinese backgrounds, clear information about where vaccination centres were located was most important [30].

Discussion

This systematic review has summarised existing evidence on factors influencing vaccination uptake amongst older adults from minority ethnic backgrounds for the first time, of high relevance to the current COVID-19 pandemic. It presents essential (i) healthcare provider related, (ii) patient-related and (iii) policy related factors to consider in vaccination strategies currently being rolled out to ensure adequate impact, efficacy and equity. These findings are based on high-moderate certainty of evidence which can be translated to practice and policy.

Lack of information about how vaccinations prevent illness and misconceptions around efficacy, side effects and perceived low risk of infectious disease were fundamental barriers to vaccine uptake amongst older adults from all minority ethnic backgrounds included in this study. Views that vaccinations are irrelevant to healthy older people and indicated for those with a poorer health status were shared amongst individuals from African-American, Western Pacific backgrounds and minority ethnic groups in Turkey, Canada and the UK. Access and cost were large negative influencers amongst people from Hispanic, Greek, Nigerian and Turkish backgrounds; historic distrust of healthcare establishments was important amongst African-American communities; and antagonising concepts with traditional Chinese medicine were significant amongst those from Western Pacific backgrounds. Facilitators were common amongst older adults across all minority ethnic backgrounds included in the studies. Adequate knowledge of how vaccines achieve health benefits, recognising age as a risk factor for serious illness, fear of developing disease, advice from a trusted HCP, reminders, and encouragement from an older persons' social community were positive influencers of vaccine uptake.

Comparison to other literature

We have grouped themes under important structural determinants identified by Nagata et al [11]. Similar sub-themes relevant to older adults from minority ethnic backgrounds emerged in our study: fear and mistrust of modern medicine amongst older adults from African-American backgrounds,

language and literacy barriers, and cultural beliefs that natural healthy lifestyles are preferable to vaccinations [11].

A systematic review by Bish et al [44] examining factors associated with influenza uptake in the general population found the degree of fear related to the 2009 influenza pandemic outbreak, positive social pressure, and less fear of side effects correlated with increased vaccination intentions of uptake, consistent with our findings. This suggests these factors are common to the general population. Other factors identified in our study including lack of information on vaccines, the belief that vaccines cause disease, the perception that vaccines are irrelevant when in good health, access issues and fear of the disease as a facilitator of vaccination uptake, are likely more common in older adults from minority ethnic backgrounds and important to consider in COVID-19 age-based vaccination policies.

Sheldenkar et al [45] recently conducted a systematic review of general adult influenza vaccine acceptance in Asia. Similar to our findings, there were a significant lack of studies in South Asia compared to East Asian countries (with Hong Kong having the greatest number of publications). This highlights a pressing gap in the research. South Asians are a sizable ethnic minority in many European countries [46]; previous studies have identified vaccine hesitancy amongst Pakistani and Bangladeshi ethnic groups [12]; and these groups are at increased risk of COVID-19 mortality [47].

Strengths and limitations

This is the first systematic review seeking to understand perceptions and beliefs influencing vaccination uptake amongst older adults from minority ethnic backgrounds. It provides insights that are pertinent to the COVID-19 pandemic, with vaccination policies being rolled out worldwide. The findings also inform existing national vaccination schedules and future policies in epidemics, to ensure optimal impact and equity. A further key strength of this study is the focus on older adults. Despite being the most vulnerable to severe illness from communicable disease [3], older adults are often excluded from clinical research [48]. The main limitation is the limited number and range of studies available, with the vast majority being set in the U.S, which may not be applicable to ethnic minority groups in other settings. We included a handful of studies from majority populations in East Asia which may not represent the views of those groups where they are an ethnic minority, but we felt

these studies were still likely to be of relevance to these populations. There were insufficient papers across diverse countries and ethnicities to compare cross-country differences in majority populations.

Many studies were excluded as the perspectives of older participants were unidentifiable in a mixed-age group. However, a brief overview of these studies indicated that the main themes were broadly similar though views may be more diverse amongst younger populations.

All studies identified in this review were on influenza and pneumococcal vaccinations. Whilst this is largely comparable to COVID-19, it is not a direct comparison and therefore some recommendations may not be directly applicable to the COVID-19 context. We identified some studies related to COVID-19 and minority ethnic groups in our searches, however these were all excluded due to age criteria (≥65 years) or focus on vaccinations in development. Recent studies that have explored COVID-19 vaccination hesitancy amongst minority ethnic groups of all ages have reported similar barriers to those we have identified: perceived risk of getting infected with COVID-19, concerns about side effects and safety, medical mistrust amongst Hispanic and African-Americans [49][50].

The studies included focused on minority backgrounds that may have obscured smaller intra-group differences. Ethnic groups are considered to share a common ancestry, culture, and feeling of solidarity with one another [13]. There is wide variation within minority ethnic groups in country of origin, language, religion, socioeconomic characteristics, and experiences that limit the interpretations we can make from this study, but enough shared culture with regards to family structures, identity, and health beliefs to make ethnic group relevant to health behaviours [13]. Our outcome focused on the perceptions of and attitudes towards vaccinations amongst minority ethnic groups. We acknowledge that whilst the themes cover some social determinants that influence vaccination uptake, all potential social determinants that pose barriers to vaccination in minority populations (including broader economic, social and cultural factors) may not have emerged in the data.

The majority of studies did not report on immigration status or citizenship of the minority ethnic groups which is a further limitation. We identified 2 studies examining perceptions of vaccinations in migrant groups in the searches, however these were excluded due to age criteria (≥65 years). Recent studies report that whilst some of the barriers are common to those identified in this review (fear of side-effects, mistrust in the healthcare system and access) others were unique to this population (fear of facing immigration checks, lack of information in an appropriate language and incompatibility with

migrants' religion) [51] [52]. Language barriers were not identified as an emergent theme in our review. The majority of non-US studies were conducted in either the native language of the minority ethnic group and/or indicated that a translator was used. Some US studies covering Hispanic populations were conducted in Spanish or used a culturally appropriate translator, however 11 US studies including African-American and Hispanic participants either stated the study language was English or not specified which is an important limitation. Clear reporting on language and use of appropriate methods is recommended for future studies.

Recommendations for practice

This review recommends, on a broad level, that efforts to provide adequate information and dispel misconceptions around vaccines by healthcare providers are fundamental to facilitating acceptance. Older adults from minority ethnic backgrounds who perceive themselves as healthy may benefit most from targeted intervention to increase uptake. This is likely to be most effective through long-term trusted relationships with healthcare professionals, tailored conversations (including family and friends) and a compassionate exploration of patient-related health beliefs. This can be supported by healthcare system level actions such as vaccination reminders and translated written information. Policy and governance level actions should focus on increasing access. This should include addressing transport issues, access for older adults living in rural communities, ensuring adequate availability of vaccination centres, home-based vaccination for frail older adults, incorporation of vaccination sites into community facilities, addressing financial barriers and existing inequity in access to preventative healthcare. Healthcare providers and policymakers should seek to tailor these recommendations to the needs and patient-related factors specific to the older ethnic minority communities they serve. Future research should address the gap in studies seeking to understand attitudes to vaccinations amongst older adults from ethnic minority groups in countries outside the US, including Europe and Australasia, and in majority groups including South Asia and Africa.

Conclusion

Moderate-high quality evidence shows factors influencing vaccination uptake involve provider and healthcare system factors, patient-related factors and governance level factors that are specific to the

older ethnic minority community being served. A tailored, multi-level approach combining increased education, increased access and culturally competent discussions with trusted healthcare professionals to address health beliefs can maximise the potential impact of widespread vaccination policies.

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Figure 1

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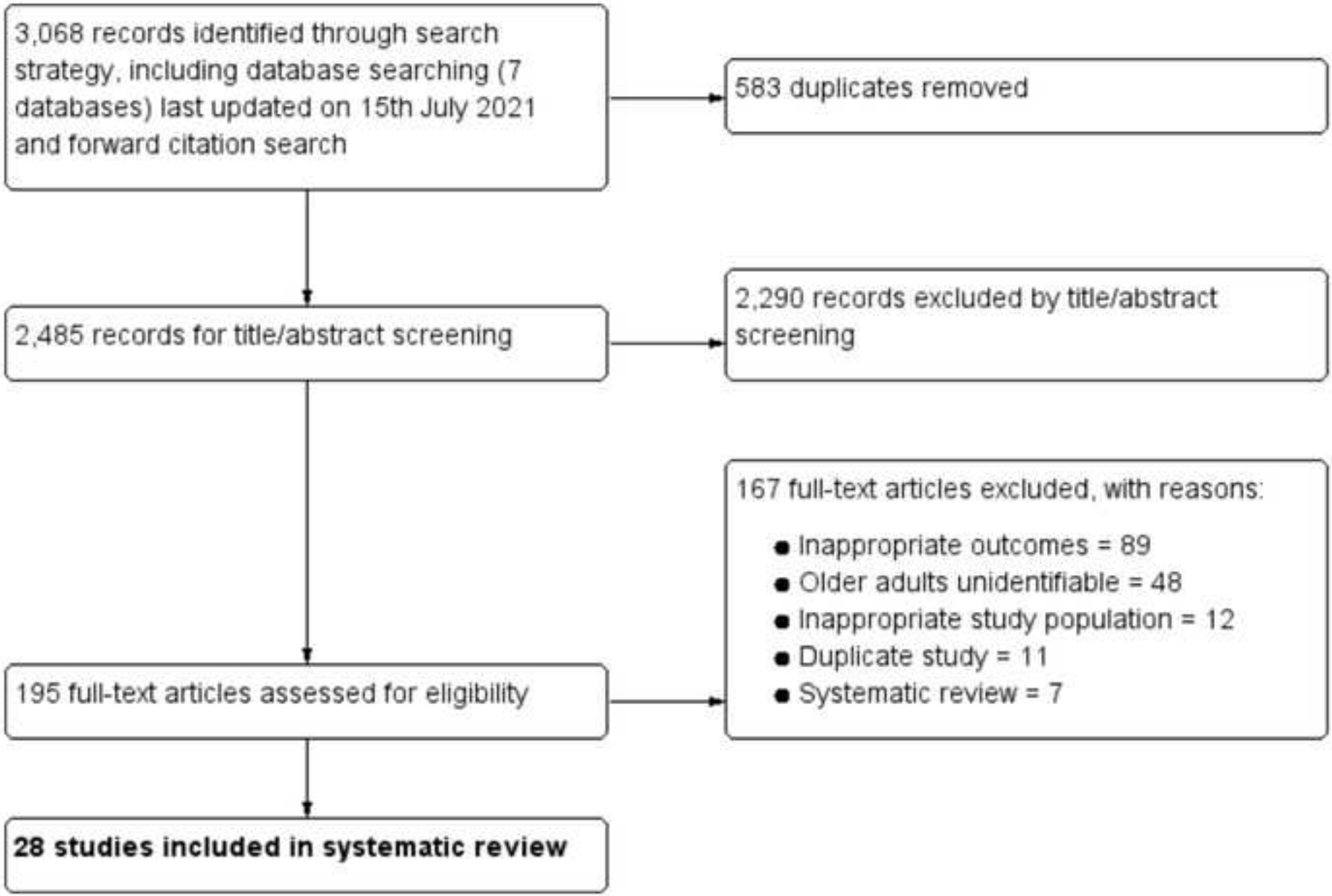

Figure 2

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	Factors	Themes	Sub-themes
Barriers towards vaccinations	(i) Healthcare provider and healthcare systems related	Misinformation and lack of information	Unaware that vaccination is recommended
			Unclear that older adults are at greater risk of severe disease
			Unaware vaccinations prevent flu; lack of knowledge on mechanism of action.
			Perception of influenza as mild illness; easily treatable – vaccine not required; lack of clear health benefit
	(ii) Patient-related	Perception of good health	Perception vaccinations are not required for those in good health, "irrelevant" treatment, lack of benefit;
			Indicated for "sick older adults" only; lack of need for preventative action
			Perceived low likelihood of contracting illness
			Perception that "healthy" immune system can protect itself; vaccination is for "weak"
			Perception that healthy practices are preferable to vaccines to protect against disease (e.g. exercise, diet, hygiene).
		Perception vaccine is ineffective	Unclear health benefit; lack of confidence in vaccine
		Perception vaccine is harmful	Vaccine causes illness
			Vaccine can cause death in old age
			Side effects (e.g. pain)
			Concern about contents of vaccine as "unnatural"; concern about chemicals;
		Mistrust in healthcare system	Mistrust in vaccine; scepticism; mistrust in medical institutions; experiences of historical medical injustice; mistrust in physicians; previous vaccine shortage)
			Negative past experiences in healthcare system (previous vaccinations; physician encounters)
			Less trust in Western medicine
	(iii) Policy and operational level	Access	Lack of transport to a vaccination site; distance
			Financial reasons
			Difficulty attending appointments when acutely/chronically sick
			Experience of previous vaccine shortage
Facilitators of vaccination uptake	(i) Healthcare provider & healthcare systems related	Recommendation from a trusted healthcare professional (HCP)	Recommendation from a physician with a long-term relationship; efforts made to "persuade" vaccination uptake Physician displays empathy, patience; cultural competence e.g. assessing English literacy; providing sufficient information
		Vaccination reminders	Offers at clinic; reminders from physicians; pamphlets; media
		Knowledge of vaccinations and mechanism of action	Awareness vaccination prevents illness, can reduce severity and duration of illness; understanding of how vaccination supports immunity
			Knowledge vaccine can reduce severity and duration of illness
			Understanding of how vaccination supports immunity
			Awareness of potential long-term benefits
	(ii) Patient-related	Supportive community	Encouragement from friends, family, social community, cultural leaders
		Fear of developing disease	Concerns about severe influenza illness; concerns about SARS
			Concern cost of disease treatment will outweigh vaccination cost
		Recognition of age as risk-factor	Perception of age and own health status as vulnerable - requiring vaccine
	(iii) Policy and operational level	Vaccination setting	Varied preference of vaccination setting; range from traditional medical settings to community facilities; clear information about where to access vaccination

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Table 1 Characteristics of studies

Authors	Year	Study setting (Country)	Study design	Analysis	Numbers included	Estimated mean age (assumptions made, see comments)	Language / Culturally appropriate	Ethnicity	Sex (% F)	Vaccine type
Abel [15]	2013	USA	Survey	Chi²	1006	75.2*	No mention but likely English	African American, Caucasian	61.4	Influenza
Albright [16]	2017	USA	Focus groups	Team-based process; reflexive team analysis	68	52.1*	English or Spanish	English-speaking, Spanish-language	NS	Diphtheria, Influenza, Pertussis, Pneumococcal, Tetanus
Anonymous (CDC)* [17]	1997	USA	Telephone Survey	NS	600	NS	English or Spanish	Hispanic, non-Hispanic White, other, White	NS	Influenza, Pneumococcal, tetanus
Armstrong [18]	2001	USA	Telephone Survey	Chi², Log regression	488	76.6	No mention but likely English	African American, Caucasian, Hispanic	71.1	Influenza
Cameron [19]	2000	USA	Focus groups	Extended parallel process model, latent content and constant comparative techniques	48	74.1	No mention but likely English	African American	67.5	Influenza
Casarin [20]	2011	Brazil	Semi-structured interviews	Thematic Analysis	7	69.4	Brazilian Portuguese	NS	57.1	Influenza
Chen [21]	2007	USA	Telephone Survey	Chi², Log regression	1961	58.8	English or Spanish	Black, Filipino, Japanese, Latino, White	65	Influenza
Harris [22]	2006	USA	Semi-structured in-depth interviews	Content analysis, including triangulation and constant comparison approach	20	71.5** (vaccinated) 74.0** (unvaccinated	No mention but likely English	African American	70	Influenza, Pneumococcal
Hebert [23]	2005	USA	Survey	Logistic regression	6746	74.5	No mention but likely English	African American, Hispanic, White	56.2	Influenza
Kajikawa [24]	2019	Japan	Questionnaire	Logistic regression	316	70**	Japanese	Japanese	48.4	Influenza
Kwong [25]	2006	Hong Kong, China	Survey	NS	70	75.8*	Chinese, likely Cantonese	Hong Kong Chinese	51.4	Influenza
Kwong [26]	2009	Hong Kong, China	Questionnaire	Chi², t-test, Kolmogorov-Smirnov test, logistic regression	197	75.2*	Chinese, likely Cantonese	Chinese	58.9	Influenza
Kwong [27]	2010	China, Indonesia, Turkey, South Korea, Greece, Canada, the United Kingdom, Brazil and Nigeria	Focus groups	Thematic Analysis	208	75.5*	English, multiple non-English languages not specified	Multiple - Chinese, Indonesian, Turkish, Korean, Greek, Canadian, British	62.8	Influenza
Lasser [28]	2006	USA	Survey and observation	Qualitative analysis	18	71.9	English or Spanish or Haitian Creole	Black, mixed, other, White	77.8	Influenza
Lau [29]	2008	Hong Kong, China	Telephone Survey	Chi², Logistic regression	483	75.5*	NS	Hong Kong Chinese	55	Influenza
Nowalk [30]	2006	USA	Telephone Survey	Chi², Logistic regression	375	64.9*	English	African American	63	Influenza, Pneumococcal
Phippards [31]	2013	USA	Survey	Chi², Logistic regression	197	46.5*	English / Spanish (culturally appropriate)	Mexican	70.1	Influenza
Ramsaran [32]	2015	USA	Online survey	ANOVA[a], Chi²	1569	44*	English	African American, Hispanic	56	Influenza
Rikin [33]	2018	USA	Survey	Wilcoxon, Logistic regression	200	74	English/Spanish (culturally appropriate with translators)	Hispanic	73	Influenza
Schwartz [34]	2006	USA	Survey	Chi², logistic regression	454	77.5*	English	African American	54.4	Influenza
Sengupta [35]	2004	USA	Interviews	Thematic coding	28	74.9	English	African American	78.6	Influenza
Singleton [36]	2005	USA	Survey	Chi², Log regression	1639	77.6*	English	Black, Hispanic	58.6	Influenza, Pneumococcal
Siu [37]	2016	Hong Kong, China	Interviews	Thematic coding	40	72.7	Cantonese	Hong Kong Chinese	67.5	Influenza, Pneumococcal
Sun [38]	2020	Hong Kong, China	Survey, focus groups	Chi², Log regression	2452	51.4*	Cantonese	Hong Kong Chinese	64.8	Influenza
Takahashi [39]	2002	Japan	Case-control	Chi², t-test, Mann Whitney, Logistic regression	210	69.8	No mention but assume Japanese	Japanese	66.7	Influenza
Weston [40]	2006	USA	Telephone survey	Chi², multivariate binomial regression	4577	74.5	No mention but likely English	Black, Hispanic, White	Unknown "majority" stated	Influenza, pneumococcal
Worden [41]	2012	USA	Telephone survey	Chi², logistic regression	3821	77.6*	No mention but likely English	Black, Hispanic, other, White	64.7	Influenza, pneumococcal
Yu [42]	2014	Hong Kong, China	Questionnaire	Logistic regression	306	74.6	Chinese, assume Cantonese	Chinese	37.5	Influenza

*mean age estimated using sum total of each subgroup frequency multiplied mid-point of each range divided by total frequency; ** median age used. "NS" – not stated.

*: CDC= "Centers for Disease Control and Prevention"

[a]: ANOVA= "analysis of variance"

Supplementary appendix

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