Factors influencing COVID-19 vaccine uptake among minority ethnic groups

Executive summary

1. Within previous national vaccination programmes in the UK, reported vaccine uptake has been lower in areas with a higher proportion of minority ethnic group populations. There is a significant risk that vaccine uptake for COVID-19 will also be lower among minority ethnic groups. Barriers to uptake must be understood and addressed within the COVID-19 vaccination programme. [***high confidence***]

2. Primary care data analysed by QResearch indicates that, for several vaccines, Black African and Black Caribbean groups are less likely to be vaccinated (50%) compared to White groups (70%). Furthermore, for new vaccines (post-2013), adults in minority ethnic groups were less likely to have received the vaccine compared to those in White groups (by 10-20%). Recent representative survey data from the UK Household Longitudinal study shows overall high levels of willingness (82%) to take up the COVID-19 vaccine. However, marked differences existed by ethnicity, with Black ethnic groups the most likely to be COVID-19 vaccine hesitant followed by the Pakistani/Bangladeshi group. Other White ethnic groups (which includes Eastern European communities) also had higher levels of COVID-19 vaccine hesitancy than White UK/White Irish ethnicity. [***high confidence***]

3. Barriers to vaccine uptake include perception of risk, low confidence in the vaccine, distrust, access barriers, inconvenience, socio-demographic context and lack of endorsement, lack of vaccine offer or lack of communication from trusted providers and community leaders. [***high confidence***]

4. To overcome these barriers, multilingual, non-stigmatising communications should be produced and shared, including vaccine offers and endorsements from trusted sources to increase awareness and understanding and to address different religious and cultural concerns (such as whether the vaccine is compliant with the dietary practices of major faiths, or with their ethical positions around medical interventions). Communication should consider the "whole communication journey" for vaccine rollout. See previous SPI-B and Ethnicity sub-group reports on communication (SPI-B, 2020; SAGE ethnicity sub-group, 2020). [***medium confidence***]

5. Community engagement is essential as health messages and vaccine distribution strategies must be sensitive to local communities. Community forums should include engagement with trusted sources such as healthcare workers, in particular GPs, and scientists from within the target community to respond to concerns about vaccine safety and efficacy [***medium confidence***]

6. There may be benefits of emulating the independent stand-alone vaccination websites created in the US[1], Canada[2], Denmark[3] and Australia[4] as a single, trusted source of information. [***medium confidence***]

7. Vaccines should be administered by trusted health practitioners in familiar and convenient locations. Place-based priorities could be considered for delivery of vaccine in the second phase to reach groups who may not be registered with primary care. [***medium confidence***]

8. Training would help healthcare staff to recognise the importance of their role as a trusted source of health information for minority ethnic groups. [***low confidence***]

9. Practical support will be required to ensure no financial disadvantage is incurred through vaccine uptake (such as loss of earnings or travel costs).

10. Transparent and regular reporting of progress on the vaccination offer, including uptake by minority ethnic groups and actions taken to address inequalities, will help to build confidence in the fairness, safety and efficacy of the vaccines.

11. Evaluation of interventions is essential to identify strategies that work well and strategies that are less effective to understand components of the vaccination programme that need to be improved and strengthened. Communication approaches must recognise the evolving evidence situation, incorporating new and emerging evidence about COVID-19 and vaccines.

[1] https://vaccinateyourfamily.org/vaccines-diseases/covid19/
[2] https://immunize.ca/
[3] https://www.stophpv.dk/?fbclid=IwAR1TXHa38Wb2xDSD-iDZrfKRG1jOmimEDY5FD_B7uklF9FPsnBZGobgzrfo
[4] https://www.healthdirect.gov.au/immunisation-for-babies

1. Background

Trials have shown promising results for vaccines preventing COVID-19 disease. However, successful implementation of a vaccination programme will depend upon uptake, which differs among population groups. Without understanding the views, needs and barriers to vaccine uptake, and targeting interventions accordingly, vaccine implementation could exacerbate pre-existing inequalities. This is particularly pertinent considering evidence that minority ethnic groups are disproportionately affected by the COVID-19 pandemic, experiencing higher morbidity and mortality (SAGE ethnicity sub-group, 2020).

Evidence on intention to be vaccinated for COVID-19 specific to minority ethnic groups is limited. A recent UK poll conducted by the Royal Society for Public Health suggests that only 57% of respondents from minority ethnic groups were likely to accept a COVID-19 vaccine, compared to 79% of White respondents (with only 55% of respondents of Asian ethnicity likely to say yes) (RSPH 2020). This echoes similar conclusions from international systematic reviews which report that intention to be vaccinated for COVID-19 is lower among minority ethnic groups (Robinson et al., 2020).

Several studies have also shown lower vaccine uptake in areas with a higher proportion of minority ethnic groups (Public Health England, 2015-2020; Pebody et al., 2007) However, very few studies have examined actual vaccine uptake data by ethnic group, including the factors associated with any differences in uptake. The relationship between ethnicity and vaccine uptake warrants further investigation. For example, studies examining H1N1 vaccine uptake in the UK have found no significant relationship between ethnicity and uptake once factors such as age, sex and socioeconomic status were controlled for (Bish et al., 2011). Within the H1N1 epidemic in the UK, the comparably higher vaccine uptake by minority ethnic groups was attributed to higher levels of illness and death and thus increased awareness among minority ethnic populations (Nguyen-Van-Tam et al., 2010; Sachedina and Donaldson, 2010; Han et al., 2016).

In this paper, use of the term “white group” does not distinguish different white population groups unless stated otherwise, including Eastern European, White British, Irish, etc., which can also have implications for vaccine uptake (Bell et al., 2019). For example, a study examining influenza vaccine uptake in Scotland in 2018 found uptake was 25% among Polish children compared to 70.7% among White British children (Bielecki 2018). Ethnicity can influence immunisation decisions through shaping perceptions about immunisations, beliefs about biological ethnic differences which affect individuals’ perceived susceptibility to disease and to vaccine side effects, and religion and language-related factors (Forster et al., 2016). Existing factors influence trust, confidence and belief in vaccine efficacy and need, and structural and access barriers may also influence vaccine uptake among minority ethnic groups.

It should be noted that given the unique circumstances in which COVID-19 vaccines are being deployed, as well as the particular nature of the vaccine and the virus itself, comparisons with previous vaccine roll-outs may be limited. In this paper, we examine new evidence surrounding vaccine uptake among minority ethnic groups to inform the approach to delivery and implementation of COVID-19 vaccination.

2. QResearch study of previous national vaccination programmes

This section provides a comprehensive, population-based analysis of previous routine vaccination uptake patterns among different population groups from the QResearch database, using individual-level primary care data. It is important to examine the possible determinants of ethnic disparities in established vaccination programmes to inform the development of targeted strategies to minimise inequities in future vaccination provision.

2.1. Methods

- Two cohort studies were undertaken using the QResearch database to assess disparities in vaccination uptake across ethnic groups among children aged below 18 years and adults aged 65 years and over.
- This database comprises over 12 million individuals registered at over 1,300 general practices across the UK.
- The uptake of influenza, meningitis C and rotavirus, and measles, mumps and rubella (MMR) vaccines were assessed in children aged under 18 years. The uptake of influenza and pneumococcal vaccines were assessed in those aged 65 years and older, and shingles vaccine in those aged 70 and over.
- Heterogeneity in vaccine uptake within individual general practices was accounted for. Logistic regression models were used to estimate the odds ratios for 8 ethnic groups compared to those of White ethnicity. Odds ratios (ORs; see Annex A) were estimated as unadjusted, adjusted for demographic factors, and then a 'maximally adjusted' model incorporating demographics and relevant comorbidities.

2.2. Results

- Variations in vaccination uptake were observed across different ethnicities for both children and adults.
- For adult vaccination programmes, there was consistently reduced vaccination uptake in Black Caribbean and Black African populations (50%) compared to the White population (70%) in the fully adjusted data.
- Within South Asian groups, people of Pakistani origin had significantly lower vaccine uptake.
- Furthermore, more recently introduced vaccinations, such as rotavirus and shingles (both since 2013), demonstrate lower vaccination uptake rates across all ethnic minority populations compared to the White population (10-20% lower).

These results provide guidance for the development of equitable targeting policies for COVID-19 vaccination across all populations in England. Work is underway to quantify the relative contributions of deprivation and other factors to these disparities, and the QResearch study will explore rates of vaccine offer (coverage) and refusals by members of different ethnic groups.

3. Attitudes to vaccination against Covid-19 – the Understanding Society study

The UK Household Longitudinal Study,[5] also referred to as 'Understanding Society', is a nationally representative longitudinal household panel study, which interviews members on average yearly. During the COVID-19 pandemic, participants were asked to complete a series of short web or telephone surveys to understand the changing impact of the COVID-19 pandemic on UK individuals, families and wider communities. Data from 11,708 participants aged 16 years+ who took part in the COVID-19 Wave 6 web survey collected in November 2020 have been analysed.

Initial analysis of the data (weighted to make it representative of the general population living outside of institutions) shows overall high intention to vaccinate with around 82% stating they were likely or very likely to take up a COVID-19 vaccine, and 18% unlikely or very unlikely. Females were more likely to be vaccine hesitant (21%) compared to males (15%) (Figure 1; Table 1). Younger age groups were more likely to be vaccine hesitant, with 28% being unlikely/very unlikely to take up a vaccine. The highest intention to vaccinate was in the 75+ age group with 96% stating that they would be likely/very likely to be vaccinated. **Vaccine hesitancy was highest in Black or Black British groups, with 72% stating they were unlikely/very unlikely to be vaccinated. Pakistani/Bangladeshi groups were the next most hesitant ethnic group with 42% unlikely/very unlikely to be vaccinated. The Any other White background (including Eastern European groups) also had a higher chance of not being willing to be vaccinated.**

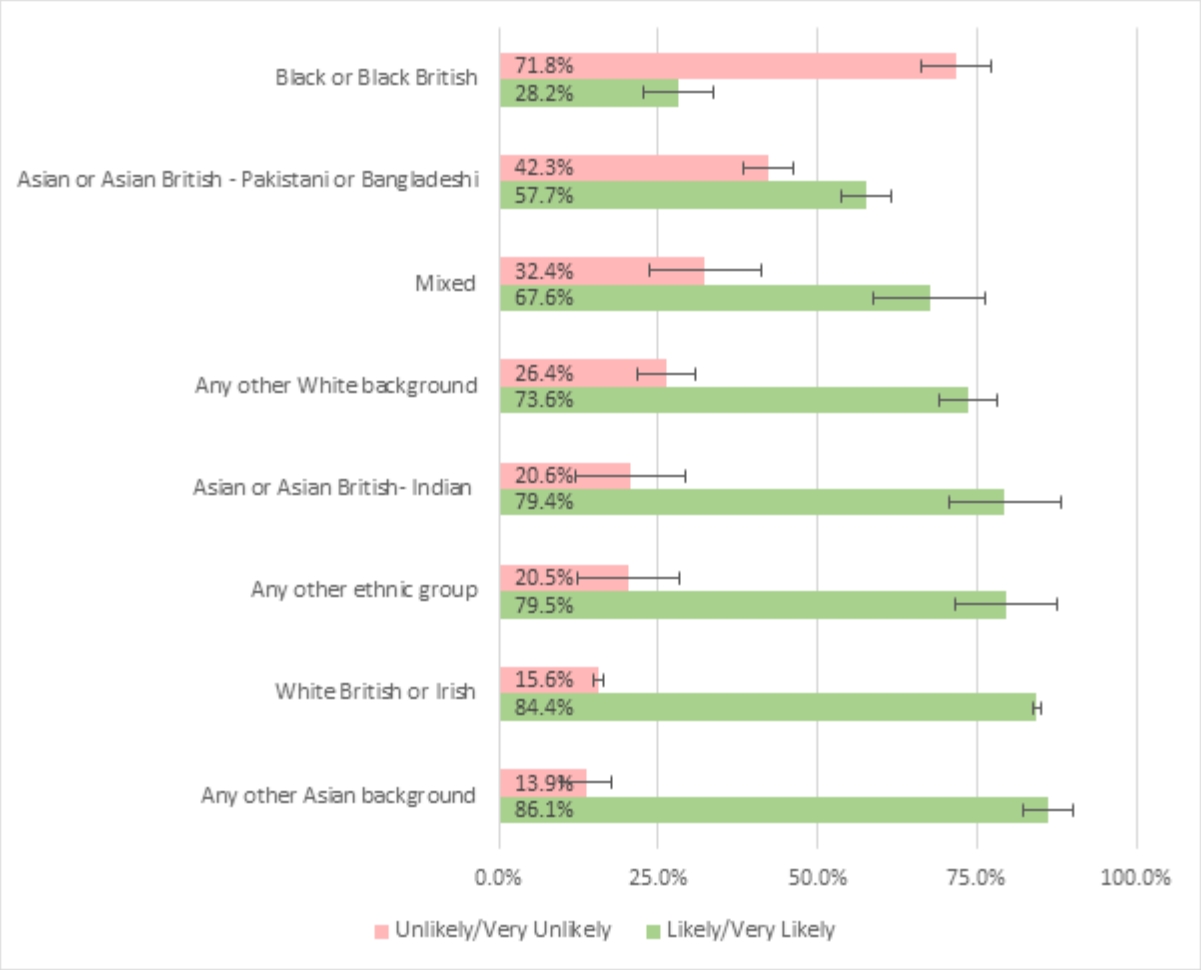

Figure 1. Willingness to be vaccinated in the UK Household Longitudinal Study by ethnic group

[5] https://www.understandingsociety.ac.uk/

The pattern of findings was similar after adjustment for differences in age and gender.

Table 1. Table: Odds ratios for the association between ethnicity and being willing to vaccinate in the UK Household Longitudinal Study

Reference group = White British/White Irish. Adjusted for age and gender.

Question asked: "Imagine that a vaccine against COVID-19 was available for anyone who wanted it. How likely or unlikely would you be to take the vaccine?". Possible responses: Very likely, Likely, Unlikely, Very unlikely, with the outcome being responding Very likely/Likely.

Ethnic group	**OR**	L95	U95
Other white background	**0.541**	0.344	0.85
Mixed	**0.528**	0.255	1.091
Asian or Asian British - Indian	**0.886**	0.599	1.311
Asian or Asian British – Pakistani/Bangladeshi	**0.378**	0.278	0.516
Asian or Asian British – any other Asian group	**1.487**	0.774	2.856
Black or Black British	**0.072**	0.039	0.134
Other Ethnic Group	**0.883**	0.321	2.43

4. Barriers to vaccine uptake among minority ethnic groups

Evidence on the barriers to COVID-19 vaccine uptake among minority ethnic groups are limited and need further research. In this section, we present the existing evidence on barriers to uptake, as well as drawing upon identified barriers from recent vaccination programmes, such as H1N1 (Mills et al., 2020):

- **Lower trust** and confidence in vaccine efficacy and safety (given low trust experiences among minority ethnic groups, with lessons learned from historical examples, such as the side effects from previous fast-tracked vaccines such as Pandemrix during H1N1). Trust is particularly important for Black communities that have low trust in healthcare organisations and research findings due to historical issues of unethical healthcare research (Gamble, 1997). Trust is also undermined by structural and institutional racism and discrimination. Minority ethnic groups have historically been a under-represented within health research, including vaccines trials, which can influence trust in a particular vaccine being perceived as appropriate and safe, and concerns that immunisation research is not ethnically heterogenous (Forster et al., 2016). Distrust is linked to the spread of misinformation about the COVID-19 vaccine (Mills et al., 2020), and linked to the speed of the vaccine approval process for the COVID-19 vaccine (City of London LCFVSF Sub-Group 2020).
- **Lower perception of risk**;
- **Inconvenience** and access barriers (including location of vaccine delivery, relative cost, time and distance to access vaccine)

  Context and socio-demographic variation (lower uptake among men, low levels of education and socio-economic status which intersect with ethnicity). Additionally, Household decision making and who receives vaccine information and offer can influence uptake. In some cases,

certain members of the household or kinship group will have greater decision-making power for the wider group, and this is also likely to include decisions on taking the vaccine. (Fairhead and Leach, 2012).

Healthcare workers play an important role as a trusted source of health information for minority ethnic groups. Therefore, it is important to reduce vaccine hesitancy in healthcare workers and particularly minority ethnic healthcare workers. Vaccine hesitancy and uptake varies among Health Care Workers (HCWs), largely by occupation and regionally by NHS trust. Support staff have the lowest reported levels of uptake, which was as low as 37% in the case of H1N1 (Mills et al., 2020). 26.5% of NHS trusts did not reach 70% coverage for seasonal influenza among HCWs in 2019-2020, suggesting that targeted support could be beneficial. The strongest predictor of H1N1 vaccination among HCWs was having had previous vaccination for seasonal influenza (OR 4.07, 95%CI: 1.62–10.24) (Hothersall, de Bellis-Ayres and Jordan, 2012). Ethnic minorities comprise a higher percentage of NHS workers compared to the working age population, suggesting that prioritisation of HCWs for vaccination will also provide higher coverage in Asian, Black, Mixed, Chinese and other ethnic groups (NHS, 2020).

5. Interventions to increase vaccine uptake in minority ethnic communities

The impact of interventions to increase vaccine uptake in minority ethnic communities will require a multifaceted and multimodal approach as minority ethnic communities experience different barriers to vaccine uptake. Broad 'catch-all' type interventions that are not designed to meet the specific needs of a community may not be as effective for some groups and may exacerbate health inequalities (Lott et al., 2020).

A rapid review of interventions to promote vaccine uptake in minority ethnic groups indicates tailored interventions targeting minority ethnic groups can increase vaccine uptake using the following mechanisms and strategies:

- **Trust** and confidence can be improved through trusted general practitioners and community health centres recommending and offering vaccines. Therefore, it is important to understand vaccine uptake among healthcare workers from minority ethnic communities and to develop interventions that target concerns in this group. Including community leaders and community champions as partners and having visible representation at all levels can increase confidence in health systems where trust is low.
    - Community engagement can identify strategies to make the vaccine more accessible, including in settings outside of formal health service provision, and increases trust between formal organisations and community members. This requires involving community leaders as partners (Peterson et al., 2019) to promote local buy-in and develop community plans (Hutchins et al., 2009). Community forums that address the cultural and historical context of vaccine research mistreatment and including diverse representation of stakeholders can increase trust (Teteh et al., 2019).

    - The genetic MNRNA process should be explained, as this has provoked mistrust around the appropriateness and safety of vaccines for different populations. Clear information

should be provided on potential vaccine side effects. Approaches should acknowledge the historical issues in healthcare research to address mistrust towards government and healthcare services experienced in Black communities in relation to vaccination. At all times the vaccine should be dis-associated from political figures.

- **Perceptions of risk for COVID-19, and perceived need of vaccination** can be addressed through a range of educational resources to increase awareness of risk, efficacy of vaccine and tackle disinformation.
    - Using educational videos in multiple languages can increase awareness (Hoppe and Eckert, 2011) leaflets which address misperceptions (Greenfield et al., 2015) and narrative films using characters that the target community can identify with to increase perceived severity of the virus and the perceived response efficacy of the vaccine, i.e. belief that getting the vaccine would reduce risk (Frank et al., 2015).
- **Access and convenience** will vary for different communities and engagement work is required to identify the appropriate settings and local barriers to accessing the vaccine. The workplace (for example for healthcare workers from minority ethnic groups), community centres and religious venues may be important settings for facilitating uptake. Practical support is important to ensure no financial disadvantage is incurred, e.g. loss of earnings due to travel or waiting time to obtain vaccine, transportation costs etc.
    - Providing immunisations in community-based settings, religious and community sites including their own general practice, outside of formal health service provision including workplace settings can improve access. This enables reach into communities that distrust government and medical professions, or were not registered with local services; it includes places of worship (Peterson et al., 2019) school-based programmes, community-based organisations, and door-to-door efforts (Hutchins et al., 2009; Rani et al., 2020).
    - Support with physical barriers such as booking appointments and transportation can improve uptake (Hoppe et al., 2011).
    - Prompts and reminders in the form of letters and text messages (Lott et al., 2020), and the perception of support from family and friends (Frew et al., 2014) can improve vaccine uptake.
- **Culturally tailored communication,** shared by trusted sources is vital for minority communities. The SPI-B and Ethnicity sub-group reports on how to develop tailored communication provide further details on how to achieve this. Health messages need to be co-designed and conveyed to individuals within family and community networks that influence health behaviours within families. This will vary between different communities, with e.g. in some places parents, others grandparents, men versus women having more say. Communication by HCWs, Community and Faith Leaders and Community Champions is essential to increase trust and confidence in the vaccination programme. It will also be important to communicate the importance of the two doses of the vaccination programme.
    - Training for healthcare staff (Hoppe et al., 2011) which includes strategies for culturally tailored conversations to address vaccine beliefs, recognising their distinctive role as the most trusted source of health information among many minority ethnic groups and the value of their making vaccine recommendations for improving uptake (Frew et al., 2014; Greenfield et al., 2015). Training for faith leaders to increase their understanding of vaccine research (Alio et al., 2014).

See table 4 (Annex B) for examples of interventions to increase vaccine uptake in minority ethnic communities.

6. Recommendations

On-going community engagement is essential as health messages and vaccine distribution strategies must be sensitive to local communities. Interventions should include ongoing open dialogue with communities to reassure people about the safety and efficacy of COVID-19 vaccines. It will be important to involve Community Champions to facilitate community engagement and specific decision makers within families should be identified for particular social groups.

Community forums should include engagement with trusted sources such as healthcare workers, in particular GPs, and scientists from within the target community to respond to concerns about vaccine safety and efficacy. This may increase confidence, trust, knowledge, acceptability, and uptake in minority ethnic groups. Approaches should acknowledge the historical issues in healthcare research to address mistrust towards government and healthcare services experienced in Black communities in relation to vaccination.

Credible sources from within target communities should be visible at all levels, including grassroots organisations, healthcare services and policy teams, as authentic representation at each of these levels is likely to increase trust and facilitate a cohesive national and local strategy.

Tailored communication shared by trusted sources can increase perceptions of risk for COVID-19 and perceived need of vaccination. Communication by healthcare workers, community and faith leaders, and community champions is essential to increase trust and confidence in the vaccination programme.

Information about vaccines should be available in various languages in both written and visual/video recorded formats to enable people from all ethnic backgrounds to make fully informed choices. See the SPI-B and Ethnicity group reports (SPI-B, 2020; SAGE ethnicity sub-group, 2020) for further details on how to develop tailored communication.

A consistent evidence-based approach to messaging about all aspects of vaccines, aligned across organisations will be important for public confidence, including for minority ethnic groups.

Governance systems should be established and used to ensure that all organisations delivering messages to the public on the vaccination programme are consistent and do not share mixed or conflicting messages.

Consideration of the "whole communication journey" for vaccine rollout, from current implementation to highest risk groups, to the potential need for repeat vaccination, is important for confidence among minority ethnic groups – including to ensure practice of broader COVID-19 measures and protective behaviours (see linked SPI-B paper on vaccines and NPIs) between and after vaccinations.

Messaging should be continuously reviewed, aligned and amended as new evidence and practical details emerge.

A trusted independent stand-alone vaccination website such as those in the US[6], Canada[7], Denmark[8] and Australia[9] which cover wider issues than just those on NHS.UK could be considered to collate resources in one place, especially non-written resources (Soborg and Jaconsen, 2019). A website

[6] https://vaccinateyourfamily.org/vaccines-diseases/covid19/
[7] https://immunize.ca/
[8] https://www.stophpv.dk/?fbclid=IwAR1TXHa38Wb2xDSD-iDZrfKRG1jOmimEDY5FD_B7uklF9FPsnBZGobgzrfo
[9] https://www.healthdirect.gov.au/immunisation-for-babies

that is not affiliated with government or formal healthcare services is likely to be more trusted by some groups.

Avoid stigmatisation if there is lower initial uptake in some communities as stigma and shame are linked to negative mental health outcomes, and create lower likelihood of engagement with health services. Avoid unintended consequences of stigma and discrimination (similar to that experienced by certain communities in earlier stages of the pandemic) if segments of minority ethnic communities (e.g. older adults) are prioritised or by focusing on barriers specific to one community, e.g. issue of halal/kosher, the latter relates to the broader issue of disinformation experienced by many faith groups.

Practical support to address physical barriers such as transportation and ensuring no financial disadvantage such as loss of earnings due to travel or waiting time to obtain vaccine. Convenience will vary for different communities and engagement work is required to identify the appropriate settings and local barriers to accessing the vaccine. The workplace (for example for healthcare workers from minority ethnic groups), community centres and religious venues may be important settings for facilitating uptake.

Local delivery of vaccination, particularly within primary care, should be prioritised. The NHS should work collaboratively with local authorities who can help to identify the approaches and locations for vaccination based on local knowledge, community trust and ability to reach individuals who may not be registered locally within primary care.

Place-based priorities could be considered for the delivery of vaccines in the second phase (such as in trusted community settings and occupation-based settings, to reach groups who may not be registered within primary care).

Training is required for all healthcare staff, community leaders and community champions to recognise the importance of their role as a trusted source of health information for minority ethnic groups. Training which includes strategies to initiate discussions about vaccinations and how to tailor conversations to address vaccine beliefs is likely to result in more meaningful dialogue.

Interventions that address vaccine hesitancy in healthcare workers from minority ethnic groups is particularly important as they are influential credible sources that some community members are more responsive to than other healthcare workers.

Monitoring and evaluation will provide openness and transparency through regular reporting of progress on the vaccination offer, uptake and coverage by time, place and person (*including by minority ethnic group*) and will help to build confidence in the fairness of offer – as will updates on the actions being taken to address inequalities in access or uptake that are identified.

Monitoring by ethnic group and by use of local data sources can inform plans for later stages of delivery of the vaccination programme as it develops, including at the local level to support locally sensitive approaches to access, delivery, communication and engagement.

Evaluation of interventions to reduce vaccine hesitancy and/or improve uptake is essential to identify strategies that work well and can be scaled up and strategies that are less effective to understand components of the vaccination programme that need to be improved.

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Annex A: QResearch results

Table 2. Children (total n=2,447,875); maximally adjusted odds ratios (95% CI) with robust standard errors to account for clustering within practices. Sample size for each model varies due to the different eligibility ages and programme start years for different vaccines (influenza, rotavirus, measles, mumps, rubella (MMR, at least 1), and meningitis C)

	Indian	*Pakistani*	*Bangladeshi*	*Other Asian*	*Black Caribbean*	*Black African*	*Chinese*	*Other*
Influenza (n=1,617,686)	*1.16 (1.10-1.23)*	*0.72 (0.68-0.76)*	*0.98 (0.91-1.04)*	*1.04 (0.94-1.15)*	*0.49 (0.46-0.51)*	*0.93 (0.87-0.97)*	*1.27 (1.19-1.35)*	*0.82 (0.80-0.85)*
Rotavirus (n=497,524)	*0.76 (0.68-0.85)*	*0.77 (0.67-0.90)*	*1.00 (0.84-1.20)*	*0.78 (0.68-0.89)*	*0.51 (0.45-0.59)*	*0.75 (0.66-0.86)*	*0.58 (0.49-0.69)*	*0.63 (0.57-0.69)*
MMR (n=1,679,356)	*1.10 (0.92-1.32)*	*1.25 (1.03-1.50)*	*2.20 (1.90-2.53)*	*1.06 (0.90-1.24)*	*0.88 (0.79-0.98)*	*0.76 (0.68-0.86)*	*0.78 (0.68-0.89)*	*0.84 (0.78-0.91)*
Men C (n=1,679,356)	*0.68 (0.63-0.74)*	*0.91 (0.81-1.02)*	*1.19 (1.08-1.32)*	*0.81 (0.74-0.87)*	*1.17 (1.09-1.26)*	*0.92 (0.86-0.99)*	*0.65 (0.60-0.70)*	*0.71 (0.68-0.74)*

Table 3. Adults aged 65 years (n=2,054,463) and over for influenza and pneumococcal vaccines, 70 years and over (n = 1,513,191) for shingles vaccine; maximally adjusted odds ratios (95%CI) with multilevel model used to handle clustering within practices.

	Indian	*Pakistani*	*Bangladeshi*	*Other Asian*	*Caribbean*	*Black African*	*Chinese*	*Other*

Influenza	*1.09 (1.06-1.12)*	*0.84 (0.81-0.88)*	*1.30 (1.23-1.38)*	*0.98 (0.94-1.01)*	*0.49 (0.47-0.50)*	*0.68 (0.65-0.70)*	*0.74 (0.70-0.79)*	*0.69 (0.67-0.71)*
Pneumococcal	*1.22 (1.18-1.26)*	*1.10 (1.05-1.15)*	*1.54 (1.45-1.65)*	*1.03 (0.99-1.07)*	*0.64 (0.62-0.66)*	*0.88 (0.85-0.91)*	*0.79 (0.74-0.83)*	*0.77 (0.75-0.79)*
Shingles (age >=70)	*0.96 (0.93-0.98)*	*0.77 (0.74-0.81)*	*0.87 (0.82-0.93)*	*0.89 (0.86-0.92)*	*0.72 (0.69-0.75)*	*0.71 (0.68-0.74)*	*0.74 (0.70-0.79)*	*0.70 (0.68-0.72)*

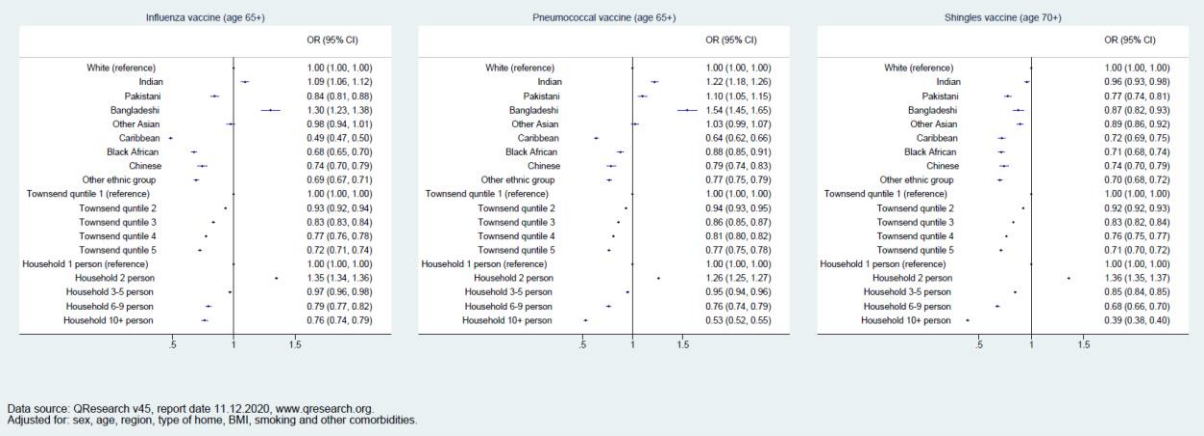

Figure 1. Maximally adjusted odds ratios for the uptake of vaccination by ethnic group, household size and quintile of deprivation.

Annex B: Tabulated summary of interventions to increase vaccine uptake

Table 4. Interventions to increase vaccine uptake in minority ethnic communities

Intervention	Aims	Group	Strategies
Tailored communication	Increase vaccine beliefs of safety and efficacy including concerns about "rushed approval" and importance of the two doses of the vaccination programme. Address religious and concerns	Community members Trusted sources including healthcare providers from within the community and Community Champions Local authority	Culturally relevant Culturally accessible Specific Multiple languages Different types of media Co-designed Target disinformation Manage expectations Trusted and authentic sources Share evidence of successful vaccination campaigns in minority ethnic groups

Access	Provide equitable access to vaccine	Community groups Local authority NHS	Flexible vaccine delivery model with multiple settings including • community hubs • GP surgery • occupation • outreach Transportation Vaccine is free
Community engagement	Increase trust Identify barriers and facilitators Enhance understanding of the uncertainty of COVID-19 vaccinations	Community members Community groups Community champions Youth ambassadors Faith leaders Local authority NHS particularly primary care Health and social care workers MHRA as independent regulator	On-going, open, transparent dialogue with community members Develop locally owned action plans
Training and education	Develop strategies for tailoring conversations to address vaccine beliefs Recognise the importance of their role as a trusted source of health information	Healthcare workers - all HCWs plus targeted approach for HCWs within ethnic communities Community leaders Community champions Faith Leaders	Videos Presentations Materials that highlight evidence of successful vaccination campaigns in minority ethnic groups Communication skills training