

# Wales COVID-19 Evidence Centre (WC19EC) Rapid Evidence Summary

## Vaccination uptake (barriers/facilitators and interventions) in adults from underserved or hard-to-reach communities

Report number – RES00006 (June 2021)

### TOPLINE SUMMARY

#### What is a Rapid Evidence Summary?

An *interim evidence briefing* to inform further work and provide *early access to key findings*. The report is based on a *limited search of key resources* and the *assessment of abstracts*. Priority is given to studies representing robust evidence synthesis. *No quality appraisal or evidence synthesis are conducted, and findings should be interpreted with caution.*

#### Background / Aim

**Vaccination against COVID-19 is critical** in bringing the current pandemic under control. However, in the UK, there is **greater vaccine hesitancy and low vaccination uptake in certain underserved and minority ethnic populations**. We looked for evidence for the **barriers to, and facilitators of vaccination uptake** in adults who are **underserved or hard-to-reach**, and for **interventions and strategies** to increase vaccination uptake in these groups. This report was requested by the Wales Vaccine Equity Group and the Public Health Wales Vaccine Preventable Disease Programme.

#### Key Findings

- Most reviews focused on vaccines **other than COVID-19 vaccine** (and therefore findings may not be applicable to the COVID-19 pandemic), **and to the general population**: 29 systematic reviews, 9 rapid reviews, 2 recommendations/clinical guidelines, 1 evidence summary and 16 ongoing reviews were identified in total.
- The [National Collaborating Centre for Methods and Tools \(2021\)](#) rapid review focused on reasons for **vaccine confidence and uptake in populations experiencing inequities**, included studies were of low/moderate quality. **Barriers** included **concerns about vaccine safety, mistrust of public health agencies, and access barriers**. **Trusted messengers to deliver information and encourage access** to vaccination were highlighted as **facilitators**.
- [The Public Health Wales Observatory \(2020a\)](#) rapid review looked at **strategies to maximise vaccination uptake in hard-to-reach groups** based on 13 descriptive non-UK primary studies, not assessed for quality. Interventions included **culturally**

**and linguistically tailored communications, translators at vaccination clinics, community-based educational campaigns and holding community-based clinics at food lines, shelters etc.**

It was decided **not to proceed to a rapid review at this stage but to revisit this work in September 2021** when the [Hussain et al \(2021\)](#) review focussing on interventions to improve uptake of COVID-19 vaccination in the UK Black, Asian, and minority ethnic population is due to be completed.

**Update 13.9.21 – Hussain et al (2021) review not complete, therefore no further findings to add to this report.**

### **Policy Implications**

In light of poor-quality evidence for interventions to promote COVID-19 vaccination uptake in hard-to-reach populations, **a multi-strategy approach** should be taken including **collaboration with community leaders** to provide **trusted information and promote access**.

### **This review should be cited as:**

Rapid evidence summary of vaccination uptake (barriers/facilitators and interventions) in adults from underserved or hard-to-reach communities. Report RR00006. Wales COVID-19 Evidence Centre. June 2021.

[http://www.primecentre.wales/resources/RES/RES00006\\_Wales\\_COVID-19\\_Evidence\\_Centre\\_Rapid\\_evidence\\_summary\\_Vaccine\\_uptake\\_equity\\_June-2021.pdf](http://www.primecentre.wales/resources/RES/RES00006_Wales_COVID-19_Evidence_Centre_Rapid_evidence_summary_Vaccine_uptake_equity_June-2021.pdf)

**Disclaimer:** The views expressed in this publication are those of the authors, not necessarily Health and Care Research Wales. The WC19EC and authors of this work declare that they have no conflict of interest.

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# **Wales COVID-19 Evidence Centre (WC19EC) Rapid Evidence Summary**

## **Vaccination uptake (barriers/facilitators and interventions) in adults from underserved or hard-to-reach communities**

**Report number – RES00006 (June 2021)**

### **FULL REPORT**

#### **1. What is a Rapid Evidence Summary (RES)?**

Rapid Evidence Summaries are designed to provide an interim evidence briefing to inform further work and provide early access to key findings. They are based on a limited search of key resources and the assessment of abstracts. Priority is given to studies representing robust evidence synthesis. No quality appraisal or evidence synthesis are conducted, and the summary should be interpreted with caution.

#### **2. Production of this rapid evidence summary**

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#### **3. Requesting Stakeholder Group(s)**

Vaccine Equity Group and Public Health Wales (PHW) Vaccine Preventable Disease programme.

#### **4. Context / Background**

Vaccination against COVID-19 is critical in bringing the current pandemic under control. To achieve herd immunity, it is essential that a substantial proportion of the population receive the COVID-19 vaccine when offered. Vaccine uptake would need to be at approximately 67% in the country to reduce the spread of the disease (Randolph and Barreiro, 2020).

However, prior research has highlighted much greater vaccine hesitancy and low vaccination uptake in certain underserved and minority ethnic populations in the UK (Razai et al., 2021, Robertson et al., 2021). An understanding of the barriers and enablers of vaccine uptake in these groups is therefore critical to informing the effective designing and rollout of COVID-19 vaccination strategies in Wales.

##### **4.1 Purpose of this report**

The objective of this report is to summarise the secondary level evidence on the barriers to, and facilitators of vaccination uptake in adults who are underserved or hard-to-reach, and to identify interventions and strategies to increase vaccination uptake in these groups.

## 5. Research Question(s)

(Used to inform the searches)

<b>Review Question 1</b>	
<b>What are the barriers to, and facilitators of, vaccination uptake in adults who are underserved or hard-to-reach?</b>	
<b>Participants</b>	Hard-to-reach or underserved adult populations (Black and minority ethnic groups, traveller communities, refugees/asylum seekers, the homeless).
<b>Intervention / Exposure</b>	Barriers and facilitators of vaccination uptake.
<b>Comparison</b>	Usual service provision/no intervention.
<b>Outcomes</b>	We focused on COVID-19 vaccination evidence in the first instance. Where this was not available, we considered evidence from other vaccination programmes.

<b>Review Question 2</b>	
<b>What interventions are effective in increasing uptake of vaccines in adults who are underserved or hard-to-reach?</b>	
<b>Participants</b>	Hard-to-reach or underserved adult populations (Black and minority ethnic groups, traveller communities, refugees/asylum seekers, the homeless).
<b>Intervention / Exposure</b>	Interventions/strategies to increase COVID-19 vaccine uptake (educational, behavioural, promotional, communicational).
<b>Comparison</b>	Increased vaccination uptake.
<b>Outcomes</b>	We focused on COVID-19 vaccination evidence in the first instance. Where this was not available, we considered evidence from other vaccination programmes.

## 6. Summary of the Evidence Base

### 6.1 Type and amount of evidence available

**Table 1. Summary of the extent the secondary/tertiary research**

<b>Evidence type</b>	<b>Total</b>	<b>Comments</b>
Systematic reviews (SRs)	29	
Rapid reviews (RRs)	9	

Evidence based Clinical Guidelines (CGs)	2	
Protocols for reviews that are underway	16	Overlap of 3 ongoing reviews identified in both Q1 and Q2
Economic evaluations (EE)		
[Other.] Evidence summary	1	

### 6. 1.1 Research question 1: What are the barriers to, and facilitators of, vaccination uptake in adults who are underserved or hard-to-reach?

Overall, this report identified **six systematic reviews, five rapid reviews of published work** (Table 1) **and 16 ongoing reviews** (Table 2). Six reviews were produced to inform the COVID-19 vaccination rollout programme. Three of these reviews explored factors affecting the general public's acceptance of a future COVID-19 vaccine prior to vaccine rollout, two reviews informed COVID-19 vaccination efforts by studying H1N1 (swine flu) vaccine uptake, while one review produced to inform public health decision makers' response to the COVID-19 pandemic, examined reasons for vaccine confidence and uptake in populations experiencing inequities. None of these reviews examined actual COVID-19 vaccination uptake in underserved or hard-to-reach groups. The remaining reviews addressed vaccination uptake broadly. The reviews identified were focused mainly on the general population.

The **six reviews** produced to inform COVID-19 vaccination efforts are summarised below:

1. The ([National Collaborating Centre for Methods and Tools, 2021](#)) rapid review explored reasons for vaccine confidence and uptake in populations experiencing inequities. This review focused on three specific populations - Indigenous populations in Canada and globally; Black, African, Caribbean communities in North America and Europe; and individuals experiencing homelessness or who are precariously housed. Quality assessment of included evidence was conducted, however for some of the included evidence, the reviewers reported lack of a suitable quality appraisal tool, or lack of expertise to assess the methodological quality within the review team. Trusted messengers to deliver information about vaccinations and encourage access to vaccination was highlighted across all three populations. Included studies were of low and moderate quality.
2. The [Konnyu and Benitez, 2020](#) rapid review explored the evidence on barriers and facilitators to individuals' willingness to receive a hypothetical future COVID-19 vaccine. This review focused on the general population and the included studies were not assessed for quality. Review findings were mapped to behavioural frameworks. Barriers to willingness to receive a COVID-19 vaccine included low-perceived risk from COVID-19, being of Hispanic or Black racial/ethnic background, and concerns about vaccine safety. A limitation of this review is that all included studies surveyed populations prior to the release of data on safety and effectiveness of Pfizer and Moderna vaccines in the USA and abroad.
3. [The Crawshaw et al, 2021](#) rapid review focused on factors affecting COVID-19 vaccination acceptance and uptake among the general public. This review focused on the general population and particularly those from equity-seeking groups. The included studies were not assessed for quality. This review found that across studies, concerns and erroneous beliefs about COVID-19 vaccine safety and mistrust of governments and public health agencies was associated with lower

vaccination acceptance, whereas social influences such as peer-to-peer/group norms may help encourage vaccination.

4. The [Ayers et al, 2021](#) systematic review aimed at informing COVID -19 vaccination efforts by studying factors associated with unequal uptake of H1N1 vaccination. Observational studies examining H1N1 vaccine uptake by race/ethnicity, socioeconomic status, rurality, and disability status in US settings were included. African American/Black, Latino, and low-socioeconomic status participants had disproportionately lower H1N1 vaccination rates. Factors potentially contributing to disparities in vaccine uptake included barriers to vaccine access, inadequate information, and concerns about vaccine safety and efficacy. A limitation of this review is that the categorisation of racial and ethnic groups was not consistent across studies.
5. The [Public Health Wales Observatory, 2020b](#) rapid review explored the evidence on effective methods of communicating with the general public to address concerns about the COVID-19 vaccine and encourage uptake. The majority of research identified in this review related to the H1N1 vaccine during 2009-2010. Predictors of COVID-19 vaccine uptake derived from surveys on future COVID-19 vaccination campaigns included being a healthcare worker, having greater medical/scientific understanding of and knowledge about COVID-19, having received a seasonal flu vaccine, confidence in government information, and suffering from asthma/COPD. Limitations of this rapid review include the use of a wide range of research that was not assessed for quality and the use of pre-print data that had not been peer-reviewed at the time of identification.
6. The [Sayles et al, 2020](#) systematic review aimed to identify individual barriers of vaccination hesitancy in minority populations in North America, in order to inform the COVID-19 vaccine rollout programme. Black, Latino, Asian, and multiracial respondents were found to be less likely to receive routine vaccination than White respondents. Barriers across all minorities included lack of information, concern about long-term side effects, lack of health insurance, cost, recommendation, and language barriers.

Of the **16 ongoing reviews identified** (Table 2), **ten were COVID-19 vaccination specific**, four targeted migrants or minority ethnic groups, one in the UK and one focused on low and middle-income countries.

Two relevant ongoing reviews focused on COVID-19 vaccination uptake in ethnic subgroups:

1. The [Hussain et al, 2021](#) review examines COVID-19 vaccine hesitancy in Black, Asian, and minority ethnic groups in the UK and is anticipated to be completed in April 2021.
2. The [Katsura et al, 2021](#) review examines factors influencing population attitudes towards the uptake of COVID-19 vaccines and how this varies across different ethnic groups. This review is anticipated to be completed in May 2021.

## 6.1.2 Research question 2: What interventions are effective in increasing uptake of vaccines in adults who are underserved or hard-to-reach?

Overall, this report identified **23 systematic reviews, four rapid reviews, two recommendations/clinical guidelines, one evidence summary** (Table 3), and **three ongoing reviews** (Table 4). Three of the identified secondary evidence pieces focused on strategies or recommendations to improve population adoption of COVID-19 vaccination. One rapid review aimed at informing the COVID-19 vaccination programme and looked at strategies to increase vaccination uptake in hard-to-reach groups. None of these reviews focused on actual COVID-19 vaccination uptake in underserved or hard-to-reach populations. One review focused on interventions to improve vaccination uptake in newly arrived migrants to the EU/EEA. Fifteen reviews were generic in their approach and addressed vaccination uptake broadly, while the remainder focused on influenza, pneumococcal and Hepatitis B and C vaccines.

Five of the identified secondary evidence found to be relevant to addressing this research question are summarised below. These reviews were COVID-19 vaccine-related (3 reviews) or were targeted at hard-to-reach groups (2 reviews).

1. [The Public Health Wales Observatory, 2020a](#) rapid review looked at **strategies to maximise vaccination uptake in hard-to-reach groups**. This review included **13 primary studies** which were a mix of **surveys, qualitative, and descriptive case studies**. Most of the studies focused on pandemic influenza. No sources contained UK data. This review identified evidence for hard-to-reach groups including **ethnic minorities, the homeless, and immigrants**. Effective interventions for ethnic minorities included **culturally and linguistically tailored communications, having translators at vaccination clinics, community-based educational campaigns, and increasing community knowledge through factual and consistent messaging**. Holding **community-based clinics at food lines, shelters** or other places where people who are homeless regularly gather, was found to be effective in this group. Finally, this review outlined specific recommendations aimed at improving vaccination uptake in immigrants. These included avoiding asking about immigration status, encouraging the use of bilingual, bicultural community health workers, developing low-literacy and culturally appropriate health education materials, and delivering messages through existing trusted channels. **A limitation of this review is the use of largely descriptive research that was not assessed for quality.**
2. The [French et al, 2020](#) summary looked at key **guidelines** in developing a pre-emptive COVID-19 vaccination uptake promotion strategy. These include: behaviour change planning, audience targeting and segmentation, competition and barrier analysis and action, mobilisation, vaccine demand building, community engagement, vaccine access, marketing promotions strategy, news media relations and outreach, and digital media strategy. Findings were descriptive and not based on actual COVID-19 vaccination uptake.
3. The [Schoch-Spana et al, 2020](#) report outlined the opportunities associated with a future COVID-19 vaccination campaign and provides empirically-informed recommendations to advance public understanding of, access to, and acceptance of COVID-19 vaccines in the US. Recommendations include: **Value** social science as key to the success of COVID-19 vaccination; **Inform** public expectations about COVID-19 vaccination benefits, risks, and supply; **Communicate** in meaningful

ways, crowding out misinformation; **Earn** the public's confidence that allocation and distribution are even-handed; **Make** vaccination available in safe, familiar, and convenient places; and **Establish** independent representative bodies to instil public ownership of the vaccination programme.

4. The [Finney Rutten et al, 2021](#) evidence summary outlined effective strategies to address COVID-19 vaccine hesitancy and support public health efforts. These include **organisation-level** interventions (standing orders, audit and feedback, reminders and recalls, and point-of-care prompts); **interpersonal-level** interventions (clinician recommendations, strong recommendations, and presumptive, announcement-style language); and **individual-level** interventions (train and educate clinicians, develop patient education materials).
5. The [Hui et al, 2018](#) systematic review on interventions to improve vaccination uptake in newly **arrived migrants to the EU/EEA**. **Three primary intervention studies** performed in the EU/EEA or high-income countries were included in this review. The population of interest included **asylum seekers, refugees, undocumented migrants, and other foreign-born residents, with a focus on newly arrived migrants** (defined as within five years of arrival to the destination country). Critical appraisal of the included studies was undertaken, with **two studies determined to be of medium quality and one of low quality**. Intervention studies showed **small but promising impact on vaccine uptake**. The identified interventions focused on **social mobilisation and community outreach programmes, planned vaccination, and educational campaigns**. Limitations of this review include the **lack of comparator data and the low quality of included studies**.

The **three ongoing reviews** (Table 4) included research questions on strategies: to reduce vaccine hesitancy in ethnic minority populations ([Kamal et al, 2021](#)); to improve vaccination uptake in Black, Asian and minority ethnic groups in the UK ([Hussain et al, 2021](#)); and to encourage vaccination and counter barriers to vaccine acceptance in ethnic minority groups ([Lam and Acharya, 2021](#)). Hussain et al, 2021 focuses specifically on COVID-19 vaccination uptake in the UK and is anticipated to be completed in April 2021.

## 6.2 Key Findings

- This rapid evidence summary **did not identify any published secondary evidence relating to actual COVID-19 vaccination uptake in underserved or hard-to-reach groups**. COVID-19 vaccination-related evidence identified focused mainly on informing future COVID-19 vaccination campaigns for the general population. This summary identified secondary evidence from reviews focused on vaccines other than COVID-19 vaccine, most commonly H1N1 (swine flu) vaccine.
- **A number of relevant ongoing reviews were identified** which relate to COVID-19 vaccination uptake – one of which focuses on Black, Asian and minority ethnic groups in the UK.
- **Most of the evidence obtained from secondary literature was specific to vaccination uptake in the general population**. A small proportion of the literature examined the following hard-to-reach populations: Indigenous populations in Canada and globally, ethnic minorities, immigrants - including newly arrived

migrants, first and second-generation migrants living in high-income countries, and individuals experiencing homelessness.

- **Barriers** to vaccine uptake in **minority ethnic groups** or migrant populations include **insufficient knowledge about vaccination and the virus being prevented, concerns about vaccine safety and risk of adverse effects, mistrust of governments and public health agencies, language barriers, low perception of risk, low socio-economic status, inconvenience and access barriers, and cultural acceptability of vaccines**
- **Barriers** to vaccine uptake in **Indigenous populations** include **mistrust of government and healthcare authorities, and safety concerns about vaccines**
- **Barriers** to vaccine uptake identified from **general population studies** include **complacency, low perceptions of personal risk, safety concerns including worries about side effects or a perceived lack of testing of the vaccine, lack of pressure from family and friends, lack of confidence in the vaccine's effectiveness or in authorities, and not receiving a recommendation to be vaccinated from a healthcare professional.**
- **Facilitators** of vaccine uptake in **minority ethnic groups or migrant populations** include **perceived risk of contracting the relevant illness and/or perceived severity of the illness, effective risk-benefit communication from a trusted messenger, and ease of access**
- Across studies, **ensuring ease of accessibility of vaccination programmes was the primary enabler of vaccine uptake across various hard-to-reach groups.**
- **Facilitators** of vaccine uptake identified from **general population** studies include **recommendation from a health professional, perceived vaccine efficacy, perception of being at increased risk, pressure from family and/or friends, concern for vulnerable family members, having received a season flu vaccine, and confidence in government information.**
- **Interventions** effective at increasing vaccination uptake among **ethnic minority groups** include the use of **non-stigmatising and linguistically tailored communications, having translators present at vaccination clinics, community-based educational campaigns, and vaccine offers and endorsements from trusted sources.**

### 6.3 Areas of Uncertainty / Evidence Gaps

- COVID-19-related research identified is from **early in the pandemic** and therefore did not examine actual COVID-19 vaccination uptake but rather **aimed to inform the COVID-19 vaccination rollout programme.**
- Some reviews included evidence from other respiratory pandemics – most commonly H1N1. It is **uncertain whether evidence from these reviews can be applicable to the current COVID-19 pandemic.**
- A number of reviews that evaluated COVID-19 vaccine uptake and acceptance - including one focused on Black, Asian and minority ethnic groups in the UK, are **currently ongoing.** We are therefore not yet able to assess and report on their findings.

## 6.4 Options for further work

- We identified a few ongoing systematic reviews which focus on COVID-19 vaccination uptake and acceptability in ethnic minority groups. Preliminary feedback from authors of these reviews suggests that they are close to completion or submitted for publication. WC19EC made the decision to **revisit this work in September 2021** when ongoing work is due to be completed.
- In the apparent absence of evidence from good quality secondary research, a focused search for primary studies and grey literature on COVID-19 vaccination uptake in specific underserved/hard-to-reach groups may be an option.

## 7. Next Steps

The decision made at stakeholder meeting 15.6.21 was not to proceed to rapid review at this stage but to revisit this work in September 2021 when ongoing work is due to be completed.

**Update 13.9.21 – Hussain et al (2021) review not complete, therefore no further findings to add to this report.**

## 8. Methods used in this evidence summary

COVID-19 specific and general repositories of evidence reviews noted in our resource list were searched in May and June 2021. An audit trail of the search process is provided within the resource list (Appendix). Searches were limited to English-language publications and did not include searches for primary studies if secondary research relevant to the question was found. Search hits were screened for relevance by a single reviewer. Priority was given to robust evidence synthesis using minimum standards (systematic search, study selection, quality assessment, and appropriate synthesis). The secondary research identified was not retrieved as full text or formally quality assessed. Therefore, the included research may vary considerably in quality and the degree of such variation could be investigated during rapid review work which may follow-on. Citation, recency, evidence type, document status and key indications were tabulated for all relevant secondary research identified in this process (Tables 1-4).

<b>Date of Search</b>	June 2021
<b>Search Concepts Used</b>	Vaccine uptake, vaccine hesitancy, minority ethnic populations, underserved groups, COVID-19 vaccine.
<b>Search Completed by</b>	Dr Chukwudi Okolie; Public Health Wales



## 8.1 Summary of Included Research

**TABLE 2: Research Question 1 - Summary of included research on barriers and facilitators of vaccination uptake in adults who are underserved or hard-to-reach: Published studies**

Citation	Recency (Search dates)	Evidence type	Status	Key findings from abstracts	Reviewer comments
<b>Secondary evidence produced to inform COVID-19 vaccination efforts</b>					
(Crawshaw et al., 2021) <a href="#">Factors affecting COVID-19 vaccination acceptance and uptake among the general public: a living behavioural science evidence synthesis</a> (v1.0, Apr 30th, 2021). Ottawa: Ottawa Hospital Research Institute, Apr 30, 2021.	April 9/20 2021	Rapid review	Published	<p>A total of 40 studies met inclusion criteria and were included.</p> <p>Overall, 10/40 studies assessed whether vaccine acceptance was associated with race and ethnicity. Of these, 9/10 studies suggest that racialised (e.g., Black, Latino, Asian) respondents are less likely to express vaccine acceptance vs. White respondents.</p> <p>Across studies, concerns and erroneous beliefs about COVID-19 vaccine safety, efficacy, and necessity were common and associated with lower vaccination acceptance.</p> <p>Across studies, mistrust of governments and public health agencies was related to lower vaccination acceptance, whereas more proximal social influences such as peer-to-peer/group norms may help encourage vaccination.</p> <p>Respondents from some racialised groups (e.g., Black, Latino) expressed more mistrust than other groups (e.g., White, Asian).</p>	Living systematic review, evidence <b>mapped to behavioural frameworks</b>

<p>(Konnyu and Benitez, 2020) <a href="#">What are the barriers and facilitators to individuals' willingness to be vaccinated for COVID-19?</a> Center for Evidence Synthesis in Health, Department of Health, Policy and Practice, Brown University. Dec 2020.</p>	<p>March to July 2020</p>	<p>Rapid review</p>	<p>Published</p>	<p>Facilitators associated with increased willingness to receive a COVID-19 vaccine include greater perceived risk from COVID-19, various population characteristics (e.g., being male, older, educated, with higher income), and valuing healthcare provider's recommendations.</p> <p>Barriers to willingness included low-perceived risk from COVID-19, being of Latino or Black racial/ethnic background, and concerns about vaccine safety.</p> <p>Barriers and facilitators mapped most commonly to several theoretical domains including: beliefs about consequences; social/professional role and identity; emotion; knowledge; social influences; environmental context and resources; and behavioural regulation.</p>	<p>Rapid review continually updated. Pre-dates COVID-19 vaccination rollout</p>
<p>(National Collaborating Centre for Methods and Tools, 2021) <a href="#">What is known about reasons for vaccine confidence and uptake in populations experiencing inequities?</a> <a href="https://res.nccmt.ca/res-vaccine-confidence-EN">https://res.nccmt.ca/res-vaccine-confidence-EN</a></p>	<p>April 14 2021</p>	<p>Rapid review</p>	<p>Published</p>	<p>Factors outlined for specific groups</p> <p><b>Indigenous peoples in Canada and globally</b></p> <ul style="list-style-type: none"> <li>• Safety was a primary concern both as a motivator for seeking vaccination (i.e., to protect oneself and others from illness) and as a reason to not seek vaccination (i.e., potential side effects). Confidence: low (GRADE-CERQual)</li> <li>• Consistent across populations and vaccines were themes reflecting a desire for knowledge and understanding about risks and benefits to enhance confidence in vaccination decisions, with a preference for information from trusted sources given experiences of stigmatisation, discrimination, and racism. Confidence: moderate (GRADE-CERQual)</li> <li>• Approaches to encourage vaccine uptake include collaboration with trusted leaders and community groups, providing vaccination at convenient and trusted locations, and ensuring ease of access. Confidence: moderate (GRADE-CERQual)</li> </ul>	<p>Recent Publication. Information relevant to indigenous, Black and homeless populations. RR authors note that most included data were from <b>vaccines other than COVID-19</b></p>

				<p><b>Black, African, Caribbean communities in North America and Europe</b></p> <ul style="list-style-type: none"> <li>• Trade-off between the perceived risk of contracting the relevant illness and/or perceived severity of the illness and the risk of adverse effects of the vaccine played an important role in vaccine uptake. Confidence: low (GRADE-CERQual)</li> <li>• Mistrust was a consistent contributor to lower vaccine confidence and uptake. Confidence: moderate (GRADE-CERQual)</li> <li>• Effective risk-benefit communication from a trusted messenger, which aimed to combat misinformation and address fear, was found to be important. Confidence: moderate (GRADE-CERQual)</li> <li>• Ease of access was highlighted as essential to support uptake. Confidence: moderate (GRADE-CERQual)</li> </ul> <p><b>Individuals experiencing homelessness or who are precariously housed</b></p> <ul style="list-style-type: none"> <li>• Ease of accessibility of vaccination programs was the primary driver of vaccine uptake across both adults and youth. Confidence: moderate (GRADE-CERQual)</li> <li>• While some concerns about vaccine effectiveness or necessity were reported, across studies participants generally were willing to follow healthcare provider recommendations, particularly if the provider was a known and trusted source. Confidence: moderate (GRADE-CERQual)</li> <li>• A barrier to vaccine uptake across studies was uncertainty about vaccination status for specific vaccines; lack of an easily accessible tracking system or vaccination records prevented healthcare providers from recommending vaccination. The confidence in this finding is moderate (GRADE-CERQual)</li> </ul>	
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<p>(Ayers et al., 2021), <a href="https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8011776/">Disparities in H1N1 Vaccination Rates: a systematic review and evidence synthesis to inform COVID-19 vaccination efforts</a> https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8011776/</p>	<p>Searches conducted from inception through May 8 2020</p>	<p>Systematic review</p>	<p>Published</p>	<p>Observational studies examining H1N1 vaccine uptake by race/ethnicity, socioeconomic status, rurality, and disability status in US settings were included.</p> <p>Included 21 studies.</p> <p>African American/Black, Latino, and low-socioeconomic status participants had disproportionately lower H1N1 vaccination rates (<i>low- to moderate-strength evidence</i>).</p> <p>Latinos were more likely than Whites to <i>intend</i> to be vaccinated.</p> <p>African American/Blacks and participants with lower-socioeconomic status were just as likely to intend to be vaccinated as their White and higher-socioeconomic status counterparts (<i>low-strength evidence</i>).</p> <p>Factors potentially contributing to disparities in vaccine uptake included barriers to vaccine access, inadequate information, and concerns about vaccine safety and efficacy.</p> <p>Review authors concluded that efforts to avoid disparities in COVID-19 vaccination uptake should prioritise vaccine accessibility and convenience in African American/Black, Latino, and low-income communities; engage trusted stakeholders to share vaccine information; and address concerns about vaccine safety and efficacy.</p>	<p>Review uses indirect <b>non COVID-19 vaccination evidence</b>. US setting only.</p>
<p>(Sayles et al., 2020) <a href="#">Systematic review of vaccination hesitancy in the minority population in relation</a></p>	<p>Date of searches unclear. Search</p>	<p>Systematic review</p>	<p>Conference presentation</p>	<p>This review aimed to identify individual barriers of vaccination hesitancy in minority population in North America, in order to inform COVID-19 vaccine rollout.</p>	<p>Conference presentation with no abstract. Review uses <b>indirect non</b></p>

<p><a href="https://accp.confex.com/accp/2020am/meetingapp.cgi/Paper/55986">to the potential for COVID vaccine uptake.</a> https://accp.confex.com/accp/2020am/meetingapp.cgi/Paper/55986</p>	<p>limits January 2010 to July 2020</p>			<p>The review found that Black, Latino, Asian, and multiracial respondents were less likely to receive routine vaccination than White respondent.</p> <p>Some common barriers across all minorities included lack of information, concern about long-term side effects, lack of health insurance, cost, recommendation, and language barriers.</p> <p>The review authors concluded that bringing widespread awareness, funding and education about vaccine trials and vaccine implementation may positively impact vaccine hesitancy in minority populations</p>	<p><b>COVID-19 vaccination evidence.</b> US setting only.</p>
<p>(Public Health Wales Observatory, 2020b) <a href="#">COVID-19: Communication to address concerns and encourage vaccine uptake. Public Health Wales Observatory Evidence Service.</a></p>	<p>Searches were performed in June 2020</p>	<p>Rapid review</p>	<p>Published</p>	<p>This review focused on the general population. The majority of research examining novel vaccine uptake in the context of a pandemic related to the H1N1 vaccine during 2009-2010.</p> <p>Barriers to uptake included:</p> <ul style="list-style-type: none"> <li>• Complacency and perceptions of personal risk about the disease</li> <li>• Lack of confidence in the vaccine's effectiveness or in authorities</li> <li>• Safety concerns including worries about side effects/adverse events, or a perceived lack of testing of the vaccine</li> <li>• Not receiving a recommendation to be vaccinated from a healthcare professional. Lack of pressure from family and friends</li> <li>• Lack of knowledge</li> <li>• Unhealthy lifestyles</li> </ul> <p>Facilitators of uptake included:</p> <ul style="list-style-type: none"> <li>• Recommendation from a health professional</li> <li>• Perceived vaccine efficacy</li> <li>• Increased risk</li> <li>• Pressure from family and/or friends</li> </ul>	<p><b>Not COVID-19 specific, and not specific to underserved populations.</b></p> <p>Authors highlighted limitations including: No quality assessment of included studies, use of pre-print sources that have not been peer-reviewed, and <b>inclusion of studies from LMICs</b></p>

				<ul style="list-style-type: none"> <li>• Concern for vulnerable family members</li> </ul> <p>Predictors of COVID-19 vaccine uptake derived from surveys on future COVID-19 vaccination campaigns included:</p> <ul style="list-style-type: none"> <li>• Being a healthcare worker</li> <li>• Greater medical/scientific understanding of and knowledge about COVID-19</li> <li>• Having received a season flu vaccine</li> <li>• Confidence in government information</li> <li>• Suffering from asthma/COPD</li> </ul>	
<b>Non COVID-19-related research</b>					
(Carlsen and Glenton, 2016). <a href="https://bmchealthservices.biomedcentral.com/articles/10.1186/s12913-016-1466-7">The swine flu vaccine, public attitudes, and researcher interpretations: a systematic review of qualitative research. BMC health services research, 16, 203.</a> https://bmchealthservices.biomedcentral.com/articles/10.1186/s12913-016-1466-7	Searches conducted in December 2013	Systematic review	Published	<p>This review sought to explore public attitudes to the swine flu vaccine in different countries. Included studies were qualitative in design.</p> <p>It indicated that the public had varying opinions about disease risk and prevalence and had concerns about vaccine safety. Most primary study authors concluded that participants were uninformed, and that more information about the disease and the vaccine would have led to an increase in vaccine uptake.</p> <p>The review authors concluded that health authorities should be more transparent in their information and decision-making process in future pandemic situations.</p>	Abstract well structured. <b>Not targeted at underserved populations</b>
(Wilson et al., 2018). <a href="https://pubmed.ncbi.nlm.nih.gov/29395515/">Barriers to immunization among newcomers: A systematic review - PubMed (nih.gov)</a> https://pubmed.ncbi.nlm.nih.gov/29395515/	Searches conducted in May 2017	Systematic review	Published	<p>Four types of barriers were identified in this review: cultural factors, knowledge barriers, insufficient access to healthcare, and vaccine hesitancy.</p>	<b>Not COVID-19 related.</b> However, the population of interest included - <b>immigrants, refugees, and asylum seekers</b>

<p>(Schmid et al., 2017).  <a href="#">Barriers of Influenza Vaccination Intention and Behavior – A Systematic Review of Influenza Vaccine Hesitancy, 2005 – 2016 (plos.org)</a>  <a href="https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0170550">https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0170550</a></p>	<p>Searches conducted in January/February 2016 for peer-reviewed articles published between the years 2005 and 2016.</p>	<p>Systematic review</p>	<p>Published</p>	<p>Most studies were conducted in the American and European region. Health care personnel and the general public were the most studied populations.</p> <p>A lack of confidence, inconvenience, calculation, and complacency were identified to different extents as barriers to influenza vaccine uptake in risk groups.</p> <p>The review authors concluded that while most sociodemographic and physical variables may be significantly related to influenza vaccine hesitancy, they cannot be used to explain its emergence or intensity.</p>	<p>Abstract well structured. <b>Not targeted at underserved populations</b></p>
<p>(European Centre for Disease Prevention and Control, 2015)  <a href="#">Rapid literature review on motivating hesitant population groups in Europe to vaccinate (europa.eu)</a>  <a href="https://www.ecdc.europa.eu/en/publications-data/rapid-literature-review-motivating-hesitant-population-groups-europe-vaccinate">https://www.ecdc.europa.eu/en/publications-data/rapid-literature-review-motivating-hesitant-population-groups-europe-vaccinate</a></p>	<p>Searches were performed in November 2014</p>	<p>Rapid review</p>	<p>Published</p>	<p>This rapid review focused on EU and EEA countries and aimed to identify who the vaccine- hesitant populations are, and the enablers and barriers to vaccination uptake for these hesitant populations.</p> <p>Parents, mothers, religious communities, healthcare workers, immigrants, social media users, pregnant women, patients with chronic diseases, and the elderly were identified as the population groups in which determinants of vaccine refusals or hesitancy were ascertained.</p> <p>Determinants of vaccine hesitancy identified were classified as: Contextual, individual/social group influences, and vaccine and vaccination specific issues.</p>	<p><b>Not COVID-19 specific and not specific to underserved populations</b></p>
<p>(Forster et al., 2017)  <a href="#">Ethnicity-specific factors influencing childhood immunisation decisions among Black and Asian</a></p>	<p>Searches were conducted in December 2014</p>	<p>Systematic review</p>	<p>Published</p>	<p>Included articles comprised participants who were parents from Black and Minority Ethnic (BAME) backgrounds in the UK.</p> <p>Two ethnicity-related factors affected immunisation decisions. First, factors that are related to ethnicity itself (namely religion, upbringing and migration, and language)</p>	<p><b>Not COVID-19 related.</b> Focused on <b>BAME population.</b> Focus is on childhood</p>

<p><a href="https://jech.bmj.com/content/71/6/544.short">Minority Ethnic groups in the UK: a systematic review of qualitative research   Journal of Epidemiology &amp; Community Health (bmj.com)</a>  <a href="https://jech.bmj.com/content/71/6/544.short">https://jech.bmj.com/content/71/6/544.short</a></p>				<p>affected parents' perceived importance of immunisations, whether immunisations were permitted or culturally acceptable and their understanding of immunisation/the immunisation schedule. Second, perceived biological differences affected decision-making and demand for information.</p> <p>Review authors concluded that factors related to ethnicity must be considered when seeking to understand immunisation decisions among parents from BAME backgrounds</p>	<p>vaccination; however, the participants are parents.</p>
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**TABLE 3: Research Question 2 - Summary of included research on barriers and facilitators of vaccination uptake in adults who are underserved or hard-to-reach: Ongoing studies**

Reference	Anticipated completion date	Evidence type	Publication status	Summary
<p>(Crawshaw et al., 2020)  <a href="https://www.crd.york.ac.uk/prospero/display_record.php?RecordID=219214">Factors influencing vaccine uptake in migrant populations in the UK and EU/EEA: a systematic review.</a>  <a href="https://www.crd.york.ac.uk/prospero/display_record.php?RecordID=219214">https://www.crd.york.ac.uk/prospero/display_record.php?RecordID=219214</a></p>	30 June 2021	Systematic review	Ongoing	<p><i>Review Questions:</i></p> <ol style="list-style-type: none"> <li>1. What are the factors influencing vaccine uptake in migrants in the UK and Europe?               <ol style="list-style-type: none"> <li>a) What are the determinants/predictors of being un-immunised in adult/adolescent migrants and children (&lt;16 years of age) of migrants in the UK and Europe?</li> <li>b) What are the barriers and facilitators to vaccine uptake in migrants in the UK and Europe post arrival in the host country?</li> </ol> </li> <li>2. Do these factors vary by sub-population or type of migrant?</li> </ol> <p>To include quantitative and qualitative data.</p>
<p>(Kamal et al., 2021).  <a href="https://www.crd.york.ac.uk/prospero/display_record.php?ID=CRD42021239010">A systematic review of drivers of vaccine hesitancy and strategies to reduce vaccine hesitancy in ethnic minority populations.</a>            PROSPERO 2021            CRD42021239010            Available from:  <a href="https://www.crd.york.ac.uk/prospero/display_record.php?ID=CRD42021239010">https://www.crd.york.ac.uk/prospero/display_record.php?ID=CRD42021239010</a></p>	30 September 2021	Systematic review	Ongoing	<p><i>Review Questions:</i></p> <ol style="list-style-type: none"> <li>1. What are the barriers to vaccine uptake in ethnic minority groups?</li> <li>2. What strategies can increased vaccine uptake in ethnic minority groups?</li> </ol> <p>To include quantitative and qualitative data.</p>

<p>(Hussain et al., 2021)  <a href="#">COVID-19 vaccine hesitancy in Black, Asian and minority ethnic groups in the UK: a rapid systematic review.</a>          PROSPERO 2021          CRD42021243083          Available from:  <a href="https://www.crd.york.ac.uk/prospero/display_record.php?ID=CRD42021243083">https://www.crd.york.ac.uk/prospero/display_record.php?ID=CRD42021243083</a></p>	<p>15 April 2021</p>	<p>Systematic review</p>	<p>Ongoing</p>	<p><i>Review question</i></p> <p>What evidence exist that are specifically focused on corona vaccine hesitancy and vaccine uptake among BAME groups in the UK?</p> <p>To include qualitative, quantitative and mixed-method studies</p>
<p>(Bhanu et al., 2021)  <a href="#">Perceptions of vaccinations amongst older adults from minority ethnic backgrounds: a systematic review.</a>          PROSPERO 2021          CRD42021237032          Available from:  <a href="https://www.crd.york.ac.uk/prospero/display_record.php?ID=CRD42021237032">https://www.crd.york.ac.uk/prospero/display_record.php?ID=CRD42021237032</a></p>		<p>Systematic review</p>	<p>Review completed, not published</p>	<p><i>Review question</i></p> <p>What are the perceptions, attitudes and beliefs around vaccinations amongst older adults from minority ethnic backgrounds?</p> <p>To include quantitative and qualitative data.</p>
<p>(Marczak et al., 2021)  <a href="#">Assessing the barriers to and reasons for intention to vaccinate against COVID-19 among United States adults: a systematic review.</a></p>	<p>31 May 2021</p>	<p>Systematic review</p>	<p>Ongoing</p>	<p><i>Review question</i></p> <p>To assess the intention of adults to vaccinate against COVID-19 using the 5C Scale (Confidence, Complacency, Collective Responsibility, Constraints, Calculation) in the United States</p>

PROSPERO 2021 CRD42021241173 Available from: <a href="https://www.crd.york.ac.uk/prospero/display_record.php?ID=CRD42021241173">https://www.crd.york.ac.uk/prospero/display_record.php?ID=CRD42021241173</a>				
(Massimi et al., 2021) <a href="#">Evalutating COVID-19 vaccine hesitancy: a systematic review.</a> PROSPERO 2021 CRD42021235328 Available from: <a href="https://www.crd.york.ac.uk/prospero/display_record.php?ID=CRD42021235328">https://www.crd.york.ac.uk/prospero/display_record.php?ID=CRD42021235328</a>	31 May 2021	Systematic review	Ongoing	<i>Review questions</i>  1. What are the determinants that influence vaccine hesitancy related to the SARS-CoV-2 vaccine among general populations and health care workers? 2. Are there any measurement tools that evaluate knowledge, behaviour, attitudes about vaccine hesitancy related to the SARS-CoV-2 vaccine among general populations and health care workers?
(Rath et al., 2020) <a href="#">Access to vaccination among disadvantaged, isolated and difficult-to-reach communities in the WHO-European Region: a mixed-method systematic review.</a> PROSPERO 2020 CRD42020192530 Available from: <a href="https://www.crd.york.ac.uk/prospero/display_record.php?ID=CRD42020192530">https://www.crd.york.ac.uk/prospero/display_record.php?ID=CRD42020192530</a>	30 June 2021	Systematic review	Ongoing	<i>Review Questions</i>  1. What are the most commonly disadvantaged groups with regards to vaccination in the WHO European region? 2. What are the vaccination uptake coverage rates among these groups? 3. What are the social determinants of health status among these groups? 4. What vaccination access routes are available to these groups in each country? 5. What barriers and facilitators influence vaccination uptake among these groups?
(Padhi et al., 2020)	01 June 2021	Systematic review	Ongoing	<i>Review questions</i>

<p><a href="#">Determinants of COVID-19 vaccine acceptance: a systematic review and meta-analysis.</a> PROSPERO 2020 CRD42020189922 Available from: <a href="https://www.crd.york.ac.uk/prospero/display_record.php?ID=CRD42020189922">https://www.crd.york.ac.uk/prospero/display_record.php?ID=CRD42020189922</a></p>				<ol style="list-style-type: none"> <li>1. What are prevalence rates of the acceptance of a COVID-19 vaccine, and how is this acceptance associated with sociodemographic, and other contextual factors?</li> <li>2. What are the factors that act as barriers or promoters to COVID-19 vaccination acceptance?</li> <li>3. Do contextual factors such as socioeconomics, religion, culture, and geographic influences affect COVID-19 vaccine acceptance?</li> <li>4. Do individual or social factors such as social norms, beliefs, and attitudes influence COVID-19 vaccine preferences?</li> <li>5. How are vaccine and vaccination-specific issues influenced by the demand for a COVID-19 vaccine among communities?</li> </ol> <p>To include qualitative and quantitative data</p>
<p>(Wang et al., 2020) <a href="#">Acceptability of vaccination against COVID-19 and its influencing factors: a systematic review and meta-analysis.</a> PROSPERO 2020 CRD42020226875 Available from: <a href="https://www.crd.york.ac.uk/prospero/display_record.php?ID=CRD42020226875">https://www.crd.york.ac.uk/prospero/display_record.php?ID=CRD42020226875</a></p>	31 January 2021	Systematic review	Ongoing	<p><i>Research questions</i></p> <ol style="list-style-type: none"> <li>1. estimate the COVID-19 vaccine acceptance rate and estimate the rate by different subgroups</li> <li>2. identify associated predictors using behavioural theories and propose a modified health belief model of influencing factors to improve acceptance</li> <li>3. explore the reasons for different intentions towards the COVID-19 vaccine</li> </ol>
<p>(Lam and Acharya, 2021). <a href="#">Exploring the barriers to vaccine acceptance in racial and ethnic minorities:</a></p>	28 March 2021	Systematic review	Ongoing	<p><i>Review Questions</i></p> <ol style="list-style-type: none"> <li>1. What are the barriers to vaccine acceptance amongst racial and ethnic minority groups?</li> </ol>

<p><a href="#">a systematic review of the literature.</a> PROSPERO 2021 CRD42021232542 Available from: <a href="https://www.crd.york.ac.uk/prospero/display_record.php?ID=CRD42021232542">https://www.crd.york.ac.uk/prospero/display_record.php?ID=CRD42021232542</a></p>				<p>2. What strategies have been adopted to counter these barriers? 3. How effective have strategies to encourage vaccination amongst racial and ethnic minority groups been?</p> <p>To include qualitative and quantitative data</p>
<p>(Church and Hall, 2021) <a href="#">A systematic review of factors influencing SARS-CoV-2 vaccine acceptance.</a> PROSPERO 2021 CRD42021233598 Available from: <a href="https://www.crd.york.ac.uk/prospero/display_record.php?ID=CRD42021233598">https://www.crd.york.ac.uk/prospero/display_record.php?ID=CRD42021233598</a></p>	15 March 2021	Systematic review	Review Completed not published	<p>Review Questions</p> <p>1. What sort of predictors influence [potential] SARS-CoV-2 vaccine uptake? Including, but not limited to: Race, gender, perceived risk, previous seasonal influenza vaccine, susceptibility to misinformation/conspiracy theories, trust in government/scientists/experts</p> <p>2. Are there any country and/or regional level differences between vaccine uptake amongst these predictors? For example, WHO regions, United States vs. rest of world, etc.</p>
<p>(Parthasarathi et al., 2021) <a href="#">Predictors of COVID-19 vaccine refusal: A meta-analysis of large nationally representative samples.</a> PROSPERO 2021 CRD42021251705 Available from: <a href="https://www.crd.york.ac.uk/prospero/display_record.php?ID=CRD42021251705">https://www.crd.york.ac.uk/prospero/display_record.php?ID=CRD42021251705</a></p>	31 August 2021	Systematic review	Ongoing	<p>Review Questions</p> <p>1. What are the proportions of people who are unwilling to take the COVID 19 vaccine globally? 2. How does gender, age, socioeconomic class, and level of education, and influence COVID 19 refusal globally?</p>

<p>(Nna et al., 2021)  <a href="#">COVID 19 Vaccine hesitancy: A protocol for systematic review and meta-analysis.</a>          PROSPERO 2021          CRD42021231165          Available from:  <a href="https://www.crd.york.ac.uk/prospero/display_record.php?ID=CRD42021231165">https://www.crd.york.ac.uk/prospero/display_record.php?ID=CRD42021231165</a></p>	<p>31 March 2021</p>	<p>Systematic review</p>	<p>Ongoing</p>	<p>Review Questions</p> <ol style="list-style-type: none"> <li>1. What are the proportions of people who are hesitant to take the COVID 19 vaccine globally?</li> <li>2. How do race, religion, location, occupation, socioeconomic class, level of education, and gender influence COVID 19 hesitancy globally?</li> <li>3. How do misinformation and lack of information influence COVID 19 hesitancy globally?</li> <li>4. How does social media influence COVID 19 vaccine hesitancy?</li> <li>5. How do safety concerns and adverse events influence COVID 19 vaccine hesitancy?</li> <li>6. With the pooled hesitancy rate globally, is it possible to achieve herd immunity by vaccination?</li> </ol>
<p>(Kuikel et al., 2021)  <a href="#">COVID-19 vaccine hesitancy in low-and middle-income countries: a systematic review.</a>          PROSPERO 2021          CRD42021238004          Available from:  <a href="https://www.crd.york.ac.uk/prospero/display_record.php?ID=CRD42021238004">https://www.crd.york.ac.uk/prospero/display_record.php?ID=CRD42021238004</a></p>	<p>31 October 2021</p>	<p>Systematic review</p>	<p>Ongoing</p>	<p><i>Review Questions</i></p> <ol style="list-style-type: none"> <li>1. What are the determinants of COVID-19 vaccine hesitancy in low-and middle-income countries?</li> <li>2. What percentage of COVID-19 vaccine hesitancy in low-and middle-income countries?</li> </ol>
<p>(Katsura et al., 2021)          The association between ethnicity and COVID-19 vaccine acceptability: A rapid systematic review. PROSPERO 2021</p>	<p>3 May 2021</p>	<p>Systematic review</p>	<p>Noted completed on PROSPERO</p>	<p>Review Question</p> <p>The association between ethnicity and COVID-19 vaccine acceptability: A rapid systematic review</p>

CRD42021235198 Available from: <a href="https://www.crd.york.ac.uk/prospero/display_record.php?ID=CRD42021235198">https://www.crd.york.ac.uk/prospero/display_record.php?ID=CRD42021235198</a>				
(Perroud et al., 2021) Adult vaccination adherence strategies in LMICs, a systematic review. PROSPERO 2021 CRD42021243723 Available from: <a href="https://www.crd.york.ac.uk/prospero/display_record.php?ID=CRD42021243723">https://www.crd.york.ac.uk/prospero/display_record.php?ID=CRD42021243723</a>	30 June 2021	Systematic review	Ongoing	Review Question  What interventions strategies are effective in improving vaccination adherence among adults in low and middle income country settings and to what degree?

**TABLE 4: Research Question 2 - Summary of included research on interventions for increasing uptake of vaccines in adults who are underserved or hard-to-reach: Published studies**

Citation	Recency (search dates)	Evidence type	Status	Key findings from abstracts	Reviewer comments
<b>Secondary evidence produced to inform COVID-19 vaccination efforts</b>					
(Public Health Wales Observatory, 2020a), <a href="#">COVID-19: Accessibility of mass vaccination.</a>	June 2020	Rapid review	Published	<p>This rapid review addressed the research questions:</p> <p>Which groups (especially among likely priority groups) may find it difficult, or may be reluctant, to attend mass venues?            How might vaccine uptake be maximised in hard-to-reach groups?</p> <p>Effective interventions for vaccine uptake in specific hard-to-reach groups include:</p> <p>Ethnic minorities</p> <ul style="list-style-type: none"> <li>• culturally and linguistically tailored communication</li> <li>• community champions</li> <li>• Community-based educational campaigns</li> <li>• Increasing community knowledge via factual and consistent messaging</li> <li>• Points of dispensing site intake forms</li> </ul> <p>Homeless</p> <ul style="list-style-type: none"> <li>• Holding community-based clinics at food lines, shelters, or other places where they regularly gather</li> </ul> <p>Immigrants</p> <ul style="list-style-type: none"> <li>• avoid asking about immigration status</li> <li>• Work with immigrants, refugees, and their service providers to guide outreach programmes with efforts to protect vulnerable populations from social stigma and discrimination</li> <li>• Encourage use of bilingual, bicultural community health workers, develop low-literacy and culturally</li> </ul>	Authors highlighted limitations including: <ul style="list-style-type: none"> <li>•No quality assessment of included research</li> <li>•Search focused on <b>vaccinations in pandemic, epidemic or disease outbreak contexts.</b> There may be more evidence from studies looking at routine vaccination campaigns</li> </ul>

				<p>appropriate health education materials, and use all forms of media</p> <ul style="list-style-type: none"> <li>• Messages should be delivered through existing trusted, effective channels</li> </ul>	
<p>(French et al., 2020) <a href="#">Key Guidelines in Developing a Pre-Emptive COVID-19 Vaccination Uptake Promotion Strategy</a>. International Journal of Environmental Research and Public Health. 2020; 17(16):5893. <a href="https://doi.org/10.3390/ijerph17165893">https://doi.org/10.3390/ijerph17165893</a></p>		Guidelines	Published	<p>This review summarises guidelines to enhance the impact of COVID-19 vaccination strategies and to promote the uptake of COVID-19 vaccines. These include:</p> <ul style="list-style-type: none"> <li>• Behaviour change planning</li> <li>• Audience targeting and segmentation</li> <li>• Competition and barrier analysis and action</li> <li>• Mobilisation</li> <li>• Vaccine demand building</li> <li>• Community engagement</li> <li>• Vaccine access</li> <li>• Marketing promotions strategy</li> <li>• News media relations and outreach</li> <li>• Digital media strategy</li> </ul>	<b>Not specific to underserved or hard-to-reach populations. Does not focus on actual COVID-19 vaccination uptake</b>
<p>(Finney Rutten et al., 2021) <a href="#">Evidence-Based Strategies for Clinical Organizations to Address COVID-19 Vaccine Hesitancy</a>, Mayo Clinic Proceedings, Volume 96, Issue 3, 2021, Pages 699-707, ISSN 0025-6196, <a href="https://doi.org/10.1016/j.mayocp.2020.12.024">https://doi.org/10.1016/j.mayocp.2020.12.024</a>.</p>		Rapid review	Published	<p>This review summarises effective strategies to address vaccine hesitancy for use by health care professionals and clinical organisations in the care of their patients and employees. These include evidence-based best practices from social, behavioural, communication, and implementation science that can inform clinical efforts. at the interpersonal, individual, and organisation levels to address COVID-19 vaccine hesitancy and support public health efforts.</p>	<b>Not specific to underserved or hard-to-reach populations. Does not focus on actual COVID-19 vaccination uptake</b>
<p>(Schoch-Spana et al., 2020) <a href="#">The public's role in COVID-19 vaccination: Human-centered</a></p>		Recommendations	Published	<p>Recommendations from the 23-person Working Group on Readyng Populations for COVID-19 Vaccines</p> <ul style="list-style-type: none"> <li>• Value social science as key to the success of COVID-19 vaccination</li> </ul>	<b>Not specific to underserved or hard-to-reach populations. Does not focus on</b>

<a href="#">recommendations to enhance pandemic vaccine awareness, access, and acceptance in the United States</a> , Vaccine, 2020, ISSN 0264-410X, <a href="https://doi.org/10.1016/j.vaccine.2020.10.059">https://doi.org/10.1016/j.vaccine.2020.10.059</a> .				<ul style="list-style-type: none"> <li>• Inform public expectations about COVID-19 vaccination benefits, risks, and supply</li> <li>• Communicate in meaningful ways, crowding out misinformation</li> <li>• Earn the public's confidence that allocation and distribution are even-handed</li> <li>• Make vaccination available in safe, familiar, and convenient places</li> </ul> Establish independent representative bodies to instill public ownership of the vaccination program	<b>actual COVID-19 vaccination uptake</b>
<b>Non COVID-19 research targeting hard-to-reach groups</b>					
(Hui et al., 2018). <a href="#">Interventions to Improve Vaccination Uptake and Cost Effectiveness of Vaccination Strategies in Newly Arrived Migrants in the EU/EEA: A Systematic Review</a> . Int. J. Environ. Res. Public Health 2018, 15, 2065. <a href="https://doi.org/10.3390/ijerph15102065">https://doi.org/10.3390/ijerph15102065</a>	Date of searches unclear. Search limits 1 January 2006 to 18 June 2018	Systematic review	Published	Population of interest included asylum seekers, refugees, undocumented migrants, and other foreign-born residents, with a focus on newly arrived migrants as defined in the protocol as within five years of arrival to the destination country.  Three primary intervention studies performed in the EU/EEA or high-income countries and one cost effectiveness study relevant to vaccinations in migrants were included in this review.  Intervention studies showed small but promising impact only on vaccine uptake with social mobilisation/community outreach, planned vaccination programs and education campaigns.  The review authors concluded that scarce but direct EU/EEA data suggest social mobilisation, vaccine programs, and education campaigns are promising strategies for migrants, but more research is needed.	Appears well conducted. Population of interest included asylum seekers, refugees, undocumented migrants, and other foreign-born residents, with a <b>focus on newly arrived migrants</b> as defined in the protocol as within 5 years of arrival to the destination country.
<b>Non COVID-19 research</b>					

<p>(Jacobson Vann et al., 2018). <a href="#">Patient reminder and recall interventions to improve immunization rates</a>. Cochrane Database of Systematic Reviews 2018, Issue 1. Art. No.: CD003941. DOI: 10.1002/14651858.CD003941.pub3.</p>	<p>January 2017</p>	<p>Systematic review</p>	<p>Published</p>	<p>The 75 included studies involved child, adolescent, and adult participants in outpatient, community-based, primary care, and other settings in 10 countries.</p> <p>Patient reminder or recall interventions, including telephone and autodialed calls, letters, postcards, text messages, combination of mail or telephone, or a combination of patient reminder or recall with outreach, probably improve the proportion of participants who receive immunisation.</p> <p>The review authors concluded that patient reminder and recall systems, in primary care settings, are likely to be effective at improving the proportion of the target population who receive immunisations.</p>	<p>Well conducted review. <b>Not targeted at underserved or hard-to-reach populations.</b> Reports individualised data on childhood, adolescent, and adult immunisations</p>
<p>(Thomas and Lorenzetti, 2018). <a href="#">Interventions to increase influenza vaccination rates of those 60 years and older in the community</a>. Cochrane Database of Systematic Reviews 2018, Issue 5. Art. No.: CD005188. DOI: 10.1002/14651858.CD005188.pub4.</p>	<p>December 2017</p>	<p>Systematic review</p>	<p>Published</p>	<p>61 RCTs of interventions to increase vaccination rates in people aged 60 years and older were included in this review.</p> <p>Interventions were categorised into three types: reminders to and education of clients to be vaccinated; interventions to increase access to vaccination; and provider- or system-based interventions. No studies reported on societal-level interventions.</p> <p>The review authors concluded that the review identified interventions that demonstrated significant positive effects of low (postcards), medium (personalised phone calls), and high (home visits, facilitators) intensity that increase community demand for vaccination, enhance access, and improve provider/system response.</p>	<p>Well conducted review. Target population – <b>individuals aged 60 years or older</b> living in the community.</p>
<p>(Higgins et al., 2021) <a href="#">Looking to the empirical literature on the potential for financial incentives to enhance adherence</a></p>		<p>Rapid review</p>	<p>Published</p>	<p>This review addresses the scientific evidence regarding the efficacy of financial incentives for increasing vaccine adherence. It outlines the findings from a 2019 meta-analysis of interventions to increase hepatitis B vaccination completion in people who inject drugs, as well as findings from two additional systematic reviews</p>	<p>Evidence drawn from <b>vaccines other than COVID-19.</b></p>

<p><a href="#">with COVID-19 vaccination</a>, Preventive Medicine, Volume 145, 2021, 106421, ISSN 0091-7435, <a href="https://doi.org/10.1016/j.ypped.2021.106421">https://doi.org/10.1016/j.ypped.2021.106421</a>.</p>				<p>supporting the efficacy of modest financial incentives for promoting adherence with HBV and influenza vaccination.</p>	
<p>(Sanftenberg et al., 2021) <a href="#">Assessing the impact of shared decision making processes on influenza vaccination rates in adult patients in outpatient care: A systematic review and meta-analysis</a>, Vaccine, Volume 39, Issue 2, 2021, Pages 185-196, ISSN 0264-410X, <a href="https://doi.org/10.1016/j.vaccine.2020.12.014">https://doi.org/10.1016/j.vaccine.2020.12.014</a>.</p>	February 2020	Systematic review	Published	<p>Twenty one studies were included in this review, with interventions including face-to-face sessions, telephone outreach, home visits, Health Care Practitioner (HCP) trainings and supporting educational material.</p> <p>In 12 studies, interventions included all elements of a Shared Decision Making (SDM) process. A meta-analysis of 15 studies showed a positive effect on vaccination rates (OR of 1.96 (95% CI: 1.31 to 2.95)). Findings further suggest that interventions are effective across different patient's groups and could increase effectiveness when the interaction is facilitated by multidisciplinary teams of HCP in comparison to interventions delivered by individual HCP.</p>	<p><b>Not targeted specifically at underserved populations</b> (included studies targeting adult patients - at least 18 years old - from high-income countries for whom influenza vaccination is recommended).</p>
<p>(Silva et al., 2020). <a href="#">Reminder sent by mail to increase adherence to influenza vaccination</a>. Medwave. 2020 Jun;20(5):e7747. DOI: 10.5867/medwave.2020.05.7746.</p>	Not stated	Evidence summary	Published	<p>Eight systematic reviews that included 35 primary studies, of which 32 correspond to randomised trials. The authors concluded that a reminder sent by mail, probably increases adherence to influenza vaccination in all age groups (adult population, over 60 and under 18).</p>	<p><b>Not targeted specifically at underserved or hard-to-reach populations</b></p>

<p>(Lawes-Wickwar et al., 2021). <a href="#">A Rapid Systematic Review of Public Responses to Health Messages Encouraging Vaccination against Infectious Diseases in a Pandemic or Epidemic</a>. Vaccines 2021, 9, 72. <a href="https://doi.org/10.3390/vaccines9020072">https://doi.org/10.3390/vaccines9020072</a></p>	<p>May 2020</p>	<p>Systematic review</p>	<p>Published</p>	<p>Thirty-five articles were included. Most reported messages for seasonal influenza (n = 11; 31%) or H1N1 (n = 11; 31%). Evidence from moderate to high quality studies for improving vaccine uptake included providing information about virus risks and vaccination safety, as well as addressing vaccine misunderstandings, offering vaccination reminders, including vaccination clinic details, and delivering mixed media campaigns across hospitals or communities. Behavioural influences (beliefs and intentions) were improved when: shorter, risk-reducing or relative risk framing messages were used; the benefits of vaccination to society were emphasised; and beliefs about capability and concerns among target populations (e.g., vaccine safety) were addressed.</p>	<p><b>Not targeted specifically at underserved or hard-to-reach populations.</b> Evidence drawn from <b>vaccines other than COVID-19.</b></p>
<p>(Parsons et al., 2018). <a href="#">Do interventions containing risk messages increase risk appraisal and the subsequent vaccination intentions and uptake?—a systematic review and meta-analysis</a>. Br. J. Health Psychol., 23 (2018), pp. 1084-1106</p>	<p>September 2017</p>	<p>Systematic review</p>	<p>Published</p>	<p>Eighteen studies were included of which and 16 were included in the meta-analysis. Interventions overall showed small significant effects on risk appraisal (d = 0.161, p = 0.047) and perceptions of susceptibility (d = 0.195, p = 0.025), but no effect on perceptions of severity (d = -0.036, p = 0.828). Interventions showed no effect on intention to vaccinate (d = 0.138, p = 0.195) and no effect on vaccination behaviour (d = 0.043, p = 0.826). The review authors concluded that there is a lack of good-quality primary studies, and existing interventions are suboptimal.</p>	<p><b>Not targeted specifically at underserved or hard-to-reach populations.</b></p>
<p>(Jarrett et al., 2015) <a href="#">Strategies for addressing vaccine hesitancy – A systematic review</a>, Vaccine, Volume 33, Issue 34, 2015, Pages 4180-4190, ISSN 0264-410X,</p>	<p>October 2013</p>	<p>Systematic review</p>	<p>Published</p>	<p>The majority of evaluation studies were based in the Americas and primarily focused on influenza, human papillomavirus (HPV) and childhood vaccines. In low- and middle-income regions, the focus was on diphtheria, tetanus and pertussis, and polio. Across all regions, most interventions were multi-component and the majority of strategies focused on raising knowledge and awareness. Thirteen relevant studies were used for the GRADE assessment that indicated evidence of moderate quality for the use of social mobilisation, mass media, communication tool-</p>	<p><b>Not targeted specifically at underserved or hard-to-reach populations.</b> Evidence drawn from <b>vaccines other than COVID-19.</b></p>

<p><a href="https://doi.org/10.1016/j.vaccine.2015.04.040">https://doi.org/10.1016/j.vaccine.2015.04.040</a>.</p>				<p>based training for health-care workers, non-financial incentives and reminder/recall-based interventions.</p>	
<p>(Ortiz et al., 2020) <a href="#">Effectiveness of Interventions for Hepatitis B and C: A Systematic Review of Vaccination, Screening, Health Promotion and Linkage to Care Within Higher Income Countries</a>. J Community Health 45, 201–218 (2020). <a href="https://doi.org/10.1007/s10900-019-00699-6">https://doi.org/10.1007/s10900-019-00699-6</a></p>	<p>Date of searches unclear. Search limits January 1990 to March 2019</p>	<p>Systematic review</p>	<p>Published</p>	<p>This review aimed to identify published literature on HBV and HCV interventions with a focus on increasing awareness, population screening and testing uptake, linkage to care and knowledge among migrants living in high-income countries. Its findings also included other outcomes apart from vaccination uptake.</p> <p>Multi-strategy approach interventions were found to increase testing and vaccination uptake.</p> <p>The review authors concluded that a range of concurrent strategies tailored to the needs of different immigrant populations are required alongside building the capacity of healthcare professionals and the healthcare system to provide appropriate and affordable care.</p>	<p>Population of interest included <b>first and second-generation migrants</b> [young adults (<math>\geq 15</math> and adults)], who are, or whose parents are from high endemic regions (Asia, Sub-Saharan Africa, North Africa, Middle East and Amazon Basin); and settled in high-income, low endemicity countries. Findings also include other outcomes apart from vaccination uptake</p>
<p>(Atkinson et al., 2019) <a href="#">Effectiveness of digital technologies at improving vaccine uptake and series completion – A systematic review and meta-analysis of randomized controlled trials</a>, Vaccine, Volume 37, Issue 23, 2019,</p>	<p>Date of searches unclear</p>	<p>Systematic review</p>	<p>Published</p>	<p>When comparing digital push interventions to non-digital ones, patients had 1.18[1.11, 1.25] the odds of receiving vaccination or series completion compared to controls. In parents of children aged 18 and younger, those receiving digital push had a 1.22[1.15, 1.30] increased odds compared to controls.</p>	<p><b>Not targeted specifically at underserved or hard-to-reach populations.</b></p>

Pages 3050-3060, ISSN 0264-410X, <a href="https://doi.org/10.1016/j.vaccine.2019.03.063">https://doi.org/10.1016/j.vaccine.2019.03.063</a> .					
(Balzarini et al., 2020) <a href="#">Does the use of personal electronic health records increase vaccine uptake? A systematic review</a> , Vaccine, Volume 38, Issue 38, 2020, Pages 5966-5978, ISSN 0264-410X, <a href="https://doi.org/10.1016/j.vaccine.2020.05.083">https://doi.org/10.1016/j.vaccine.2020.05.083</a> .	Date of searches unclear. Search limits 2000 to 2019	Systematic review	Published	Eight studies were included in the review, the majority published in the US and before 2015. 62% were randomised trials, the rest used an observational study design. Evidence suggests a moderate positive impact of Personal Electronic Health Records (PEHR) access in increasing vaccine uptake, with data available for influenza and pneumococcal vaccines, diabetic patients, and childhood immunisation. Pooled data report the addition of digital communication features, i.e., the delivery of educational messages, reminders and availability of scheduling features might increase vaccine uptake, compared to PEHR access alone. However, evidence is not conclusive.	<b>Not targeted specifically at underserved or hard-to-reach populations.</b> Evidence drawn from <b>vaccines other than COVID-19</b> .
(Briss et al., 2000) <a href="#">Reviews of evidence regarding interventions to improve vaccination coverage in children, adolescents, and adults</a> . The Task Force on Community Preventive Services. Am J Prev Med. 2000 Jan;18(1 Suppl):97-140. doi: 10.1016/s0749-3797(99)00118-x. PMID: 10806982.	Date of searches unclear. Search limits 1980 to 1997	Systematic review	Published	One hundred and eight-three qualifying studies were included. Interventions include: Increasing community demand for vaccinations <ul style="list-style-type: none"> <li>• Client reminder/recall (42 studies): strong evidence supports the effectiveness of client reminder/reminder in increasing vaccination rates.</li> <li>• Multicomponent interventions that include education (17 studies): strong evidence supports the use of multicomponent interventions that include education in increasing vaccination rates.</li> <li>• Vaccination requirements for childcare, school or college attendance (9 studies): sufficient evidence exists to support the use vaccination requirements is effective in improving vaccination coverage and/or in reducing rates of disease.</li> <li>• Community-wide education (one time series): there was insufficient evidence (study had limitations in design and conduct).</li> </ul>	Search limits outdated. Contains data on children and adolescents. <b>Not targeted specifically at underserved or hard-to-reach populations.</b>

				<ul style="list-style-type: none"> <li>• Clinic-based education only (3 studies): There was insufficient evidence.</li> <li>• Client or family incentives (3 studies): there was insufficient evidence (small number of studies, variability in interventions, inconsistent results).</li> <li>• Client held medical records (4 studies): there was insufficient evidence (small number of studies, variability in interventions, inconsistent results).</li> </ul> <p>Enhancing access to vaccination services</p> <ul style="list-style-type: none"> <li>• Reducing out-of-pocket costs (19 studies): strong evidence supports the effectiveness of reducing out-of-pocket expenses in increasing vaccination rates.</li> <li>• Expanding access to health care settings (16 studies): strong evidence supports expanding access, as part of a multicomponent intervention, to improve vaccination coverage among children and adults. Insufficient evidence exists on expanding access as a sole intervention.</li> <li>• Vaccination programmes in the Special Supplemental Nutritional Program for Women Infants and Children (WIC) Settings (4 studies): sufficient evidence exists to support interventions in WIC settings.</li> <li>• Home visits (7 studies): sufficient evidence exists to support home-visiting interventions in improving vaccination coverage.</li> <li>• Vaccination programmes in schools (one study): a multiple component intervention used to increase delivery of hepatitis B vaccinations to adolescents reported significant improvements in client knowledge regarding hepatitis, faster return of consent forms when incentives were used, and 66% coverage with three doses of hepatitis B vaccine after the intervention (no comparative data were available).</li> </ul>	
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				<ul style="list-style-type: none"> <li>• Vaccination programmes in childcare centres (no studies).</li> </ul> <p>Provider-based interventions.</p> <ul style="list-style-type: none"> <li>• Provider reminder/recall (29 studies): strong evidence supports the effectiveness of provider reminders/recall interventions in increasing vaccination rates.</li> <li>• Assessment and feedback for vaccination providers (14 studies): strong evidence supports the effectiveness assessment and feedback in increasing vaccination rates.</li> <li>• Standing orders (11 studies): Strong evidence supports the use of standing orders in improving vaccination rates in adults.</li> <li>• Provider education only (4 studies): there was insufficient evidence (small number of studies, limitations in designs and conduct, small effect sizes).</li> </ul>	
(Odone et al., 2019) <a href="#">A systematic review of email-based reminder interventions to increase vaccine uptake</a> , European Journal of Public Health, Volume 29, Issue Supplement_4, November 2019, ckz186.519, <a href="https://doi.org/10.1093/eurpub/ckz186.519">https://doi.org/10.1093/eurpub/ckz186.519</a>	Date of searches unclear	Systematic review	Published	Eleven studies were included in the final analysis (9 RCTs, 1 controlled trial, and 1 before and after study). Most studies were conducted in the US. Six studies had data on the uptake of influenza vaccination, three on HPV series completion, 1 on Pneumococcal polysaccharide vaccine, and 1 on vaccines recommended for adolescents. In 4 studies email reminders proved to be more effective in increasing vaccination uptake than no reminders. Five studies did not show advantages of using email reminders when compared to traditional methods (phone call, mail, paper card) and digital reminders (SMS, automated phone calls). In 1 study a significantly higher increase in uptake was achieved when combining emails with Interactive Voice Response phone calls	<b>Not targeted specifically at underserved or hard-to-reach populations.</b> Evidence drawn from <b>vaccines other than COVID-19.</b>
(Groom et al., 2015) <a href="#">Immunization Information Systems to Increase</a>	Date of searches unclear. Search limits	Systematic review	Published	Studies described or evaluated Immunisation Information Systems capabilities to: (1) create or support effective interventions to increase vaccination rates, such as client reminder and recall, provider assessment and feedback,	<b>Not targeted specifically at underserved or</b>

<p><a href="#">Vaccination Rates</a>, Journal of Public Health Management and Practice: May/June 2015 - Volume 21 - Issue 3 - p 227-248 doi: 10.1097/PHH.000000000000069</p>	<p>January 1994 to April 2011</p>			<p>and provider reminders; (2) determine client vaccination status to inform decisions by clinicians, health care systems, and schools; (3) guide public health responses to outbreaks of vaccine-preventable disease; (4) inform assessments of vaccination coverage, missed vaccination opportunities, invalid dose administration, and disparities; and (5) facilitate vaccine management and accountability</p>	<p><b>hard-to-reach populations.</b></p>
<p>(Isenor et al., 2016) <a href="#">Impact of pharmacists as immunizers on vaccination rates: a systematic review and meta-analysis</a>. Vaccine. 2016; 34: 5708-23. Available at: <a href="http://www.sciencedirect.com/science/article/pii/S0264410X16307927">http://www.sciencedirect.com/science/article/pii/S0264410X16307927</a></p>	<p>Date of searches unclear. Search limits inception to October 2015</p>	<p>Systematic review</p>	<p>Published</p>	<p>Thirty-six studies were included in the review, 22 assessed the role of pharmacists as educators and/or facilitators and 14 assessed their role as administrators of vaccines. All studies reviewed found an increase in vaccine coverage when pharmacists were involved in the immunization process, regardless of role (educator, facilitator, administrator) or vaccine administered (e.g., influenza, pneumococcal), when compared to vaccine provision by traditional providers without pharmacist involvement</p>	<p><b>Not targeted specifically at underserved or hard-to-reach populations.</b></p>
<p>(Lau et al., 2012) <a href="#">Interventions to Improve Influenza and Pneumococcal Vaccination Rates Among Community-Dwelling Adults: A Systematic Review and Meta-Analysis</a>, The Annals of Family Medicine Nov 2012, 10 (6) 538-546; DOI: 10.1370/afm.1405</p>	<p>Date of searches unclear. Search limits inception to August 2010</p>	<p>Systematic review</p>	<p>Published</p>	<p>Most studies involved elderly primary care patients. Interventions were associated with improvements in the rates of any vaccination. Interventions that appeared effective were patient financial incentives (influenza only), audit and feedback (influenza only), clinician reminders, clinician financial incentives (influenza only), team change, patient outreach, delivery site changes (influenza only), clinician education (pneumococcus only), and case management (pneumococcus only). Patient outreach was more effective if personal contact was involved. Team changes were more effective where nurses administered influenza vaccinations independently</p>	<p><b>Not targeted specifically at underserved or hard-to-reach populations.</b> Evidence drawn from <b>vaccines other than COVID-19.</b></p>
<p>(Ndiaye et al., 2005) <a href="#">Interventions to improve influenza,</a></p>	<p>Date of searches unclear.</p>	<p>Systematic review</p>	<p>Published</p>	<p>This review concluded that provider reminder systems (alone) and combination interventions (enhanced access with provider/system-based interventions and/or increased</p>	<p><b>Not targeted specifically at underserved or</b></p>

<p><a href="#">pneumococcal polysaccharide, and hepatitis B vaccination coverage among high-risk adults: a systematic review</a>. Am J Prev Med. 2005 Jun;28(5 Suppl):248-79. doi: 10.1016/j.amepre.2005.02.016. PMID: 15894160.</p>	<p>Search limits 1980 to August 2001</p>			<p>client/community demand for vaccinations) were effective in increasing target vaccination coverage. The conclusions reflected the evidence presented, but limitations of the evidence made the applicability of the results unclear for one specific vaccination type, or for healthcare systems outside the USA.</p>	<p><b>hard-to-reach populations.</b> Evidence drawn from <b>vaccines other than COVID-19.</b></p>
<p>(Odone et al., 2015) <a href="#">Effectiveness of interventions that apply new media to improve vaccine uptake and vaccine coverage</a>, Human Vaccines &amp; Immunotherapeutics, 11:1, 72-82, DOI: 10.4161/hv.34313</p>	<p>Date of searches unclear. Search limits January 1st 1999 to September 10th 2013</p>	<p>Systematic review</p>	<p>Published</p>	<p>Nineteen studies were included in this systematic review. Retrieved studies explored the role of text messaging (n.7, 37%), smartphone applications (n.1, 5%), YouTube videos (n.1, 5%), Facebook (n.1, 5%), targeted websites and portals (n.4, 21%), software for physicians and health professionals (n.4, 21%), and email communication (n.1, 5%).</p> <p>There is some evidence that text messaging, accessing immunization campaign websites, using patient-held web-based portals and computerised reminders increase immunization coverage rates. Insufficient evidence is available on the use of social networks, email communication and smartphone applications.</p>	<p><b>Not targeted specifically at underserved or hard-to-reach populations.</b></p>
<p>(Ward et al., 2012) <a href="#">Strategies to improve vaccination uptake in Australia, a systematic review of types and effectiveness</a>. Australian and New Zealand Journal of Public Health, 36, 369-377.</p>	<p>Date of searches unclear. Search limits 1997 to May 2011</p>	<p>Systematic review</p>	<p>Published</p>	<p>Multi-component strategies, patient and provider reminders, plans for catch-up vaccination and accelerated schedules were identified as most effective. There was a lack of evidence for strategies to improve coverage in Aboriginal and Torres Strait Islander peoples, behaviourally at-risk groups, and pregnant women</p>	<p><b>Not targeted specifically at underserved or hard-to-reach populations.</b></p>

<p>(European Centre for Disease Prevention and Control, 2015).  <a href="#">Rapid literature review on motivating hesitant population groups in Europe to vaccinate.</a>  Stockholm: ECDC; 2015.</p>	<p>November 2014</p>	<p>Rapid review</p>	<p>Published</p>	<p>This rapid review focused on EU and EEA countries and aimed to identify who the vaccine- hesitant populations are, the enablers and barriers to vaccination uptake for these hesitant populations, and what is known about successful interventions targeting these populations.</p> <p>Interventions to reduce vaccine hesitancy were found to take place in healthcare facilities such as hospitals, primary care centres, or nursing homes.</p> <p>Three main types of communication interventions aimed at reducing vaccine hesitancy were identified: mass communication campaign, personalised communication campaign, and training and educational interventions</p>	<p><b>Not targeted specifically at underserved or hard-to-reach populations.</b></p>
<p>(Guide to Community Preventive Services, 2021)  <a href="#">Vaccination Programs: Home Visits to Increase Vaccination Rates.</a>  <a href="https://www.thecommunityguide.org/finding-s/vaccination-programs-home-visits-increase-vaccination-rates">https://www.thecommunityguide.org/finding-s/vaccination-programs-home-visits-increase-vaccination-rates.</a> Page last updated: March 17, 2021. Page accessed: June 8, 2021</p>	<p>Search periods:  Original search 1980 to 2009.  Updated search 2009 to 2012</p>	<p>Systematic review</p>	<p>Published</p>	<p>The systematic review included 23 studies. Home visits led to meaningful improvements in vaccination rates when used in the following ways:</p> <ul style="list-style-type: none"> <li>•With all clients in a designated population (12 study arms)</li> <li>•With only clients who did not respond to other interventions (9 study arms)</li> <li>•When focused on vaccinations alone (12 study arms)</li> <li>•When used to address vaccinations and other health concerns (9 study arms)</li> <li>•When vaccinations were provided on-site (8 study arms)</li> <li>•When clients were referred to vaccination services outside the home (13 study arms)</li> <li>•As the sole intervention (8 study arms)</li> <li>•As part of a larger healthcare system or community-based program (13 study arms)</li> </ul>	<p>Included studies were conducted primarily in <b>urban settings</b> (15 studies) and among <b>lower income populations</b> (10 studies).</p>
<p>(Guide to Community Preventive Services, 2020b)  <a href="#">Vaccination Programs: Client</a></p>	<p>Search periods:  Original search - 1980 to 1997.  Updated</p>	<p>Systematic review</p>	<p>Published</p>	<p>Twenty-nine studies were included in the systematic review.</p> <ul style="list-style-type: none"> <li>•Overall vaccination rates increased by a median of 11 percentage points.</li> </ul>	<p><b>Not targeted specifically at underserved or hard-to-reach populations.</b></p>

<p><a href="https://www.thecommunityguide.org/finding-s/vaccination-programs-client-reminder-and-recall-systems">Reminder and Recall Systems.</a>  <a href="https://www.thecommunityguide.org/finding-s/vaccination-programs-client-reminder-and-recall-systems">https://www.thecommunityguide.org/finding-s/vaccination-programs-client-reminder-and-recall-systems</a>. Page last updated: September 30, 2020. Page accessed: June 8, 2021</p>	<p>search 1997 to February 2012</p>			<ul style="list-style-type: none"> <li>•Client reminder and recall interventions used alone: median increase of 6 percentage points (14 studies).</li> <li>•Interventions implemented with additional components: median increase of 12 percentage points (15 studies).</li> </ul>	
<p>(Guide to Community Preventive Services, 2020d)  <a href="https://www.thecommunityguide.org/finding-s/vaccination-programs-standing-orders">Vaccination Programs: Standing Orders.</a>  <a href="https://www.thecommunityguide.org/finding-s/vaccination-programs-standing-orders">https://www.thecommunityguide.org/finding-s/vaccination-programs-standing-orders</a>. Page last updated: September 30, 2020. Page accessed: June 8, 2021</p>	<p>Search periods:  Original search - 1997 to 2009.  Updated search 2009 to February 2012</p>	<p>Systematic review</p>	<p>Published</p>	<p>The systematic review included 35 studies.</p> <ul style="list-style-type: none"> <li>•Overall, vaccination rates increased by a median of 24 percentage points (27 studies).</li> <li>•Standing orders used alone increased vaccination rates by a median of 16 percentage points (9 studies).</li> <li>•Standing orders used in combination with additional interventions increased vaccination rates by a median of 27 percentage points (19 studies).</li> </ul>	<p><b>Not targeted specifically at underserved or hard-to-reach populations.</b></p>
<p>(Guide to Community Preventive Services, 2020c)  <a href="https://www.thecommunityguide.org/finding-s/vaccination-programs-provider-reminders">Vaccination Programs: Provider Reminders.</a>  <a href="https://www.thecommunityguide.org/finding-s/vaccination-programs-provider-reminders">https://www.thecommunityguide.org/finding-s/vaccination-programs-provider-</a></p>	<p>Search periods:  Original search - 1997 to 2007.  Updated search 2007 to February 2012</p>	<p>Systematic review</p>	<p>Published</p>	<p>The systematic review included 28 studies.</p> <ul style="list-style-type: none"> <li>•Overall vaccination rates increased by a median of 10 percentage points (22 studies).</li> <li>•Provider reminders used alone increased vaccination rates by a median of 12 percentage points (7 studies).</li> <li>•Provider reminders used with additional interventions increased vaccination rates by a median of 9 percentage points (15 studies).</li> </ul>	<p><b>Not targeted specifically at underserved or hard-to-reach populations.</b></p>

reminders. Page last updated: September 30, 2020. Page accessed: June 8, 2021					
(Guide to Community Preventive Services, 2020a) <a href="#">Vaccination Programs: Client or Family Incentive Rewards.</a> <a href="https://www.thecommunityguide.org/findings/vaccination-programs-client-or-family-incentive-rewards">https://www.thecommunityguide.org/findings/vaccination-programs-client-or-family-incentive-rewards</a> . Page last updated: September 30, 2020. Page accessed: June 8, 2021.	Search periods: Original search - 1980 to 2009. Updated search 2009 to 2012	Systematic review	Published	Seven studies were included in the systematic review. •Overall vaccination rates increased by a median of 8 percentage points. •Incentive rewards used alone led to similar changes in vaccination rates (8.5 and 9.0 percentage points; 2 studies).	<b>Not targeted specifically at underserved or hard-to-reach populations.</b>

**TABLE 5: Research Question 2 - Summary of included research on interventions for increasing uptake of vaccines in adults who are underserved or hard-to-reach: Ongoing studies**

Reference	Anticipated completion date	Evidence type	Publication status	Summary
(Kamal et al., 2021). <a href="#">A systematic review of drivers of vaccine hesitancy and strategies to reduce vaccine hesitancy in ethnic minority populations.</a> PROSPERO 2021 CRD42021239010 Available from: <a href="https://www.crd.york.ac.uk/prospero/display_record.php?ID=CRD42021239010">https://www.crd.york.ac.uk/prospero/display_record.php?ID=CRD42021239010</a>	30 September 2021	Systematic review	Ongoing	<i>Review Questions</i>  <ol style="list-style-type: none"> <li>1. What are the barriers to vaccine uptake in ethnic minority groups?</li> <li>2. What strategies can increased vaccine uptake in ethnic minority groups?</li> </ol> To include quantitative and qualitative data.
(Hussain et al., 2021) <a href="#">COVID-19 vaccine hesitancy in Black, Asian and minority ethnic groups in the UK: a rapid systematic review.</a> PROSPERO 2021 CRD42021243083 Available from: <a href="https://www.crd.york.ac.uk/prospero/display_record.php?ID=CRD42021243083">https://www.crd.york.ac.uk/prospero/display_record.php?ID=CRD42021243083</a>	15 April 2021	Systematic review	Ongoing	<i>Review question</i>  What evidence exist that are specifically focused on corona vaccine hesitancy and vaccine uptake among BAME groups in the UK?  To include qualitative, quantitative and mixed-method studies
(Lam and Acharya, 2021) <a href="#">Exploring the</a>	28 March 2021	Systematic review	Ongoing	<i>Review Questions</i>

<p><a href="#">barriers to vaccine acceptance in racial and ethnic minorities: a systematic review of the literature.</a>  PROSPERO 2021  CRD42021232542  Available from:  <a href="https://www.crd.york.ac.uk/prospero/display_record.php?ID=CRD42021232542">https://www.crd.york.ac.uk/prospero/display_record.php?ID=CRD42021232542</a></p>				<ol style="list-style-type: none"> <li>1. What are the barriers to vaccine acceptance amongst racial and ethnic minority groups?</li> <li>2. What strategies have been adopted to counter these barriers?</li> <li>3. How effective have strategies to encourage vaccination amongst racial and ethnic minority groups been?</li> </ol> <p>To include qualitative and quantitative data</p>
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## 9. Appendix

### 9.1 List of Resources for Question 1 - Barriers and facilitators

Resource	Key words used	Date searched	Success or relevancy of the retrieval
<b>Priority COVID resources for reviews</b> <i>(All should be searched)</i>			
<a href="https://COVIDreviews.cochrane.org/search/site">Cochrane COVID Review Bank</a> https://COVIDreviews.cochrane.org/search/site		<u>07/05/2021</u>	Searched, nothing found
<a href="https://www.COVID19reviews.org/index.cfm">VA-ESP</a> https://www.COVID19reviews.org/index.cfm		<u>07/05/2021</u>	Searched, results found
<a href="#">L*OVE – COVID-19</a>		<u>11/05/2021</u>	Searched, results found
<a href="https://www.collabovid.org/">Collabovid</a> https://www.collabovid.org/		<u>11/05/2021</u>	Searched, results found
<b>Additional COVID resources for reviews</b> <i>(Tailor the list according to the topic and potential evidence base. In some cases it may be preferable to scan the main (generic) source rather than COVID-19 specific product; listed under secondary research)</i>			
<a href="https://www.ncbi.nlm.nih.gov/research/coronavirus/">LitCOVID</a> https://www.ncbi.nlm.nih.gov/research/coronavirus/			Not searched, maybe relevant
<a href="https://eunetha.eu/COVID-19-treatment/">Rolling collaborative review of COVID-19 treatments - Eunetha</a> (not a searchable database but a list of living reviews) https://eunetha.eu/COVID-19-treatment/			Not searched, not relevant
<b>For technology/ treatment questions</b>			
<a href="https://database.inahta.org/">International HTA database (ITS-HTA)</a> (for technology questions only) https://database.inahta.org/			Not searched, not relevant
<a href="#">EUnetHTA – COVID 19 response</a> (not a searchable database but a lists of evidence covering diagnostics and treatments)			Not searched, not relevant

<a href="https://eunethta.eu/services/COVID-19/">https://eunethta.eu/services/COVID-19/</a>			
<b>Additional COVID resources for guidelines</b>			
<a href="#">Trip</a> (Trip Pro can be accessed by an institutional based subscription based via institution, otherwise use Trip) add an additional COVID search term and filter by UK guidelines, covers NICE, and SIGN. Can also filter for non-UK guidance if stakeholder requests it) <a href="https://labs2020.tripdatabase.com/">https://labs2020.tripdatabase.com/</a>		11/05/2021	Searched, results found
<b>Additional COVID resources for primary studies</b>			
<a href="#">L*OVE primary studies</a>			Not searched, maybe relevant
<a href="https://app.iloveevidence.com/loves/5e6fdb9669c00e4ac072701d?population=5e7fce7e3d05156b5f5e032a&amp;classification=primary-study">https://app.iloveevidence.com/loves/5e6fdb9669c00e4ac072701d?population=5e7fce7e3d05156b5f5e032a&amp;classification=primary-study</a>			
<a href="#">Cochrane COVID-19 Study Register</a> <a href="https://COVID-19.cochrane.org/">https://COVID-19.cochrane.org/</a>			Not searched, maybe relevant
<a href="#">LitCOVID</a> <a href="https://COVID-19.cochrane.org/">https://COVID-19.cochrane.org/</a>			Choose an item.
<b>Secondary research resources for reviews (non-COVID-19)</b> (Tailor the list according to the topic and potential evidence base, talk to stakeholder before proceeding with this type of search)			
<a href="#">Cochrane Database of Systematic Reviews (CDSR)</a> <a href="https://www.cochranelibrary.com/cdsr/reviews">https://www.cochranelibrary.com/cdsr/reviews</a>		11/05/2021	Searched, nothing found
<a href="#">Campbell Collaboration</a> <a href="https://www.campbellcollaboration.org/better-evidence.html">https://www.campbellcollaboration.org/better-evidence.html</a>			Choose an item.
JBI (via OVID) (Subscription based service – WCEBC has a subscription)		11/05/2021	Searched, nothing found
<a href="#">Epistemonikos</a> <a href="https://www.epistemonikos.org/en/advanced_search">https://www.epistemonikos.org/en/advanced_search</a>			Not searched, maybe relevant
<a href="#">PROSPERO</a> <a href="https://www.crd.york.ac.uk/prospéro/">https://www.crd.york.ac.uk/prospéro/</a>		11/05/2021	Searched, results found

<a href="https://pubmed.ncbi.nlm.nih.gov/clinical/">PubMed Clinical Queries</a> https://pubmed.ncbi.nlm.nih.gov/clinical/			Not searched, maybe relevant
<a href="https://pubmed.ncbi.nlm.nih.gov/">PubMed</a> Filter by systematic reviews, reviews or meta-analysis once search undertaken) https://pubmed.ncbi.nlm.nih.gov/			Not searched, maybe relevant
<b>Secondary resources for reviews relevant to local/UK context</b>			
<a href="https://www.healthtechnology.wales/COVID-19/">Health Technology Wales- Coronavirus (COVID-19) Evidence reviews and research</a> (not a searchable database but lists of evidence appraisal reports, topic exploration reports, rapid summaries, economic reports, impact and externally published reports) https://www.healthtechnology.wales/COVID-19/			Not searched, maybe relevant
<a href="http://www.healthcareimprovementscotland.org/our_work/coronavirus_COVID-19/evidence_for_scotland.aspx">Healthcare Improvement Scotland – COVID-19: Evidence for Scotland</a> (not a searchable database but a lists of once for Scotland guidance, rapid evidence reviews, NIC rapid guidelines evidence covering diagnostics and treatments) http://www.healthcareimprovementscotland.org/our_work/coronavirus_COVID-19/evidence_for_scotland.aspx			Not searched, maybe relevant
<a href="https://hselibrary.ie/COVID19-evidence-summaries/">Ireland, HSE Library, COVID-19 Summaries of Evidence</a> not a searchable database but a list of all summaries of evidence that HIQA have been asked to address) https://hselibrary.ie/COVID19-evidence-summaries/			Not searched, maybe relevant
<a href="https://www.gov.uk/government/organisations/scientific-advisory-group-for-emergencies">SAGE</a> https://www.gov.uk/government/organisations/scientific-advisory-group-for-emergencies			Not searched, maybe relevant

## 9.2 List of Resources for Question 2 - Interventions

Resource	Key words used	Date searched	Success or relevancy of the retrieval
<b>Priority COVID resources for reviews</b> (All should be searched)			
<a href="https://COVIDreviews.cochrane.org/search/site">Cochrane COVID Review Bank</a> https://COVIDreviews.cochrane.org/search/site		<u>01/06/2021</u>	Searched, nothing found

<a href="https://www.COVID19reviews.org/index.cfm">VA-ESP</a> https://www.COVID19reviews.org/index.cfm		<u>02/06/2021</u>	Searched, results found
<a href="#">L*OVE – COVID-19</a>		<u>02/06/2021</u>	Searched, results found
<a href="https://www.collabovid.org/">Collabovid</a> https://www.collabovid.org/		<u>02/06/2021</u>	Searched, results found
<b>Additional COVID resources for reviews</b> <i>(Tailor the list according to the topic and potential evidence base. In some cases it may be preferable to scan the main (generic) source rather than COVID-19 specific product; listed under secondary research)</i>			
<a href="https://www.ncbi.nlm.nih.gov/research/coronavirus/">LitCOVID</a> https://www.ncbi.nlm.nih.gov/research/coronavirus/			Not searched, maybe relevant
<a href="https://eunetha.eu/COVID-19-treatment/">Rolling collaborative review of COVID-19 treatments - Eunetha</a> (not a searchable database but a list of living reviews) https://eunetha.eu/COVID-19-treatment/			Not searched, not relevant
<b>For technology/ treatment questions</b>			
<a href="https://database.inahta.org/">International HTA database (ITS-HTA)</a> (for technology questions only) https://database.inahta.org/			Not searched, not relevant
<a href="https://eunetha.eu/services/COVID-19/">EUnetHTA – COVID 19 response</a> (not a searchable database but a lists of evidence covering diagnostics and treatments) https://eunetha.eu/services/COVID-19/			Not searched, not relevant
<b>Additional COVID resources for guidelines</b>			
<a href="https://labs2020.tripdatabase.com/">Trip</a> (Trip Pro can be accessed by an institutional based subscription based via institution, otherwise use Trip) add an additional COVID search term and filter by UK guidelines, covers NICE, and SIGN. Can also filter for non-UK guidance if stakeholder requests it) https://labs2020.tripdatabase.com/			Searched, results found
<b>Additional COVID resources for primary studies</b>			

<a href="#">L*OVE primary studies</a>			Not searched, not relevant
<a href="https://app.iloveevidence.com/loves/5e6fdb9669c00e4ac072701d?population=5e7fce7e3d05156b5f5e032a&amp;classification=primary-study">https://app.iloveevidence.com/loves/5e6fdb9669c00e4ac072701d?population=5e7fce7e3d05156b5f5e032a&amp;classification=primary-study</a>			
<a href="https://COVID-19.cochrane.org/">Cochrane COVID-19 Study Register</a> <a href="https://COVID-19.cochrane.org/">https://COVID-19.cochrane.org/</a>			Not searched, not relevant
<a href="https://COVID-19.cochrane.org/">LitCOVID</a> <a href="https://COVID-19.cochrane.org/">https://COVID-19.cochrane.org/</a>			Not searched, not relevant
<b>Secondary research resources for reviews (non-COVID-19)</b> (Tailor the list according to the topic and potential evidence base, talk to stakeholder before proceeding with this type of search)			
<a href="https://www.cochranelibrary.com/cdsr/reviews">Cochrane Database of Systematic Reviews (CDSR)</a> <a href="https://www.cochranelibrary.com/cdsr/reviews">https://www.cochranelibrary.com/cdsr/reviews</a>		02/06/2021	Searched, results found
<a href="https://www.campbellcollaboration.org/better-evidence.html">Campbell Collaboration</a> <a href="https://www.campbellcollaboration.org/better-evidence.html">https://www.campbellcollaboration.org/better-evidence.html</a>			Not searched, maybe relevant
JBI (via OVID) (Subscription based service – WCEBC has a subscription)			Not searched, maybe relevant
<a href="https://www.epistemonikos.org/en/advanced_search">Epistemonikos</a> <a href="https://www.epistemonikos.org/en/advanced_search">https://www.epistemonikos.org/en/advanced_search</a>		02/06/2021	Searched, results found
<a href="https://www.crd.york.ac.uk/prospero/">PROSPERO</a> <a href="https://www.crd.york.ac.uk/prospero/">https://www.crd.york.ac.uk/prospero/</a>		02/06/2021	Searched, results found
<a href="https://pubmed.ncbi.nlm.nih.gov/clinical/">PubMed Clinical Queries</a> <a href="https://pubmed.ncbi.nlm.nih.gov/clinical/">https://pubmed.ncbi.nlm.nih.gov/clinical/</a>			Not searched, not relevant
<a href="https://pubmed.ncbi.nlm.nih.gov/">PubMed</a> Filter by systematic reviews, reviews or meta-analysis once search undertaken) <a href="https://pubmed.ncbi.nlm.nih.gov/">https://pubmed.ncbi.nlm.nih.gov/</a>		02/06/2021	Searched, results found
<b>Secondary resources for reviews relevant to local/UK context</b>			

<a href="https://www.healthtechnology.wales/COVID-19/">Health Technology Wales- Coronavirus (COVID-19) Evidence reviews and research</a> (not a searchable database but lists of evidence appraisal reports, topic exploration reports, rapid summaries, economic reports, impact and externally published reports) <a href="https://www.healthtechnology.wales/COVID-19/">https://www.healthtechnology.wales/COVID-19/</a>		02/06/2021	Searched, nothing found
<a href="#">Healthcare Improvement Scotland – COVID-19: Evidence for Scotland</a> (not a searchable database but a lists of once for Scotland guidance, rapid evidence reviews, NIC rapid guidelines evidence covering diagnostics and treatments)			Not searched, maybe relevant
<a href="https://hselibrary.ie/COVID19-evidence-summaries/">Ireland, HSE Library, COVID-19 Summaries of Evidence</a> not a searchable database but a list of all summaries of evidence that HIQA have been asked to address) <a href="https://hselibrary.ie/COVID19-evidence-summaries/">https://hselibrary.ie/COVID19-evidence-summaries/</a>			Not searched, maybe relevant
<a href="https://www.gov.uk/government/organisations/scientific-advisory-group-for-emergencies">SAGE</a> <a href="https://www.gov.uk/government/organisations/scientific-advisory-group-for-emergencies">https://www.gov.uk/government/organisations/scientific-advisory-group-for-emergencies</a>			Not searched, maybe relevant

## 10. About the Wales COVID-19 Evidence Centre (WC19EC)

The Centre integrates with worldwide efforts to synthesise and mobilise knowledge from research. We operate as part of [Health and Care Research Wales](#) with a core team, hosted in the Wales Centre for Primary and Emergency (including Unscheduled) Care Research (PRIME).

The centre core team of the centre works closely with collaborating partners in [Health Technology Wales](#), [Wales Centre for Evidence-Based Care](#), [Specialist Unit for Review Evidence centre](#), [SAIL Databank](#), [Bangor Institute for Medical & Health Research/ Health and Care Economics Cymru](#), and the [Public Health Wales Observatory](#).

Together we aim to provide around 50 reviews per year, answering the priority questions for policy and practice in Wales as we meet the demands of the pandemic and its impacts.

**Director:** Professor Adrian Edwards

**Contact Email:** [WC19EC@cardiff.ac.uk](mailto:WC19EC@cardiff.ac.uk)

**Website:** <https://healthandcareresearchwales.org/about-research-community/wales-covid-19-evidence-centre>