# COVID-19 Vaccination:
# Reducing vaccine hesitancy
# Review & Recommendations

**Authors**

Produced by Hertfordshire County Council Behaviour Change Unit: Wayne Bateman (Behavioural Science Specialist, document lead), Roshni Deo (Behavioural Science Specialist), Ludovico Nocco (Behavioural Science Specialist) and Dr. Michelle Constable (Head of HCC Behaviour Change Unit), with UCL Centre for Behaviour Change Deputy Director Dr. Paul Chadwick.

December 2020

Correspondence to: bcu@hertfordshire.gov.uk

# CONTENTS

Reducing vaccine hesitancy

# COVID-19 Vaccination:
## Reducing vaccine hesitancy
## Review & Recommendations

## EXECUTIVE SUMMARY

### Introduction

Global efforts across government, academia, and the private sector were made to develop a vaccine against COVID-19, considered widely as the critical step to ending the COVID-19 pandemic. However, developing, testing and producing a vaccine is just the first challenge – 'it is vaccination not just the vaccine that saves lives, and ensuring that enough individuals are vaccinated is crucial' (The Royal Society and The British Academy, 2020:5).

In recent years, public acceptance and uptake of vaccinations has fallen, both in childhood and adult vaccination programmes with significant implications for public health (Williams et al., 2020). The observed delay in acceptance or refusal of vaccines despite their availability is referred to as 'vaccine hesitancy' and is widely documented within research in this field. The World Health Organization (2014) defines it as *'a behaviour, influenced by a number of factors including issues of confidence (level of trust in vaccine or provider), complacency (do not perceive a need for a vaccine, do not value the vaccine), and convenience (access)'.*

Acceptance amongst health professionals and the public are key to reducing vaccine hesitancy and ensuring the uptake of the COVID-19 vaccine is high enough to achieve herd immunity. Herd immunity refers to the concept that 'a population can be protected from a certain virus if a threshold of vaccination is reached' (World Health Organization). The threshold refers to the percentage of people within a population who need to have antibodies towards the virus, and this threshold varies with each disease. A recent report from The Royal Society and The British Academy estimated that 'A community-level vaccine coverage of 80+% will be required to protect the community from infection, dependent on the vaccine efficacy and duration of protection' (2020:1).

Surveys of intention to be vaccinated have shown that 81-83% of people intended to be vaccinated (Royal Society of Public Health 2020; Thorneloe et al., 2020). However, research in this area shows that intention is not a reliable predictor of behaviour and that an 'intention-behaviour gap' exists (Sheeran, 2002), this has been shown within previous research into pandemic vaccination uptake (de Figueiredo et al., 2020). As such, it is highly likely that behavioural interventions to increase vaccine uptake will be required. Steps should therefore be taken to understand the influences upon vaccination intentions and behaviours, in order to effectively increase the uptake of the vaccine.

# Purpose

This paper presents a rapid review of the literature to inform decisions on how local authorities can increase the uptake of the COVID-19 vaccination amongst their residents, using a behaviourally informed approach. Three areas of research are reviewed: vaccination intentions and behaviours for previous pandemics; population surveys to measure attitudes and intentions towards COVID-19 vaccination; and the influence of misinformation upon vaccination decision making.

A series of guiding principles and evidence-based recommendations to reduce vaccine hesitancy, with a particular focus upon communications, are presented below in brief. Further details, including practical examples of their application, are provided on pages 19-25.

# Guiding principles

Public health communications 'play a key role in informing the public on how to manage risks and prevent transmission during public health pandemics, including vaccination acceptance and uptake' (Thorneloe et al., 2020:4). To reduce vaccine hesitancy, effective and targeted communications are essential both for the general public and for groups where uptake is likely to be lower. At the core of the development of any COVID-19 vaccine comms plan is the principle of engagement.

The principles of engagement are not linear with a clear start and finish. Rather, they emphasise the dynamic and cyclical nature of meaningful engagement with groups where vaccine uptake is anticipated to be lower than average.

**Engage** to **understand**  → **Engage** to **empower**  → **Engage** to **evaluate**

Applying these principles supports the development and delivery of communications that:

- Are informed by an accurate understanding of the barriers to vaccination.
- Acknowledge and validate the concerns and apprehensions that may exist.
- Address these concerns and reduce vaccine hesitancy.
- Are well received by the target group.
- Adapt to changes in community sentiments and barriers to vaccination.

### Engage to understand
Barriers to vaccine uptake vary within and between groups, influencing behaviour to a greater or lesser extent. Engage with local stakeholders to understand their needs, values, and beliefs, and identify trusted sources of information.

### Engage to empower
Co-produce tailored materials and resources with the group, applying the insights gained to address the specific barriers identified and emphasising the benefits of having the COVID-19 vaccine. Engage with key influencers to establish routes into the community and to gain endorsement and support for messaging.

Hertfordshire

**Engage** to **evaluate**

Assess if materials and resources are having the impact they were intended to. Influences on vaccination intentions fluctuate over time so strategies and communications will need to reflect changes to ensure they are still relevant.

## Recommendations

Communications to decrease vaccine hesitancy, and thereby increase the uptake of the COVID-19 vaccine, are more likely to be effective if they achieve the following:

- **Residents believe that there is a risk to them of getting COVID-19 and that this could have severe implications upon their health**

  People are more likely to be vaccinated if they perceive that they are at risk of contracting the virus and that there would be severe implications upon their health if they did. Increasing knowledge of the personal risks associated with not being vaccinated should therefore feature within communication strategies for both the general public and for specific groups.

- **Residents believe that the COVID-19 vaccine is safe and is effective**

  People are more likely to have the COVID-19 vaccine if they believe that it is safe and effective, particularly for groups where greater apprehension and fears have been identified. It is important that concerns are addressed in communications and not dismissed or ignored.

- **Being vaccinated is made as easy as possible for residents**

  The easier it is for someone to be vaccinated, the more likely they are to have the vaccine. Invitations should provide clear and specific information, including where to go and how to get there, and offer a variety of convenient times and locations. Employers should be encouraged to support staff to get the vaccine by ensuring there are no financial or time implications of them attending appointments. Support with planning should also be provided to increase the likelihood of people attending their second vaccination appointment.

- **Residents are motivated to have the COVID-19 vaccine**

  People will have multiple motivations to have the vaccine and these will be different for different people e.g. wanting to protect themselves, their friends and family, the NHS or the economy. Identifying the different motivational levers is key to effective communications.

- **Information gaps are identified and filled, and misinformation is corrected**

  Identify and address any gaps in knowledge regarding COVID-19 and the vaccine and develop resources and communications to address them. Where false information is identified, communicate the correct information as soon as possible to reduce exposure and prevent the spread of misinformation.

- **Engagement crosses multiple communication channels**

  Use a range of media channels that are appropriate for the audience. Harnessing social media is essential for engaging a diverse audience as it is the primary source of information for most people. Online campaigns against vaccination, which have the potential to gain rapid exposure, should be counteracted with strategic communications.

# COVID-19 Vaccination:
## Reducing vaccine hesitancy
## Review & Recommendations

## BACKGROUND

Global efforts across government, academia, and the private sector have been being made to produce a vaccine against COVID-19, considered widely as the critical step to ending the COVID-19 pandemic. However, developing, testing and producing a vaccine is just the first challenge – 'it is vaccination not just the vaccine that saves lives, and ensuring that enough individuals are vaccinated is crucial' (The Royal Society and The British Academy, 2020:5).

### Herd immunity

Herd immunity refers to the concept that 'a population can be protected from a certain virus if a threshold of vaccination is reached' (World Health Organization). The threshold refers to the percentage of people within a population who need to be immune to a particular disease, and this threshold varies with each disease. A recent report from The Royal Society and The British Academy estimated that 'A community-level vaccine coverage of 80+% will be required to protect the community from infection, dependent on the vaccine efficacy and duration of protection' (2020:1). Importantly, achieving herd immunity means that the most vulnerable within the population (e.g. those who cannot be vaccinated) are protected.

### Vaccine hesitancy

In recent years, public acceptance and uptake of vaccinations has fallen, both in childhood and adult vaccination programmes (Williams et al., 2020). This 'vaccine hesitancy' is widely documented in the research and is defined by the World Health Organization (2014) as:

*'a behaviour, influenced by a number of factors including issues of confidence (level of trust in vaccine or provider), complacency (do not perceive a need for a vaccine, do not value the vaccine), and convenience (access). Vaccine-hesitant individuals are a heterogeneous group that are indecisive in varying degrees about specific vaccines or vaccination in general. Vaccine-hesitant individuals may accept all vaccines but remain concerned about vaccines, some may refuse or delay some vaccines, but accept others, and some individuals may refuse all vaccines.'*

International studies have shown that vaccine hesitancy has been increasing for a number of diseases and the implications this can have upon public health are significant – the 2008 outbreak of measles (1,000 cases across 11 countries in Europe) is one example. The 75% population target/threshold set by the World Health Organization remains unmet, even for one of the most common vaccines – seasonal flu – where uptake is typically below 50%, even for those groups classified as at high risk (Jorgensen et al., 2018). This has led to vaccine hesitancy being categorised by The World Health Organization in 2019 as one of the top ten international threats to global health.

Acceptance amongst health professionals and the public is key to reducing vaccine hesitancy and ensuring the uptake of the COVID-19 vaccine is high enough to achieve herd immunity, particularly given that a 'vaccine refusal rate greater than 10% could significantly impede attainment' (DeRoo et al., 2020:2458). Steps should therefore be taken to understand the various influences upon vaccine hesitancy so that any identified barriers can be addressed, with a particular focus upon confidence, complacency, and convenience.

### Estimating uptake

The importance of reaching the herd immunity threshold for the COVID-19 vaccination is clear. Considering increases in vaccine hesitancy, it is essential to identify barriers to uptake and implement measures to address them.

Now that a COVID-19 vaccination has been approved, local authorities must consider how to ensure equitable access and distribution of the vaccine and support these infrastructural/logistical measures with behavioural strategies to encourage uptake. However, at the time of writing this paper the vaccine has only just been released and so there is no data on uptake available to review. In the absence of this information, consulting data on uptake for previous pandemic vaccination programmes is useful. Determining an individual's intention to vaccinate against COVID-19, through surveys and interviews, provides an additional source of information upon which to estimate uptake.

### Behavioural interventions to increase uptake

Historically some high-income countries have made particular vaccines for children mandatory, which have proven effective in ensuring high uptake rates, although making vaccines mandatory for adults is rare (Mello et al., 2020). It has been argued that given how infectious and dangerous COVID-19 is, making the vaccine mandatory with substantive penalties for those who do not get vaccinated (for example, requirements to self-isolate) warrants discussion among government officials. However, in the likely event that no such measures will be taken, behavioural interventions are needed at a local level if we are to reach the threshold required for herd immunity.

Interventions should be informed by the best available evidence, developed in collaboration with key stakeholders, and supported by a systematic and structured communications strategy. This paper presents a rapid review of the literature and makes a series of evidence-based recommendations for behaviourally informed approaches that can reduce resident vaccine hesitancy and increase vaccination rates, with a particular focus upon communications.

# RESEARCH AND EVIDENCE

## Research Methodology

**Research questions**

There are several questions this paper seeks to answer through a review of the available research:

- What are the influences upon vaccine hesitancy?
- Of these influences, which are most relevant to the COVID-19 vaccine?
- Which influences are malleable to behavioural interventions?
- What does the research tell us about how to intervene effectively in these areas?

These questions will be considered at a population level but also with regard to particular target groups where vaccination uptake is predicted to be lower than average (e.g. BAME communities).

**Research reviewed**

Secondary research

In seeking to answer the above questions, priority was given to research focused on COVID-19. However, recognising the limited available research and the reliance upon studies exploring vaccination intentions, which do not always accurately predict behaviours, consideration was also given to intentions and uptake of other vaccines/pandemics. For example, H1N1, smallpox, and human papillomavirus (HPV). The following sources of information were considered:

- Peer-reviewed journal articles.
- Systematic reviews.
- Government and non-government guidance.
- Policy papers.
- Pre-print research papers.

Primary research

Further to the above, this paper and the recommendations made have been informed by primary research conducted by Hertfordshire County Council colleagues, including consultation with BAME communities and a survey of vaccination intentions amongst English Gypsy and Irish Traveller communities.

## Research findings

This first section focuses on what has been learnt from studies into previous pandemic vaccination uptake. The second section then considers the key behavioural influences identified and recent studies into COVID-19 vaccination intentions, both nationally and internationally. Research on misinformation and conspiracy theories is then presented in the third section.

Hertfordshire

## SECTION ONE: Previous Pandemics

A recent review conducted by The Royal Society and The British Academy (2020) identified five key behavioural influences upon vaccine uptake:

1. Complacency and threat appraisal (perception of risk and severity of disease).
2. Trust and confidence (in the efficacy and safety of the vaccine).
3. Convenience (barriers, access).
4. Sources of information.
5. Sociodemographic characteristics (e.g., education, sex, ethnicity, religion, past vaccination behaviour).

These are presented below, followed by consideration of other studies which support these findings, and a brief discussion of additional factors that were not reported but have been identified elsewhere.

### 1. Complacency and threat appraisal

Studies of vaccine uptake have shown that when deciding whether to be vaccinated an individual considers the personal risk of contracting a given virus and the health consequences if the virus is contracted. This perception of personal risk is a principle that is a widely accepted behavioural insight within decision making. Research into the uptake of vaccinations for previous pandemics also supports this – for example, within studies of the H1N1 vaccine (Hidiroglu et al., 2010). Associated with the influence of perception of personal risk is the perception of severity of pandemic or disease, which has been shown to positively correlate with intentions to vaccinate (Seale et al., 2010).

### 2. Trust and confidence

The greatest influence upon whether someone intends to be vaccinated/ is vaccinated is their understanding and belief that the vaccination is safe and effective, as was found within a UK study of H1N1 vaccinations (Myers & Goodwin, 2011). A key factor in how safe and effective a vaccine is perceived to be is the development and testing it has been subjected to prior to market launch.

### 3. Convenience

Ensuring that it is as easy as possible for people to get vaccinated, for example by locating vaccination sites near public transport routes and extending their operating hours, increases the likelihood of uptake. An analysis of H1N1 vaccinations in the US found that levels were particularly high in states where children received the vaccination at school (CDC, 2011).

### 4. Sources of information

Vaccine uptake rates are influenced by the information used by individuals when deciding whether or not to be vaccinated. Their sources of information can increase or decrease the likelihood of vaccination. Studies into the H1N1 pandemic found that parents who watched the national news and were pro-active in seeking out information to fill any knowledge gaps were more likely to vaccinate their children (Jung et al., 2013). Obtaining information from a healthcare professional has also been found to increase the likelihood of vaccination (Maurer et al., 2010). There is a growing body of research that demonstrates that 'internet users are more likely to believe that healthy individuals do not need to be vaccinated and that it is harmful' (The Royal

Society and The British Academy, 2020:11), and as a result are less likely to be vaccinated. In part, this might be explained by mere exposure to anti-vaccine conspiracy beliefs, an effect that has been shown to be mediated by a number of other factors including the 'perceived dangers of vaccines, perceptions of powerlessness and disillusionment and mistrust in authorities' (The Royal Society and The British Academy, 2020:11).

### 5. Socio-demographic influences

The role of socio-demographic factors in determining vaccine uptake have been studied widely. Whilst there is a degree of variance in the findings depending on whether the vaccine is for adults or for children, the country in which the study was conducted, and who participated in the study, this body of research highlights areas for consideration. These include:

- **Education:** Some studies have found that lower levels of education are associated with lower intentions to vaccinate (Larson et al., 2014).

- **Socio-economic status:** Those from lower-income backgrounds have been found to view vaccines less positively (Larson et al., 2014).

- **Age:** The impact of age appears to depend on the vaccination (whether the vaccine is for children or adults). Generally, younger people report less vaccine hesitancy, although in regards to seasonal flu vaccines, older people have been found to have less vaccine hesitancy. This finding likely reflects the increased risk that older people have in catching the flu and campaigns to increase uptake targeting this age group in particular. A systematic review of uptake of the H1N1 vaccination also found that older people were more likely to have higher intentions to have the vaccination (Bish et al., 2011).

- **Sex:** Men have been found to be more likely to report anti-vaccine sentiments – however, a study of the H1N1 vaccination reported the opposite, with men indicating higher intentions of being vaccinated than female respondents (Bish et al., 2011).

- **Ethnicity:** Research suggests that people from BAME groups are less likely to be vaccinated. This is due in part to a lack of trust in government/health care systems and may also reflect inequalities in access to healthcare services, health care insurance, and convenience (The Royal Society and The British Academy, 2020). Interestingly, a systematic review of studies focused on H1N1 vaccination intentions and behaviours reported that in the UK, individuals identifying as BAME were more likely to be vaccinated (Bish et al., 2011). It is possible that this was because 'individuals from Asian ethnic minorities were more likely to be hospitalised (The Royal Society and The British Academy, 2020:11) and mortality rates for children from Bangladeshi and Pakistani families were higher.

- **Religion:** Certain vaccines met opposition from religious groups to their ingredients, resulting in lower levels of vaccination (Yufika et al., 2020; Wong & Sam, 2010).

- **Social network:** People typically associate with others who share the same ideas and opinions regarding core values and beliefs, and research has shown that this holds true for vaccinations. A 2017 study (Meleo-Irwin et al., 2017) into vaccination reported that 'the proportion for and against vaccination within an individual's social circle' (The Royal Society and The British Academy, 2020:12) was a relevant factor in vaccination intentions/ uptake (Meleo-Irwin et al.), with parents who chose not to vaccinate their children having 70% of their social networks holding similar attitudes (compared to only 13% of those who did vaccinate).

- **Past health and vaccination behaviour:** When reviewing factors that influenced uptake of the H1N1 vaccination, one of the strongest predictors was previous vaccination behaviour – those people who had previously received the vaccination for seasonal flu were more likely to have received the H1N1 vaccination than those who had not (Bish et al., 2011).
- **Higher risk priority groups:** Research has shown that individuals with a pre-existing chronic illness or who are at greater risk of the current virus are more likely to be vaccinated (Schwarzinger et al., 2010). It has also been shown that doctors and health care professionals have greater intentions and uptake in general, and this was observed within the H1N1 pandemic (Bish et al., 2011). Pregnant women have also been found to be more likely to vaccinate, particularly where they have concerns about the disease and where they believe the vaccine to be effective (Edmonds et al., 2010).

The influence of **vaccine importance, safety, and effectiveness** upon uptake discussed above is confirmed by the largest global vaccine confidence study conducted to date (de Figueiredo et al., 2020) – a retrospective analysis of data from 284,381 participants. The researchers also identified that confidence in the importance of vaccines was most strongly associated with the uptake of vaccines. Encouragingly, confidence in the importance of vaccinations was found to be increasing in the majority of countries across Europe, including the UK where a rise from 47% in May 2018 to 52% in November 2019 was reported. The researchers are currently collecting data in the UK from over 15,000 people, with the intention of mapping attitudes towards vaccines and 'identifying local barriers to uptake' (de Figueiredo et al., 2020). It should be noted that the survey question asked to gauge a measure of confidence in the importance of vaccines was 'I think vaccines are important for children to have' and this might place a limitation on the generalisability of these findings.

Several other factors related to a lower likelihood of having a vaccine included:
- Being male.
- Lower levels of science education.
- Trusting family/friends/non-medical sources for medical advice, over healthcare workers and medical professionals.
- Belonging to a minority religious group/religious extremism.
- Political instability/distrust.

**Perception of personal threat and vaccine effectiveness**
The last worldwide pandemic experienced was the H1N1 'swine flu' in 2009. Different countries adopted different approaches to vaccination, with some opting to vaccinate the entire population and others prioritising/targeting particular groups, such as those with certain pre-existing health issues. International data on vaccine uptake showed variability across countries, with most countries reporting under 50% of their target populations having received the vaccine (Brien et al., 2012). Identifying the factors that influenced whether an individual volunteered to take the vaccine was key and a systematic review in 2011 (Bish et al., 2011) reported that 'stronger vaccination intentions and higher vaccination uptake were related to the degree of threat experienced and perceptions of vaccination as an effective coping strategy' (Williams et al., 2020:1040). In addition to the degree of threat and perception of vaccine effectiveness, non-uptake has been found to be associated with concerns regarding the safety of the vaccine and the perception that it had not been properly tested (Fabry et al., 2011; Seale et al., 2010).

Hertfordshire

**Groups where vaccination rates are lower/need consideration**

Research has identified groups where vaccination uptake (incomplete or under-vaccinated) is higher, defined as 'under-vaccinated groups' (UVGs). For example, Orthodox Protestant communities, Orthodox Jewish communities, and Roma and Traveller communities (Fournet et al., 2018). Studies have shown a number of common beliefs that were found to influence non-vaccination, some held by particular groups and others shared across groups, including risks associated with being vaccinated/not vaccinated and vaccine ingredients that were not permissible for consumption by certain religious groups (Fournet et al., 2018). Vaccination of pregnant women has also been found to be lower than the general public, potentially due to a greater degree of caution as a result of being advised by healthcare professionals to avoid medications during pregnancy (Ghio et al. 2020).

It is widely accepted that outbreaks of vaccine preventable diseases (VPDs) will continue where there are areas/groups of low vaccination as viruses will continue within these communities but also present a risk to the general population through transmission. A useful way to capture the different barriers experienced and to illustrate this to stakeholders is through segmentation – 'the identification of groups who share similar beliefs, attitudes, and behavioural patterns…beyond demographic, epidemiological, and service uptake-based targeting' (French et al., 2020: 5986). Developing segmentation models recognises the heterogeneity of vaccine hesitancy and enables the tailoring of interventions to specific groups.

A model developed by Fournet et al. (2018) identifies four unprotected and under-protected population groups, that could inform vaccination strategies developed by local authorities:

- **The hesitant**

  Those who have concerns about perceived safety issues and are unsure about needs, procedures, and timings for immunising.

- **The unconcerned**

  Those who consider immunisation a low priority and see no real perceived risk of vaccine-preventable diseases.

- **The poorly reached**

  Those who have limited or difficult access to services, related to social exclusion, poverty and, in the case of more integrated and affluent populations, factors related to convenience.

- **The active resisters**

  Those for whom personal, cultural, or religious beliefs discourage them from vaccinating.

**Summary**

The research into vaccination uptake for previous pandemics has identified several influencing factors that are relatively consistent. Given this consistency, it could be hypothesised that these factors will also influence the uptake of the COVID-19 vaccination.

- Complacency: Perceptions of the personal risk of contracting COVID-19; and perceptions of the severity of COVID-19.
- Confidence: Confidence in the safety of the COVID-19 vaccine; and confidence in the effectiveness of the COVID-19 vaccine.
- Convenience: Convenience of being vaccinated against COVID-19.

The research also suggests that the following factors may mediate these influences upon intentions to have the COVID-19 vaccination:

- Vaccine literacy and how much reliable and accurate information an individual has on the COVID-19 vaccine.
- Socio-demographic variables, including age, ethnicity, and religious beliefs.

Consideration will now be given to research into COVID-19 vaccination intentions, with a focus upon the above influences.

**SECTION TWO: Surveys on acceptability of COVID-19 vaccination**

As the COVID-19 vaccine is rolled-out it is important to understand the likely uptake rate and any barriers that may prevent reaching the threshold required for herd immunity. Doing so as early as possible increases the opportunity to mitigate any identified risks.

With the understanding gained from studies of the uptake of vaccinations for previous pandemics, research focused on detecting, monitoring and analysing public confidence in vaccines can provide the insights required for a successful vaccination uptake strategy across local authorities.

**United Kingdom**
An online survey of 527 high-risk individuals in the United Kingdom (311 older adults and 216 chronic respiratory patients (young/middle-aged adults)) conducted in early April 2020 found that 86% expressed a desire to receive the COVID-19 vaccine. This desire was 'positively correlated with the perception that COVID-19 will persist over time, and negatively associated with perceiving the media to have over-exaggerated the risk' (Williams et al., 2020:1039). A thematic analysis of the data identified three facilitators to intention to vaccinate ('personal health', 'severity of COVID-19 disease', and 'health consequences to others') and one barrier ('concerns about vaccine safety') – reflecting the role of complacency and confidence in vaccine hesitancy. It should be noted that this was a relatively small survey, targeting high-risk individuals and as such the conclusions should not be extrapolated to other population groups without further consideration. Never-the-less these findings are consistent with those from studies into vaccination uptake for previous pandemics. A less optimistic finding on vaccination intentions was reported in a recent study where of those surveyed across the UK, approximately 36% of people say they are either 'uncertain' or 'very unlikely' to agree to be vaccinated against COVID-19 (Sherman et al. 2020).

Supporting the findings from studies of vaccine uptake for previous pandemics, a survey of 2,152 individuals within the UK found lower vaccination intentions amongst respondents identifying as BAME than those identifying as white – 55.9% and 79.9% respectively (Thorneloe et al., 2020). Overall, 76.9% of respondents reported a willingness to be vaccinated.

**Global**
A global survey of 13,426 people across 19 countries was conducted in June 2020 to better understand COVID-19 vaccination intentions, and the factors influencing intentions, to have the COVID-19 vaccination when it becomes available (Lazarus et al., 2020). Across all participants 71.5% responded positively ('very likely' or 'somewhat likely') when presented with the statement 'If a COVID-19 vaccine is proven safe and effective and is available, I will take it'. Of the 768 respondents

within the UK, 71.48% responded positively. Whilst an analysis of UK data was not reported, several key findings are of interest to this paper. These are presented below, with references to other international surveys that further support the influence of complacency, confidence, convenience, and socio-demographic factors.

**Complacency**
- The number of cases and deaths (per million) within a country influenced acceptance, with higher rates in those counties with medium and high cases and deaths. However, counter to what might be expected, those who reported either personally being sick with COVID-19 or having family members who had, were still less likely to accept the vaccine than those who hadn't/didn't.
- An Australian survey of 4,362 participants found 85.5% reported an intention to get the vaccination, and identified a positive correlation between intention to be vaccinated and perceived threat of COVID-19 (Dodd et al., 2020).
- A nationwide poll of 1,056 adults in the USA found that only 49% reported an intention to have a COVID-19 vaccine when it became available, with the key drivers identified as being a desire to protect themselves (93%), their families (88%), and their community (78%) (AP-NORC Centre, 2020). When non-intenders were asked why, a lack of concern about getting seriously sick from COVID-19 was reported by 31%, and a general belief that 'the coronavirus outbreak is not as serious as some people say it is' reported by 24%. Believing that vaccination was essential for returning to normal was also a key driver for those who intended to be vaccinated (72%).

**Confidence**
- A greater level of trust in government was associated with increased likelihood of an intention to have the COVID-19 vaccination, as was a greater trust in government issued vaccine information.
- The influence of employers was noted, with 61.4% reporting that they would have the vaccine if their employer recommended it, with a positive correlation with trust in information from their government. Interestingly, regarding acceptance of the vaccine if required by their employer, this was reversed.
- Concerns about the safety of a COVID-19 vaccination and any side effects was the most influential factor upon decisions to not be vaccinated, accounting for 70% of responses (AP-NORC Centre, 2020). This was followed by a concern about getting COVID-19 from the vaccine (42%), and a general belief that vaccines are not effective (30%).

**Socio-demographic influences**
- Wide variances in vaccine acceptance were reported between countries, with those in China at 88.6% and those in Russia at 54.9%.
- Those respondents aged 18-24 were less likely to accept the vaccine than those aged 25-54, 55-64, and 65+.
- Gender differences were small with men only slightly less likely to accept the vaccine or an employer's requirement.
- Income levels were found to influence acceptance of vaccination, with those earning more being more likely to accept.
- Higher levels of education were also found to positively correlate with acceptance of the vaccination.
- A survey of a representative sample of the French population found that 26% of respondents did not intend to have a COVID-19 vaccination, with

non-intention more prevalent among low-income participants (37%), young women aged 18-35yrs (36%), and people over 75yrs (22%) (COCONEL Group, 2020). The researchers also reported political views as having an influence upon intentions to have the COVID-19 vaccination. When responses to the question on intention were analysed against voting behaviours at the first round of the presential election in 2017 'those who had voted for a far left or far right candidate were much more likely to state that they would refuse the vaccine, as well as those who abstained from voting' (2020:770).

- Further analysis of the Australian survey data found that 'inadequate health literacy and lower education level were significantly associated with a reluctance to be vaccinated against both influenza and COVID-19' (Dodd et al., 2020:1).

- Ethnicity also influenced intentions, specifically for black Americans who were more likely than other racial and ethnic groups to state they did not intend to be vaccinated (AP-NORC Centre, 2020).

- The AP-NORC Centre poll found that those identifying as Democrat were more likely to report an intention to be vaccinated against COVID-19 (62%) than those identifying as Republican (43%) and those identifying as 'Independent' (31%). Given that the survey was conducted whilst Trump was in Office, it is possible that the Republican President's public denial of the true risks of COVID-19 influenced the intentions of his party followers. The link between political affiliation and intention to be vaccinated was also found within the COCONEL Group survey.

**Limitations of surveys**
International studies of vaccine acceptance and intention to have the vaccine have shown variance between countries, so care should be taken in informing local authority strategies in the UK by using lessons from surveys conducted outside of the UK. Furthermore, surveys are snapshots in time and as such responses cannot be assumed to be fixed; a number of influences can change these responses over time (e.g. media coverage and personal experience of COVID-19).

**Intention-behaviour gap**
It is widely acknowledged and accepted within behavioural science that an intention to perform a behaviour, for example to have the COVID-19 vaccination, is not an accurate predictor of actual behaviour (Sheeran, 2002). Decisions to have a vaccine are influenced by several factors and these factors can change over time, and across contexts.

**Summary**
Despite the limitations of survey data, asking the public about their intentions to have the COVID-19 vaccine when it becomes available still provides information that is essential to effective vaccination programme development. The research discussed in this section supports the role of the barriers and facilitators to vaccination uptake identified within the studies on previous pandemics highlighted in section one.

A key influence upon many of the barriers and facilitators discussed is the knowledge and understanding of information related to COVID-19 and the COVID-19 vaccine. Given the importance of accurate and reliable information in ensuring individuals are fully aware of the risks of non-vaccination, the next section presents the research into misinformation in general and one particular form of misinformation, conspiracy theories.

## SECTION THREE: Misinformation and conspiracy theories

*"When there is a large drop in vaccination coverage, it is often because there's an unproven vaccine safety scare seeding doubt and distrust. There are also cases where vaccine debates have been purposefully polarised, exploiting the doubting public and system weaknesses for political purposes, while waning vaccine confidence in other places may be influenced by a general distrust in government and scientific elites."*
Professor Heidi Larson, London School of Hygiene & Tropical Medicine (Dunning, 2020)

The threat that misinformation and false beliefs pose to vaccination programmes has been witnessed globally and widely documented (French et al., 2020), often leading to the resurgence of diseases, as seen with vaccination against measles (Poland & Jacobson, 2011). The current situation with COVID-19 presents a similar risk, with researchers stating 'there has been a tsunami of misinformation and conspiracy theories that have the potential to reduce vaccine uptake' (French et al., 2020:5893).

A recent poll of the UK public reported that for the 19% of respondents who indicated that they would not get the COVID-19 vaccination or were not sure if they would, one of the key themes for not doing so was 'having encountered rumours about the vaccine on social media, for example that it will be contaminated with the virus' (Royal Society for Public Health, 2020). A recently published review of COVID-19 vaccine narratives and misinformation on social media concluded that 'a cacophony of voices and narratives have coalesced to create an environment of extreme uncertainty' (Smith et al., 2020:2). Opinion polls conducted before and during the pandemic have shown that public 'confidence in vaccines is volatile', and that this is 'likely to affect rates of uptake'.

### Common narratives

The spread of misinformation regarding vaccinations is commonplace, and a focus on the safety of vaccines is not new. However, a recent review of online discussions/information around COVID-19 identified a shift in the common narratives: 'mistrust in the intentions of institutions and key figures surrounding vaccines are now driving as much of the online conversation and vaccine skepticism as safety concerns' (Smith et al., 2020:2). Some of the currently trending misconceptions/misinformation regarding COVID-19, according to a recent report from non-profit Public Good Projects, include:

- Stories that question the safety of a COVID-19 vaccine.
- Positioning of the vaccination mandate as being "tyrannical".
- Stating that the vaccination could be forced.
- That the vaccination is going to be used to cull the population.
- That the vaccination includes a microchip which will be used to track individuals.

Taking the last example, the plan for Bill Gates to implant microchips is one of the most widely shared claims in recent weeks, according to BBC News. A YouGov poll of 1,640 people conducted in May found that 28% believed this was true (Sanders, 2020). The figure was higher amongst Republicans at 44%, suggesting a political influence. The influence of political authorities/personalities upon publicly held beliefs about the COVID-19 vaccine has been raised as a cause for concern. As an example, recently Emerald Robinson, a White House correspondent for Newsmax

(a pro-Trump website), Tweeted to her 264,000 followers that the Pfizer/BioNTech vaccine "tampers with your DNA" and that people should "beware".

**Key sources of misinformation**
The internet is the most common source for sharing and obtaining both information and misinformation, primarily due to reasons of speed, convenience, and global reach. It is unsurprising that social media channels are also a key outlet for misinformation.

A recent analysis of online narratives about vaccines reported that Instagram and unverified Facebook pages were the two key platforms for driving debates – accounting for 71% of 13 million interactions and 84% of 'interactions generated by conspiracy theory-related content' (Smith et al., 2020:10). Those typically responsible for posting misinformation are individuals, or groups of individuals, with a common interest (e.g. a common goal or a common adversary). In Poland a highly organised local anti-vaccine movement caused significant reductions in confidence in the safety of vaccines. When asked to what extent participants agreed that vaccines are safe, 64% indicated strongly agreeing in November 2018 and in December 2019 this had decreased to 53% (de Figueiredo et al., 2020).

**Factors that enable the spread and uptake of misinformation**
There are many factors that lay a fertile ground for the spread of misinformation and anti-vaccine narratives, one of which being 'data deficits' – referring to instances where there is a high demand for information on a given subject (e.g. COVID-19 vaccine) but little reliable and credible information available. If reliable and accurate information isn't then provided these knowledge gaps can be filled by inaccurate and misinformed opinions voiced by laypeople and/or exploited by parties with alternative interests (e.g. anti-vaccinists).

A recent review into COVID-19 vaccine deployment (The Royal Society and The British Academy, 2020) reported that 'COVID-19 vaccine deployment faces an infodemic with misinformation often filling the knowledge void' (2020:1). The report highlighted five characteristics of this infodemic:

1. Distrust of science and selective use of expert authority;
2. Distrust in pharmaceutical companies and government;
3. Straightforward explanations;
4. Use of emotion; and
5. Echo chambers.

**Countering misinformation**
The degree to which misinformation is assimilated by the public depends on several contextual factors, one of which being trust in government and associated institutions. When levels of trust are low and people cannot access reliable information on vaccines, 'misinformation narratives rush in to fill the vacuum' (Smith et al., 2020:1). Active steps should be taken to identify, counter, and prevent the spread of misinformation regarding the COVID-19 vaccination 'before dangerous myths take root in the public psyche' (De Roo et al., 2020:2458). Where misinformation is identified, correcting any false statements/claims and providing accurate information, 'either through individual comment or link to evidence-based information – may be effective in changing health beliefs' (De Roo et al., 2020:2459).

**Summary**

For people to make informed choices regarding the vaccination they need to have an adequate level of knowledge of both the virus and the vaccine. Access to information is therefore key, as is the ability to be able to discern between what information is reliable and accurate and what isn't. The challenge with the internet as a source of information is that there may be little that can be done to prevent misinformation from being posted, particularly where there is a lack of responsibility and accountability for social media platforms to fact-check. Efforts are therefore focused on limiting exposure levels and preventing the public's acceptance of misinformation.

The research demonstrates that relatively minor pieces of misinformation can contribute to the shifting of larger narrative and attitudes. Local authorities must develop a pro-active and reactive strategy to mitigate any risks to public trust in order to reduce vaccine hesitancy. This will require a more dynamic response than might ordinarily be taken in other contexts.

## BEHAVIOURAL ANALYSIS

Identifying and understanding the key influences upon whether an individual receives the COVID-19 vaccine is an integral element of the design and delivery of effective public health campaigns. The Behaviour Change Wheel provides a framework by which to analyse the extent to which three key influences upon behaviour are present regarding individual vaccination against COVID-19: capability, opportunity, and motivation (Michie et al., 2011).

### COM-B analysis

**Capability influences**
Residents are more likely to have the COVID-19 vaccination if they have the psychological and physical capability to do so. For example:

- They understand the personal risks of contracting COVID-19.
- They understand the potential severity of the implications of COVID-19 upon their health.
- They understand the risks they pose to others if they contract COVID-19.
- They understand why it is important to be vaccinated (for themselves, others, and their community).
- They know that the vaccine is safe and effective.
- They know how to get the vaccine (where to go, how to get there, when to go).
- They have any skills required to access the vaccine (e.g. using an online booking system to book a test).
- They know that two doses are required to achieve immunity.
- They remember to receive both the first and second dose.

**Opportunity influences**
Residents are more likely to have the COVID-19 vaccination if the physical and social environment around them supports them to do so. For example:

- They are aware that most people in their community are having the vaccination.
- They see examples of other people in their community having the vaccination, particularly key members.
- Receiving the vaccination is seen as 'the right thing to do' by the majority of people in their peer group, and they are aware of this.
- They have the time to go and be vaccinated.
- Vaccination sites are easily accessible (location and operating hours).
- There is adequate social and practical support for people to attend a vaccination appointment. For example, organisations support their staff by releasing them to take up the vaccine.
- Relevant social and cultural narratives within the individual's community are supportive of vaccination.

**Motivational influences**
People are more likely to have the COVID-19 vaccine if doing so is consistent with their identity, values, their beliefs about their ability to be vaccinated, their understanding and belief in the benefits of doing so and the consequences of not

Hertfordshire

doing so, and the emotional and habitual processes that underpin being vaccinated (motivational influences). For example:

- They see contracting COVID-19 as a severe risk to their health.
- They have an intention to be vaccinated and believe that doing so is within their control.
- They feel that being vaccinated is important for the themselves, family and friends, and/or the community.
- They believe that the vaccination will protect them from contracting the virus and that they will not suffer harm from having it.
- People with whom they share a common identity, are also choosing to be vaccinated.
- Receiving a vaccination is consistent with their religious beliefs.
- They are able to make specific plans to receive the vaccine.
- They do not experience overwhelming feelings of fear, anxiety, or worry about having the vaccine.

**Summary**
The COM-B framework provides a robust and systematic way of conducting an analysis of vaccination intention/behaviour. The following section applies the COM-B insights to the three core influences upon vaccine hesitancy as defined by WHO (2014): complacency, confidence, and convenience, with a series of recommendations on how to address identified barriers to vaccine uptake. Examples of how each recommendation might be pragmatically applied within local authorities are provided.

# ENGAGEMENT PRINCIPLES

As discussed, the likelihood that someone will get the COVID-19 vaccine is increased if they have the capability, opportunity, and motivation (Michie et al., 2011) to do so. Influencing these factors are perceptions of risk and severity of COVID-19 (complacency), perceptions of the safety and effectiveness of the vaccine (confidence), and how easy it is to get the vaccine (convenience). Whilst there are a range of possible ways to intervene where barriers to vaccination have been identified, the focus here is the use of communications in doing so, both directly and indirectly.

Public health communications 'play a key role in informing the public on how to manage risks and prevent transmission during public health pandemics, including vaccination acceptance and uptake' (Thorneloe et al., 2020:4). To reduce vaccine hesitancy, effective and targeted communications, informed by primary and secondary research, are essential: both for the general public and for groups where uptake is likely to be lower. At the core of the development of any COVID-19 vaccine comms plan is the principle of engagement.

*"In this new phase of the COVID-19 response, successful vaccine roll-out will only be achieved by ensuring effective community engagement, building local vaccine acceptability and confidence, and overcoming cultural, socioeconomic, and political barriers that lead to mistrust and hinder uptake of vaccines."*
Burgess et al., 2020:1

## Engagement

It is important to recognise that residents are not a homogeneous group and the degree to which the factors of complacency, confidence, and convenience will influence vaccine hesitancy will vary. Research has shown, however, that there are sub-groups where members share common barriers – for example, those who identify as BAME. Applying behavioural science to communications in order to increase impact requires insight – an understanding of the influences upon the given behaviour, ideally obtained through consultation with the target group.

A useful way to capture the different barriers experienced and to illustrate this to stakeholders is through segmentation – 'the identification of groups who share similar beliefs, attitudes, and behavioural patterns...beyond demographic, epidemiological, and service uptake-based targeting' (French et al., 2020:5986).

Alongside communications to reduce vaccine hesitancy in the general population, segmentation enables a more strategic and tailored approach to particular sub-groups that addresses the specific barriers to uptake, identified for that particular sub-group.

## Audience segmentation

Segmentation is a tool commonly used by local authorities to understand key information about a given target group. In relation to the current pandemic standard segmentation processes, while yielding some useful information, will not provide the level of detail needed to address the concerns of specific populations. In order to understand the concerns, fears, and challenges faced by specific groups in relation to the vaccine, meaningful engagement is required. Working

with the community to understand their perceptions and beliefs, and co-creating communications that address these specific issues, offers the real chance of increasing uptake of the vaccine.

Engaging with communities should be an integral part of a robust and systematic methodology for the development of any COVID-19 vaccine related comms. It will provide the insights needed to ensure comms are effective, both in terms of their content and their acceptability by the target audience and can also mitigate several other risks associated with vaccine hesitancy, for example distrust in the government.

Engagement also avoids taking an approach that is focused on the one-way provision of information, recognising the need for local authorities to "generate an open dialogue that addresses misinformation and does not dismiss people's real vaccine concerns and hesitancy" (Melinda Mills, Oxford University Professor, quoted in Routers 2020). Furthermore, it is essential to create proactive messaging that is both compelling and tailored to different audiences and to do so effectively requires an understanding of the influences that are most salient to different groups.

Local authorities should conduct a stakeholder analysis to identify any groups where uptake of the COVID-19 vaccination is likely to be lower than the general public.

## Engagement - guiding principles

The research reviewed within this paper has informed the development of a set of guiding principles for local authority teams.

**Engage** to **understand** → **Engage** to **empower** → **Engage** to **evaluate**

It is important to note that these principles are not followed in a linear fashion, with a clear start and finish. Rather, they emphasise the dynamic and cyclical nature of authentic engagement with those groups where vaccine uptake is anticipated to be lower than average.

Applying these principles supports the development and delivery of communications that:

- Are informed by an accurate understanding of the barriers to vaccination.
- Acknowledge and validate the concerns and apprehensions that may exist.
- Address these concerns and reduce vaccine hesitancy.
- Are well received by the target group.
- Adapt to changes in community sentiments and barriers to vaccination.

The open and transparent nature of these principles is also likely to build trust in the local authority. Continual engagement also acknowledges that vaccination intentions/behaviours are likely to fluctuate throughout the course of a pandemic (Ghio et al., 2020) and provides local authorities with opportunities to identify changes and respond accordingly.

### Engage to **understand**

The research discussed within this paper has highlighted several barriers to vaccine uptake, whilst also highlighting that these barriers will exist to a greater or lesser extent for different people. These factors do not exist in isolation, rather they interact – both at an individual level and at a community/group level. If we are to effectively address low levels of uptake in identified groups, we need to understand to what extent the various barriers are influencing decisions and what other barriers might exist. Engaging with local stakeholders to gain subgroup specific insights into their needs, values, and beliefs can inform the development of tailored narratives that emphasise the associated benefits of having the COVID-19 vaccination.

- Engagement with identified groups should be participatory, iterative, and respectful of group sensitivities. Engagement is focused on listening to and understanding perspectives, beliefs, and concerns in regard to vaccination.
- Establish the current levels of understanding regarding COVID-19 and the vaccine, and identify any gaps in information.
- Any fears, concerns, issues, and apprehensions identified during engagement should be acknowledged and not invalidated.
- Use activities such as short questions, surveys, focus groups, and interviews to gain insights.
- Utilise pre-existing links to community groups to access specific communities e.g. faith groups.
- Find out where people in the group get their information? What are the sources of information that they trust.

### Engage to **empower**

Once an understanding of the various influences upon vaccination intentions for a particular group have been identified, involving group members in creating solutions to address any barriers is empowering in two ways. In times of uncertainty and where trust may be low, people need to feel as informed as they can and that they trust those providing the information. Working in collaboration with group members to create solutions to identified barriers, empowers members of that group and can also increase public trust (Lazarus et al., 2020).

- Collaborate with local partners and representatives from the various groups to co-produce comms that address any barriers to uptake. This ensures that any materials and resources are sensitive to the specific needs, cultures, and beliefs of the groups, and the language used is appropriate (particularly where translation is required).
- Engage with key messengers and informal opinion leaders to develop a range of messages that can be circulated by key influencers.
- Use trusted sources of information e.g. local radio stations or social media groups to circulate your co-created messages.

### Engage to **evaluate**

It is important to assess if the materials and resources that have been developed are having the impact they were intended to, that is – reducing vaccine hesitancy. The influences upon individual's intention to have the vaccine have been shown to fluctuate over time, and as such it is possible that the strategies implemented will need to reflect these changes.

- Consider and agree ways in which you will assess the impact of any comms upon vaccine uptake.
- Utilise the opportunity to test any new communications, so that any amends can be made prior to wider dissemination.
- Maintain open communication with group members, particularly the trusted messengers, to enable a feedback loop where any issues around acceptability and uptake can be identified.
- Provide opportunities for group members to meet representatives from the local authority, online and/or face-to-face (depending upon social distancing restrictions). This will help keep members engaged, as their input is valued, and allow local authority colleagues to identify any changes in complacency, confidence, and convenience.
- Gather new data as it emerges, so that an understanding of what works happens in real time and this insight can inform new policies and services and ensure they align with local needs.

Reducing vaccine hesitancy

Hertfordshire

# RECOMMENDATIONS

The following evidence-informed recommendations to address vaccine hesitancy are based upon the research discussed within this paper, including the behavioural analysis (capability, opportunity, and motivation) outlined in the previous section. Recommendations are applied to the influencing factors of complacency, confidence and convenience, with a specific focus upon communication and engagement.

## Complacency

**Increase perceptions of the risk of contracting COVID-19**
If people perceive there is a personal risk of contracting COVID-19, they are more likely to be vaccinated to protect themselves.

**Recommendation:** Increase knowledge of the risks of contracting COVID-19 for the general population and specific groups where uptake is likely to be lower.

**Example:** Use audience segmentation to identify key groups and their specific risks. Work with communities to understand any gaps in knowledge and develop messages that speak directly to the target population. For example, for the general population "Even if you are fit and healthy, you are still at risk of getting COVID-19" or for a specific group such as "Members of the BAME community are at a greater risk of contracting COVID-19".

**Increase perceptions of the severity of COVID-19**
If people perceive that there are potentially significant implications to their health from contracting COVID-19, they are more likely to be vaccinated to protect themselves.

**Recommendation:** Increase knowledge of the severity of COVID-19 for the general population and specific groups where uptake is likely to be lower. Focus on risk-reducing messages over health benefit messages.

**Example:** Develop messaging that includes some of the health consequences of contracting COVID-19 and that being vaccinated reduces their risk. For the general population, "Getting COVID-19 can affect your heart health, breathing and cause long term fatigue; protect yourself, get vaccinated", for people with long term conditions "People with diabetes are at increased risk of developing complications from Coronavirus", or for young people "Young people are twice as likely to suffer from long-COVID". Accompany with calls-to-action such as "Get vaccinated and reduce your risk".

**Increase understanding of the importance of the vaccination**
If people perceive that the vaccine is important for ending the pandemic and returning to a sense of 'normality', they are more likely to be vaccinated. It is important to cover a range of motivations as different things will motivate different people.

**Recommendation:** Emphasise the importance of individual vaccination in achieving herd immunity for protecting the most vulnerable, protecting the NHS, strengthening the economy, and relaxing current social distancing measures.

**Example:** Consider messaging such as: "Get vaccinated to show your loved ones you care" / "Get vaccinated and let's get back to normal" / "Get vaccinated and protect the NHS" / "Play your part and get vaccinated!" / "Play your part in protecting your community and get vaccinated!".

**Recommendation:** Build a social norm within the community that vaccination uptake is widespread, and the majority of people are doing their part for the benefit of the community/society.

**Example:** Focus on the positives. Consider presenting the number of people being vaccinated within specific groups (age/community) in terms of percentage changes (e.g. percentage increases from previous week/month). Present information in a visual form, including statistics in a graph, to illustrate increased uptake, and support with case studies of community members who have been vaccinated to reinforce this. Making people aware of low uptake can reinforce the belief that not many people are getting vaccinated, thus decreasing the likelihood of people coming forward to receive the vaccine – so this should be avoided where uptake is low. Use national data to communicate intentions, for example "XX% of people intend to have the vaccination".

## Confidence

**Increase trust and confidence in the safety and effectiveness of the COVID-19 vaccine**
If people believe that the vaccine is safe and effective, then they are more likely to be vaccinated. It is important to address these concerns throughout the roll out of the COVID-19 vaccination as concerns may change over time.

**Recommendation:** Highlight that the vaccine has gone through the same rigorous development and testing process as other vaccines.

**Example:** Provide details of the COVID-19 development and testing process, highlighting the way in which the same rigor has been applied, as had been for previous vaccinations. Present the information in an accessible form, such as an infographic, using formal language (e.g. COVID-19 *vaccine*, rather than COVID-19 j*ab*), whilst avoiding complex technical terms.

**Recommendation:** Acknowledge the uncertainties and fears held by the general public and by specific groups - do not dismiss or ignore them. Provide information to address these concerns and make it easy to understand.

**Example:** Identify any broadly held uncertainties and address these within population wide communications. For groups where uptake is likely to be lower, engage with that community to understand and address specific safety and effectiveness concerns by co-producing messaging. Use trusted channels and messengers within the different communities to promote communications.

**Recommendation:** Ensure transparency regarding vaccine effectiveness and potential side effects, taking care to avoid drawing attention to side effects that are classified as rare.

**Example:** Acknowledge that some people may experience side effects and build links to safety and effectiveness information in messaging promoting the vaccine. This could be by guiding people to a list of FAQs on a trusted website such as the local authority or the NHS. Be clear about what we do and do not know about the vaccine. Where there are gaps in current understanding, be honest about this i.e. the length of time the vaccine will protect people for.

**Increase trust in the local authority and medical/scientific institutions**
The more trust an individual has in their local authority, and the more trust they have in the medical/scientific institutions who have been involved in the development and deployment of the vaccine, the more likely they are to be vaccinated. A lack of trust is an even greater barrier to vaccination where concerns around the safety and effectiveness of the vaccine are also held.

**Recommendation:** Local authorities can increase public trust in them by co-creating open and transparent comms that acknowledge their concerns and don't attempt to invalidate/ignore them.

**Example:** Engagement is key to building trust and is a principle that runs throughout the development of any COVID-19 vaccine communications. Start a dialogue with established networks and community groups, to understand the barriers to vaccination uptake and local trusted sources of information. Engage with a range of people across the community, including those who hold differing views regarding the COVID-19 vaccination. Collaborate in producing materials and resources to ensure that any information provided is relevant and culturally sensitive.

**Recommendation:** Engage with thought leaders and respected voices within communities to build trust and support.

**Example:** Utilise the influence of thought leaders and respected voices to promote messaging through sources of information trusted by the community. For example, interviews on a local radio station or posts on a community Facebook group. Avoid excluding people who are not digitally connected by providing information through other sources e.g. in the local paper or through leaflet drops.

**Recommendation:** Link being vaccinated to the personal (e.g. people's values such as being a caring or responsible member of society) and/or the social identities (e.g. linked to the behaviours expected of people according to their roles as members of professional, faith or community groups) of the target group.

**Example:** Provide case studies and testimonials of people who are being vaccinated (locally and nationally), particularly with examples of thought leaders within the target community (e.g. faith leaders).

**Recommendation:** Take all reasonable steps to ensure that people being vaccinated have a positive experience, particularly for their first dose as this will have an influence on the likelihood that they will return for their second dose. People talk to others about their experience, so providing a positive experience may increase the likelihood of their friends/family having theirs. It is important that proper safety measures are followed at vaccination sites to alleviate any fears held by visitors.

**Example:** Discuss and establish agreed ways of working amongst staff at vaccination sites, including how visitors will be greeted, how different factors (e.g. religious beliefs) will be addressed sensitively, and how individuals who express concerns over the safety/effectiveness of the vaccine can be reassured. Staff should be seen to be visibly following safety measures such as maintaining physical distancing (themselves and patients), wearing face masks, and facilitating hand hygiene.

## Convenience

**Increase convenience of being vaccinated**
The easier it is for people to be vaccinated, the more likely they are to do so. Practical and logistical aspects will influence the degree of uptake (e.g. time, place, cost).

**Recommendation:** Ensure that vaccine invitations provide clear and specific information, so people know where to go, when to go, and how to get there.

**Example:** Work with partners to ensure that any correspondence includes a clear call to action, provides relevant information on the venue (including a map), what to bring to the appointment (e.g. face coverings) and links to directions and public transport information to reduce barriers to attendance.

**Recommendation:** Provide support with planning to increase the likelihood of people attending their second vaccination appointment.

**Example:** Planning increases the likelihood that someone will attend the appointment for their second dose of the vaccine. Examples of support could include: booking the second appointment at the same time as the first appointment; providing an appointment card and asking them to note the date and time of the second dose; entering the appointment date/time into their diary. Sending reminders via email/text/post a couple of days before the second appointment, and where possible on the morning of the appointment, increases likelihood of attendance. Emphasise on the appointment card and in signage that the second dose is essential for the most effective protection.

**Recommendation:** Ensure that vaccination sites are located in areas which are accessible by various modes of transportation and inform the public of this in communications such as invitation letters.

**Example:** For those who are taking private transport, provide clear directions on how to reach the venue and details of parking arrangements. For people travelling by public transport, signpost to personal travelling plans/public transport sites so that they can plan their journey to vaccination sites. Consider deploying stewards at entry/exit points to help usher people and answer queries.

**Recommendation:** Where possible use vaccination locations that are already part of people's routines and are therefore familiar to them and convenient to visit.

**Example:** Ensure that the vaccine is accessible at multiple locations (e.g. GP surgeries, pharmacies, schools, offices, and community halls) and offer a variety of convenient opening times such as lunchtime and after work. Avoid long commuting times to vaccination centres and build on existing infrastructures which have proven to work already e.g. childhood or emergency vaccination programmes. Create outreach services for hard-to-reach groups e.g. care home residents.

**Recommendation:** Minimise barriers which may act as deterrents for receiving the vaccination e.g. needing to take unpaid time off work. Ensure that available support and resources are communicated clearly to the public and in a timely manner.

**Example:** Employers should be encouraged to reassure staff that they will be compensated for any time they need to take out of work in order to receive the vaccination and that there will be no additional time or financial implications for them as a result. Consideration should be given to support staff who may need to take time off work if they experience side effects so that no penalties are incurred, as this will reduce the likelihood of employees attending their second vaccination appointment.

Reducing vaccine hesitancy

Hertfordshire

## CONCLUSION

The recent release of the COVID-19 vaccine marks a key milestone towards ending the pandemic. This is a major achievement but it will only be effective in its aim of protecting the whole population if sufficient numbers of people are vaccinated.

Public acceptance and uptake of vaccinations has fallen in recent years, leading to the classification of 'vaccine hesitancy' as one of the top ten threats to global health by the World Health Organization (WHO). Defined as *'a behaviour, influenced by a number of factors including issues of confidence (level of trust in vaccine or provider), complacency (do not perceive a need for a vaccine, do not value the vaccine), and convenience (access)'* (WHO, 2014).

Vaccine hesitancy must be addressed at a local level as it requires an understanding of the knowledge, beliefs, and motivations held by the general population <u>and</u> specific groups. One of the strengths of local authorities are the relationships with local communities. These relationships provide an opportunity for direct engagement in order to understand the degree to which complacency, confidence, and convenience are influencing intentions. Importantly, they also enable the coproduction of materials and resources that are relevant and acceptable to the target population, and are therefore more likely to increase vaccine uptake. Engagement enables an assessment of the impact of materials and resources, and a more dynamic response to any fluctuations in vaccination behaviours.

Successful vaccine roll-out will only be achieved if we understand, acknowledge, and address the barriers to vaccination for all members of our community. This is where the work of local authorities and other public sector organisations can make a significant difference.

## RESOURCES

The following resources provide useful information, guidance and tools/models to assist the development of a COVID-19 vaccination programme.

## Communication and engagement

ECOM: Effective Communication in Outbreak Management.
http://ecomeu.info/

Social Marketing Guide for Public Health Programme Managers and Practitioners (European Centre for Disease Control and Prevention).
https://www.ecdc.europa.eu/en/publications-data/social-marketing-guide-public-health-programme-managers-and-practitioners

Transparent communication in Epidemics: Learning lessons from experience, delivering effective messages, providing evidence.
https://www.tellmeproject.eu/

COVID-19 Communications: Community engagement and local democracy
https://local.gov.uk/our-support/guidance-and-resources/comms-hub-communications-support/covid-19-communications/covid-0

COVID-19 Communications: Insight
https://local.gov.uk/our-support/guidance-and-resources/comms-hub-communications-support/covid-19-recovery-0

COVID-19 Communications: Channels
https://local.gov.uk/our-support/guidance-and-resources/comms-hub-communications-support/covid-19-communications/covid-2

## Information

COVID-19 Information: Vaccinations
https://www.local.gov.uk/our-support/coronavirus-information-councils/covid-19-service-information/covid-19-vaccinations

COVID-19 Frequently Asked Questions (US Food and Drug Administration (FDA))
https://www.fda.gov/emergency-preparedness-and-response/coronavirus-disease-2019-covid-19/covid-19-frequently-asked-questions

Frequently Asked Questions about Covid-19 vaccination (Centers for Disease Control and Prevention (CDC))
https://www.cdc.gov/coronavirus/2019-ncov/vaccines/faq.html

Google COVID-19 warnings (includes general information)
https://www.google.com/covid19/

Q&A Detail – Coronavirus (World Health Organization)
https://www.who.int/news-room/q-a-detail/coronavirus-disease-(covid-19)-vaccines?adgroupsurvey={adgroupsurvey}&gclid=EAIaIQobChMIpoT7p-es7QIVWdTtCh2zdgDzEAAYASAAEgLG3PD_BwE

## Misinformation

The COVID-19 Poynter Resources from the International Fact-Checking Network (IFCN) coordinated by the United Nations
https://www.poynter.org/coronavirusfactsalliance/

World Health Organization (WHO) MythBusters
https://www.who.int/emergencies/diseases/novel-coronavirus-2019/advice-for-public/myth-busters

The province of Québec created a public online fact-checking services called the Détecteur de Rumeurs (Rumour Detector)
http://www.scientifique-en-chef.gouv.qc.ca/en/dossiers/chercheurs-et-sphere-publique/detecteur-de-rumeurs/

World Health Organization (WHO) site with links to report misinformation for the largest media sites
https://www.who.int/campaigns/connecting-the-world-to-combat-coronavirus/how-to-report-misinformation-online

## Vaccination programmes

ECDC guides and toolkits for healthcare workers, immunization program managers, and public health experts, to support their efforts in addressing vaccine hesitancy.
https://www.ecdc.europa.eu/sites/portal/files/documents/Catalogue-interventions-vaccine-hesitancy.pdf

Human Center Design for Health. A comprehensive set of tools developed by UNICEF to apply the human-centered design approach to challenges facing health services, with a particular emphasis on demand for immunization and health services.
https://www.hcd4health.org/resources

Improving vaccination demand and addressing hesitancy (World Health Organization)
http://awareness.who.int/immunization/programmes_systems/vaccine_hesitancy/en/

Social Science Research for Vaccine Deployment in Epidemic Outbreaks. A practical guide to using social science research and insights to better understand social, behavioral, cultural, community and political dynamics as part of efforts to introduce vaccines in epidemic outbreak settings.
https://www.socialscienceinaction.org/resources/social-science-research-for-vaccine-deployment-in-epidemic-outbreaks/

Tailoring Immunization Programmes (TIP) An introductory overview (World Health Organization).
https://www.who.int/immunization/programmes_systems/Global_TIP_overview_July2018.pdf?ua=1

The Guide to Tailoring Immunization Programmes (TIP) (World Health Organization).
https://www.euro.who.int/__data/assets/pdf_file/0003/187347/The-Guide-to-Tailoring-Immunization-Programmes-TIP.pdf

Hertfordshire

# REFERENCES

AP-NORC Centre (2020). *Expectations for a COVID-19 Vaccine.* Accessed on 17.11.2020 at
https://apnorc.org/projects/expectations-for-a-covid-19-vaccine/

BBC News. Vaccine rumours debunked: Microchips, 'altered DNA' and more. Accessed on 17.11.2020 at https://www.bbc.co.uk/news/54893437

Bish et al. (2011). Factors associated with uptake of vaccination against pandemic influenza: a systematic review. *Vaccine*, 29(38), 6472 - 6484. https://doi.org/10.1016/j.vaccine.2011.06.107

Bode, L. & Vraga, E.K. (2018). See something, say something: correction of global health misinformation on social media. Health Commun., 33(9), 1131 – 1140. https://doi.org/10.1080/10410236.2017.1331312

Brien, S., Kwong, J. C., & Buckeridge, D. L. (2012). The determinants of 2009 pandemic A/H1N1 influenza vaccination: a systematic review. *Vaccine, 30*(7), 1255-1264. Accessed on 17.11.2020 at https://doi.org/10.1016/j.vaccine.2011.12.089

British Medical Association (2020). *Action to improve immunisation coverage rates across the UK.* Accessed on 17.11.2020 at https://www.bma.org.uk/media/2884/action-to-improve-immunisation-coverage-rates-across-the-uk-report.pdf

Burgess, R. A., Osborne, R. H., Yongabi, K. A., Greenhalgh, T., Gurdasani, D., Kang, G., ... & Reicher, S. (2020). The COVID-19 vaccines rush: participatory community engagement matters more than ever. *The Lancet.* Accessed on 16.12.2020 at https://doi.org/10.1016/S0140-6736(20)32642-8

Centers for Disease Control and Prevention. (2010). Final estimates for 2009e10 seasonal influenza and influenza A (H1N1) 2009 monovalent vaccination coverage e United States, August 2009 through May, 2010. Secondary final estimates for 2009e10 seasonal Influenza and influenza A (H1N1) 2009 monovalent vaccination coverage e United States, August 2009 through May, 2010, 2011. Accessed on 17.11.2020 at https://www.cdc.gov/flu/fluvaxview/coverage_0910estimates.htm

COCONEL Group. (2020). A future vaccination campaign against COVID-19 at risk of vaccine hesitancy and politicisation. *The Lancet. Infectious diseases, 20*(7), 769. Accessed on 17.11.2020 at https://www.thelancet.com/action/showPdf?pii=S1473-3099%2820%2930426-6

de Figueiredo, A., Simas, C., Karafillakis, E., Paterson, P., & Larson, H. J. (2020). Mapping global trends in vaccine confidence and investigating barriers to vaccine uptake: a large-scale retrospective temporal modelling study. *The Lancet, 396*(10255), 898-908.

DeRoo, S. S., Pudalov, N. J., & Fu, L. Y. (2020). Planning for a COVID-19 Vaccination Program. *JAMA.* Accessed on 17.11.2020 at https://jamanetwork.com/journals/jama/fullarticle/10.1001/jama.2020.8711

Dodd, R. H., Cvejic, E., Bonner, C., Pickles, K., & McCaffery, K. J. (2020). Willingness to vaccinate against COVID-19 in Australia. *The Lancet. Infectious Diseases.*

Reducing vaccine hesitancy

Hertfordshire

Dunning, H. (2020). *Largest global vaccine confidence survey reveals hesitancy hotspots*. Imperial College London. Accessed on 17.11.2020 at https://www.imperial.ac.uk/news/203893/largest-global-vaccine-confidence-survey-reveals/

Edmonds, B. M. T., Coleman, J., Armstrong, K., & Shea, J. A. (2011). Risk perceptions, worry, or distrust: What drives pregnant women's decisions to accept the H1N1 vaccine?. *Maternal and child health journal, 15*(8), 1203-1209. Accessed on 17.11.2020 at https://doi.org/10.1007/s10995-010-0693-5

Effective Communication in Outbreak Management (ECOM). Accessed on 17.11.2020 at http://www.ecomeu.info.

European Centre for Disease Prevention and Control. (2012). Narcolepsy in association with pandemic influenza vaccination (a multi-country European epidemiological investigation). *Stockholm.* Accessed on 17.11.2020 at https://www.ecdc.europa.eu/en/publications-data/narcolepsy-association-pandemic-influenza-vaccination-multi-country-european

Fabry, P., Gagneur, A., & Pasquier, J. C. (2011). Determinants of A (H1N1) vaccination: cross-sectional study in a population of pregnant women in Quebec. *Vaccine, 29*(9), 1824-1829. Accessed on 17.11.2020 at https://doi.org/10.1016/j.vaccine.2010.12.109

Fournet, N., Mollema, L., Ruijs, W. L., Harmsen, I. A., Keck, F., Durand, J. Y., ... & Smit, E. G. (2018). Under-vaccinated groups in Europe and their beliefs, attitudes and reasons for non-vaccination; two systematic reviews. *BMC public health, 18*(1), 196. Accessed on 17.11.2020 at https://bmcpublichealth.biomedcentral.com/articles/10.1186/s12889-018-5103-8

French et al. (2019). Compilation of Social Marketing Evidence of Effectiveness. Key references 2019 briefing Paper. International Social Marketing Association (ISMA) and affiliated National and Regional Associations 2019. Accessed on 17.11.2020 at https://www.dropbox.com/s/u3lnma09bajaxvq/Key%20Social%20Marketing%20Evidence%20of%20Effectiveness%20citations%20Nov%202018..pdf?dl=0

French, J., Deshpande, S., Evans, W., & Obregon, R. (2020). Key guidelines in developing a pre-emptive COVID-19 vaccination uptake promotion strategy. *International Journal of Environmental Research and Public Health, 17*(16), 5893.

Ghio, D., Lawes-Wickwar, S., Tang, M. Y., Epton, T., Howlett, N., Jenkinson, E., ... & Sutherland, L. (2020). What influences people's responses to public health messages for managing risks and preventing disease during public health crises? A rapid review of the evidence and recommendations. Accessed on 17.11.2020 at https://doi.org/10.31234/osf.io/nz7tr

Hidiroglu, S., Ay, P., Topuzoglu, A., Kalafat, C., & Karavus, M. (2010). Resistance to vaccination: The attitudes and practices of primary healthcare workers confronting the H1N1 pandemic. *Vaccine, 28*(51), 8120-8124. Accessed on 17.11.2020 at http://localhost/var/www/apps/conversion/tmp/scratch_5/dx.doi.org/10.1016/j.vaccine.2010.09.104

Hughes, D. (2020). *Increasing vaccination uptake is a priority that must not be overlooked. Pfizer*. Accessed on 17.11.2020 at https://www.pfizer.co.uk/increasing-vaccination-uptake-priority-must-not-be-overlooked

Jung, M., Lin, L., & Viswanath, K. (2013). Associations between health communication behaviors, neighborhood social capital, vaccine knowledge, and parents' H1N1 vaccination of their children. *Vaccine, 31*(42), 4860-4866. Accessed on 17.11.2020 at
*https://doi.org/10.1016/j.vaccine.2013.07.068*

Kumar, D., Chandra, R., Mathur, M., Samdariya, S., & Kapoor, N. (2016). Vaccine hesitancy: understanding better to address better. *Israel journal of health policy research, 5*(1), 2. Accessed on 17.11.2020 at https://ijhpr.biomedcentral.com/articles/10.1186/s13584-016-0062-y

Larson, H. J., Jarrett, C., Eckersberger, E., Smith, D. M., & Paterson, P. (2014). Understanding vaccine hesitancy around vaccines and vaccination from a global perspective: a systematic review of published literature, 2007–2012. *Vaccine, 32*(19), 2150-2159. Access on 17.11.2020 at
https://doi.org/10.1016/j.vaccine.2014.01.081

Lazarus, J. V., Ratzan, S. C., Palayew, A., Gostin, L. O., Larson, H. J., Rabin, K., ... & El-Mohandes, A. (2020). A global survey of potential acceptance of a COVID-19 vaccine. *Nature medicine*, 1-4. Accessed on 17.11.2020 at https://doi.org/10.1038/s41591-020-1124-9

Maurer, J., Uscher-Pines, L., & Harris, K. M. (2010). Perceived seriousness of seasonal and A (H1N1) influenzas, attitudes toward vaccination, and vaccine uptake among US adults: does the source of information matter?. *Preventive medicine*, 51(2), 185-187. Accessed on 17.11.2020 at
https://doi.org/10.1016/j.ypmed.2010.05.008

Meleo-Erwin, Z., Basch, C., MacLean, S. A., Scheibner, C., & Cadorett, V. (2017). "To each his own": Discussions of vaccine decision-making in top parenting blogs. *Human vaccines & immunotherapeutics, 13*(8), 1895-1901. Accessed on 17.11.2020 at doi
https://doi.org/10.1080/21645515.2017.1321182

Mello, M. M., Silverman, R. D., & Omer, S. B. (2020). Ensuring uptake of vaccines against SARS-CoV-2. *New England Journal of Medicine, 383*(14), 1296-1299.

Michie, S. et al. (2011). The behaviour change wheel: a new method for characterising and designing behaviour change interventions. *Implementation science, 6*(1), 42. Accessed on 17.11.2020 at
*http://www.implementationscience.com/content/6/1/42*

Myers, L. B., & Goodwin, R. (2011). Determinants of adults' intention to vaccinate against pandemic swine flu. *BMC Public Health*, 11(1), 15. Accessed on 17.11.2020 at https://doi.org/10.1186/1471-2458-11-15

Poland, G. A., & Jacobson, R. M. (2011). The age-old struggle against the antivaccinationists. *N Engl J Med, 364*(2), 97-9. Accessed on 17.11.2020 at https://doi.org/10.1056/nejmp1010594

Royal Society for Pubic Health (2020). Accessed on 17.11.2020 at https://www.rsph.org.uk/about-us/news/one-in-five-public-unsure-about-getting-coronavirus-vaccine-if-available.html

Sanders, L. (2020). The Difference between What Republicans and Democrats Believe to be True about COVID-19. *YouGov. Available online at:* https://today.yougov.com/topics/politics/articles-reports/2020/05/26/republicans-democrats-misinformation (accessed May 26, 2020).

Schwarzinger, M., Flicoteaux, R., Cortarenoda, S., Obadia, Y., & Moatti, J. P. (2010). Low acceptability of A/H1N1 pandemic vaccination in French adult population: did public health policy fuel public dissonance?. *PLoS One, 5*(4), e10199. Accessed on 17.11.2020 at
https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0010199

Seale, H., Heywood, A. E., McLaws, M. L., Ward, K. F., Lowbridge, C. P., Van, D., & MacIntyre, C. R. (2010). Why do I need it? I am not at risk! Public perceptions towards the pandemic (H1N1) 2009 vaccine. *BMC infectious diseases, 10*(1), 99. Accessed on 17.11.2020 at https://doi.org/10.1186/1471-2334-10-99

Sheeran, P. (2002). Intention—behavior relations: a conceptual and empirical review. *European review of social psychology, 12*(1), 1-36. Accessed on 17.11.2020 at
https://doi.org/10.1080/14792772143000003

Sherman, S. M., Smith, L. E., Sim, J., Amlôt, R., Cutts, M., Dasch, H., ... & Sevdalis, N. (2020). COVID-19 vaccination intention in the UK: Results from the COVID-19 Vaccination Acceptability Study (CoVAccS), a nationally representative cross-sectional survey. Human vaccines & immunotherapeutics, 1-10. Accessed on 17.11.2020 at
https://www.researchgate.net/deref/http%3A%2F%2Fdx.doi.org%2F10.1101%2F2020.08.13.20174045

Smith, R., Cubbon, S., & Wardle, C. (2020). *Under the surface: Covid-19 vaccine narratives, misinformation and data deficits on social media.* First Draft. Accessed on 17.11.2020 at https://firstdraftnews.org/long-form-article/under-the-surface-covid-19-vaccine-narratives-misinformation-and-data-deficits-on-social-media/

The Royal Society and The British Academy (2020). *COVID-19 vaccine deployment: Behaviour, ethics, misinformation and policy strategies.* Accessed on 17.11.2020 at https://royalsociety.org/-/media/policy/projects/set-c/set-c-vaccine-deployment.pdf

Thomson, A., Vallee-Tourangeau, G., & Suggs, L. S. (2018). Strategies to increase vaccine acceptance and uptake: from behavioral insights to context-specific, culturally-appropriate, evidence-based communications and interventions. Vaccine, 36(44), 6457-6458. Accessed on 17.11.2020 at https://doi.org/10.1016/j.vaccine.2018.08.031

Thorneloe, R., Wilcockson, H., Lamb, M., Jordan, C. H., & Arden, M. (2020). Willingness to receive a COVID-19 vaccine among adults at high-risk of COVID-19: a UK-wide survey. Accessed on 17.11.2020 at: https://doi.org/10.31234/osf.io/fs9wk

Trogen, B., Oshinsky, D., & Caplan, A. (2020). Adverse Consequences of Rushing a SARS-CoV-2 Vaccine: Implications for Public Trust. *JAMA.* Accessed on 17.11.2020 at
https://jamanetwork.com/journals/jama/fullarticle/2766651

Trujillo, K.L. & Motta, M. (2020). *A majority of vaccine sceptics plan to reduce a COVID019 vaccine, a study suggests, and that could be a big problem.* Published May 4, 2020. Accessed on 17.11.2020 at https://theconversation.com/a-majority-of-vaccine-skeptics-plan-to-refuse-a-covid-19-vaccine-a-study-suggests-and-that-could-be-a-big-problem-137559

Williams, L., Gallant, A. J., Rasmussen, S., Brown Nicholls, L. A., Cogan, N., Deakin, K., ... & Flowers, P. (2020). Towards intervention development to increase the uptake of COVID-19 vaccination among those at high risk: Outlining evidence-based and theoretically informed future intervention content. *British Journal of Health Psychology, 25*(4), 1039-1054. Accessed on 17.11.2020 at https://doi.org/10.1111/bjhp.12468

Wilson, R., Zaytseva, A., Bocquier, A., Nokri, A., Fressard, L., Chamboredon, P., ... & Verger, P. (2020). Vaccine hesitancy and self-vaccination behaviors among nurses in southeastern France. *Vaccine, 38*(5), 1144-1151.

Wong, L. P., & Sam, I. C. (2010). Factors influencing the uptake of 2009 H1N1 influenza vaccine in a multiethnic Asian population. *Vaccine, 28(*28), 4499-4505. Accessed on 17.11.2020 at https://doi.org/10.1016/j.vaccine.2010.04.043

World Health Organization. (2014). Principles and considerations for adding a vaccine to a national immunization programme: from decision to implementation and monitoring. Accessed on 17.11.2020 at https://apps.who.int/iris/bitstream/handle/10665/111548/9789241506892_eng.pdf?sequence=1

World Health Organization. (2020). Behavioural considerations for acceptance and uptake of COVID-19 vaccines: WHO technical advisory group on behavioural insights and sciences for health, meeting report, 15 October 2020. Accessed on 17.11.2020 at:
https://apps.who.int/iris/bitstream/handle/10665/337335/9789240016927-eng.pdf?sequence=1&isAllowed=y

Yufika, A., Wagner, A. L., Nawawi, Y., Wahyuniati, N., Anwar, S., Yusri, F., ... & Maulida, N. F. (2020). Parents' hesitancy towards vaccination in Indonesia: A cross-sectional study in Indonesia. *Vaccine, 38*(11), 2592-2599. Accessed on 17.11.2020 at https://doi.org/10.1016/j.vaccine.2020.01.072

Reducing vaccine hesitancy