



Public perceptions of vaccine development

On 1st June 2023, the Future Vaccine Manufacturing Research Hub (Vax-Hub) held an in-person workshop to discuss:

- drivers of vaccine uptake and the implications of these drivers for the vaccine development process;
- areas where public perceptions of vaccine development have implications for vaccine uptake;
- ideas for actions that can be implemented to address these drivers;
- actions that the Vax-Hub team could take forward in the next phase of their research.

The workshop brought together the Vax-Hub team with a range of academics and policymakers involved in vaccine development, manufacturing, delivery, and policy.

Context

The COVID-19 pandemic brought to the fore the issues of disparities in vaccine uptake and public perceptions of vaccines in the UK. Vaccination is one of the most cost-effective ways to avoid disease.¹ Vaccines prevented 2-3 million deaths per year (in 2019) and 1.5 million deaths could be avoided by improving global coverage of vaccines. Several policy documents, studies and articles have illustrated the importance of behavioural and social determinants in shaping the public's willingness and intent to get vaccinated, and uptake of vaccines.²

Key points

1. Public perceptions of vaccine development are influenced by cognitive and behavioural responses, social drivers, and practical barriers. These drivers overlap with other factors such as underlying health conditions, socioeconomic status, ethnicity, and gender.
2. To ensure meaningful public engagement, there are challenges to overcome in terms of collaboration, communication beyond one-way information-provision, funding, skills, time, and resources for those engaged in public engagement activities.
3. Primary goals for public and policy engagement should be: include the public in the design and delivery of activities, develop indicators for effective community engagement based on what is known about the challenges with uptake, identify equity measures, build networks, coordinate with other stakeholders involved in vaccine development and delivery, and learn from successes elsewhere.

¹ WHO. 2019. 'Ten threats to global health in 2019.' WHO, 2019. Available from: <https://www.who.int/news-room/spotlight/ten-threats-to-global-health-in-2019>

² Lazarus, J. et al. 2023. 'A survey of COVID-19 vaccine acceptance across 23 countries in 2022.' *Nature Medicine* 29, 266-275

The British Academy. 2022. *COVID-19 Recovery: Building Future Pandemic Preparedness and Understanding Citizen Engagement in the USA and the UK*. British Academy, 2022. Available from: <https://www.thebritishacademy.ac.uk/documents/3754/COVID-19-recovery-summary-policy-synthesis.pdf>

Majeed, A., Pollock, K. & M. Papaluca. 2022. 'Implementation of covid-19 vaccination in the United Kingdom.' *BMJ* 378.

Kadambari, S. & S. Vanderslott. 2021. 'Lessons about COVID-19 vaccine hesitancy among minority ethnic people in the UK.' *The Lancet Infectious Diseases* 21(9), 1204-1206.

NHS England and NHS Improvement. 2021. *Vaccination: race and religion/belief*. Available from: <https://www.england.nhs.uk/south-east/wp-content/uploads/sites/45/2021/05/Vaccination-and-race-religion-and-belief-A4.pdf>

Vax-Hub

Vax-Hub is a five-year research programme (2018-2023) funded by the UK's Department of Health and Social Care's Official Development Assistance programme, the UK Vaccine Network. The Vax-Hub's mission is to secure the supply of essential vaccines to low- and middle-income countries.

The Engineering and Physical Sciences Research Council (EPSRC), part of UK Research and Innovation, recently announced a £12 million investment to fund the UCL-Oxford Vax-Hub for the next seven years, until 2030. The new Hub will build on the success of Vax-Hub1 with the vision of making the UK the global centre for end-to-end vaccine discovery, development and manufacture.



"The UK has a long history of pioneering vaccine research and development, and this funding will help ensure the UK is well placed to develop the science, technology and innovation the UK and the planet needs to ensure economic resilience in the face of growing global threats."

Minister of State for Science, Research and Innovation George Freeman

The workshop

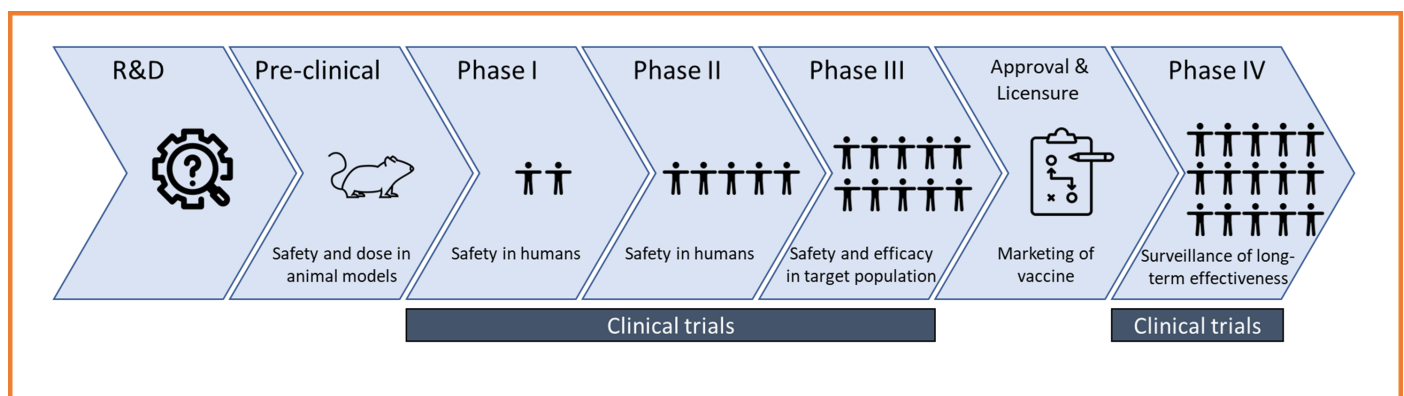
The aim of this workshop was to address and understand some of the key considerations that stakeholders working in the vaccine manufacturing and development space should keep in mind in terms of public perceptions, motivations, thinking and feeling that have an impact on vaccine uptake. The figure below illustrates the focus of this workshop in terms of the vaccine development and delivery supply chain. All steps in figure 1³ were applicable to the workshop scope as defined. We also focussed on public considerations related to vaccine formulation, which refers to the way the vaccine is packaged and introduced into the body.

To prepare participants for the ensuing discussions, presentations were provided by :

- Professor Martina Micheletti who informed participants of the Vax-Hub's work to date and Vax-Hub's success in securing funding for the next phase of research, as part of the EPSRC's Manufacturing Hubs for a Sustainable Future call.
- Dr Shoba Poduval who shared insights from a qualitative research project titled 'Beyond information provision: identified drivers in communities with the lowest vaccine uptake'.⁴

This report summarises discussions from three questions put to our participants: i) what are some of the drivers of public perceptions and considerations of vaccine development that have implications for vaccine uptake?; ii) what are the barriers and enablers to considering these drivers in your research/policy work; and iii) what are some potential solutions to address these public considerations in research and policy? The report also highlights possible future actions for the Hub to take forward in the next phase of research.

Figure 1: Vaccine development process and scope of project



³ Micheletti, M. & P. Carmichael. 2020. Part 2: Manufacturing new vaccines for pandemics. Vax-Hub, October 2020. Available from: https://www.ucl.ac.uk/steapp/sites/steapp/files/vax-hub_vaccine_explainer_part_2_manufacturing_new_vaccines_for_pandemics_oct_2020.pdf

⁴ Poduval, S.; Kamal, A.; Martin, S.; Islam, A.; Kaviraj, C.; Gill, P. *Beyond Information Provision: A Critical Analysis of the Roles of Structure and Agency in Decision-Making about COVID-19 Vaccination in ETHNIC minority Communities and Recommendations for Primary Care*. Preprints.org 2023, 2023070095. Available from: <https://doi.org/10.20944/preprints202307.0095.v1>

There was insufficient time to fully interrogate individual solutions, so readers should not consider them as recommendations. We are instead sharing the ideas that were generated as areas where further investigation might be fruitful.

Drivers of public perceptions and considerations of vaccine development that have implications for vaccine uptake

Participants were asked to brainstorm drivers related to vaccine development that have implications for vaccine uptake, and to group these into the three categories: thinking and feeling, social processes, and practical drivers (these categories were developed by the World Health Organization⁵).

There was agreement that there is no single “public”. The public constitutes many different communities and include factors such as underlying health conditions, socioeconomic status, ethnicity, and gender.

Trust in and perceptions of stakeholders and institutions

Trust in and perceptions of the stakeholders and institutions that are involved in vaccine development and delivery was the most commonly identified driver.

Government and politicians. Relates to the way that the government communicates and whether this resonates with the public. Changes in COVID-19 guidance (such as changes in rules for mask wearing and social distancing) and lack of compliance with guidelines by government might have undermined trust in other measures. In addition, for COVID-19, communications were framed around national pride in being the first to have the vaccine, but this did not resonate with all members of the public.

Science, scientists, and scientific processes. The public lacks opportunity to gain insight into the work that is carried out by researchers and scientists, for example in labs and clinical trials. The public might perceive that certain aspects of science are ‘grey’ or uninteresting. This might apply even more to processes that are important in driving vaccine uptake, such as safety assessments. Science is also often perceived as being ‘certain’, and communicating uncertainty can have a negative impact on vaccine uptake. The cognitive and behavioural responses of scientists and researchers engaging with the public might also have an impact as some scientists and researchers might fear or lack the confidence to speak with the public.

Some aspects of vaccine development might also not be well explained by vaccine developers. This includes concepts that are instrumental to understanding how vaccines are delivered and their safety, such as the concept

WHO Behavioural and Social Drivers of Vaccine Uptake

Thinking and feeling relates to the cognitive and emotional responses of people to getting diseases that can be prevented by vaccines, and to the vaccines themselves.

Social processes relate to the norms that the public has about vaccination and the recommendations that the public receives from society to get vaccines.

Practical issues refer to the experiences that people have when they try to get vaccinated and participate in the vaccine development process. This includes aspects related to availability, affordability, ease of access, and service quality for the population accessing vaccination services.

Dr Shoba Poduval, *Beyond information provision: identified drivers in communities with the lowest vaccine uptake. Key points:*

- Public perceptions of vaccine development are impacted by social factors, not just knowledge.
- For the vaccine development process, relevant findings were concerns around the speed of development, lack of transparency of development process, safety and risks, and racism.
- It is our responsibility to explore and demonstrate our understanding of these factors (particularly those relating to discrimination). The ways in which vaccine developers can work towards achieving this are by incorporating meaningful public engagement in our ways of working, for example by building public engagement into vaccine development research and development processes, and taking an anti-racist approach to health and care.

⁵ World Health Organization. 2022. *Behavioural and Social drivers of vaccination: tools and practical guidance for achieving high uptake*. World Health Organization, 2022. Available from: <https://apps.who.int/iris/handle/10665/354459>

of batch failure, number of participants in clinical trials, and the inevitability of side-effects if a vaccine is delivered to a large population.

Regulatory process. If regulatory processes are sped up to deliver vaccines more rapidly, there might be uncertainty connected to why and how the regulatory process is accelerated, and whether the regulatory process was thorough enough.

Community figures and leaders. This relates to trust in and visibility of community champions and role-models, such as local community leaders, religious leaders, and celebrities, as people who can share information.

Industry. Trust in biopharmaceutical companies was highlighted as an important determinant of the public's willingness to get vaccines. Some participants felt that some members of the public were more distrustful of the true intentions of industry's role in vaccine development.

Other drivers of vaccine uptake

Other important drivers of vaccine uptake include:

Perceived safety and efficacy of vaccines. This is influenced by public perceptions of the vaccine development process and concerns related to minor and serious side-effects and potential side-effects that might occur after immunisation. If vaccine hesitant views gain extensive publicity, the public might be less likely to trust vaccines and the vaccine development process.

Perceived need for a vaccine. This relates to whether the public perceives that there is a risk of taking vaccines and whether vaccines are necessary to protect others.

Prior experience of healthcare. Members of the public might be influenced by their prior experiences of healthcare and vaccination. If the public had a poor experience previously, they might be less inclined to take vaccines. It is important to consider the 'living memory' that the public might have related to public health interventions.

Representation in the vaccine development process. Whether different population groups are represented in all stages of the vaccine development process, including research design and clinical trials participation, might have an impact on vaccine uptake.

The availability of certain delivery methods. The availability and lack of certain vaccine services, such as home visits and flexible appointments.

Vaccine formulation and ingredients. Administration routes refer to the way that the packaged and introduced into the body.⁶ Traditional vaccine administration routes deliver vaccines intramuscularly. Novel administration routes include microarray patches, tablets or inhalers. Perceptions around ingredients in vaccines also influence uptake. An example is the use of foetal derived cell lines, which has been identified by some Catholic groups as necessary but not ideal.

Language barriers. For example, for those accessing vaccine services or participating in the vaccine development process.

Drivers of vaccine uptake

- Trust in and perceptions of stakeholders
- Perceived safety and efficacy
- Perceived need for a vaccine
- Prior experience of healthcare
- Representation in the vaccine development process
- Vaccine formulation and ingredients
- Language barriers



⁶ Kadambari, S. & S. Vanderslott. 2021. 'Lessons about COVID-19 vaccine hesitancy among minority ethnic people in the UK.' The Lancet Infectious Diseases 21 (9), 1204-1206.

NHS England and NHS Improvement. 2021. Vaccination: race and religion/belief. Available from: <https://www.england.nhs.uk/south-east/wp-content/uploads/sites/45/2021/05/Vaccination-and-race-religion-and-belief-A4.pdf>

Local Government Association. n.d. 'Confidence, complacency, convenience model of vaccine hesitancy.' LGA, n.d. Available from: <https://www.local.gov.uk/our-support/coronavirus-information-councils/covid-19-service-information/covid-19-vaccinations/behavioural-insights/resources/3Cmodel-vaccine-hesitancy>

Micheletti, M. & P. Carmichael. 2020. Part 2: Manufacturing new vaccines for pandemics. Vax-Hub, October 2020. Available from: https://www.ucl.ac.uk/steapp/sites/steapp/files/vax-hub_vaccine_explainer_part_2_manufacturing_new_vaccines_for_pandemics_oct_2020.pdf

Barriers to incorporating these drivers in research and policy

Participants were asked to consider barriers and enablers to research and policy teams incorporating these drivers in their work.

Resource availability. Participants felt that funding does not give sufficient scope and flexibility to conduct work that might be beneficial to understanding barriers to uptake and overcoming them. For example, those who are embedded within communities are often in unpaid roles and research funding periods will often be fixed and short-term. Renumeralated public engagement roles could help to boost the ability to address barriers. Another enabler would be granting long-term funding with more specific public engagement deliverables.

Collaboration. Research, policymaking, and public engagement processes are intrinsically interlinked. There is a need to build more links between different types of organisations, including academia, policymakers, industry and the third sector.

Communication. The one-way information provision model – where there is an assumption that there is an information deficit amongst the public that can be filled with an information campaign rather than engagement – persists across policymaking and the research community.

A key barrier is that the speed of communication differs across stakeholder groups, which might make it difficult to create health communication and engagement activities that are tailored to different audiences. Another barrier is how researchers and policymakers can create an open forum for discussion where everyone can open about their views and where professionals can modify their practices according to these views. Those tasked with providing information e.g. call centres, also often provide generic information rather than tailored information to answer more specific questions.

Information provision can be both an enabler and a barrier. For example, social media platforms and community forums can contribute to positive messaging but can also include information that reinforces and increases vaccine hesitancy. Moderators can contribute with fact-checking and provide evidence-based input.

Ways of working and access to population groups. Public engagement might be hampered by researchers' and policymakers' access to population groups, particularly those who are homeless or not registered with a general practitioner. Perceptions of certain members of the community, that might result in alienation of some population groups due to their socioeconomic status, nationality or race, can make it difficult for policymakers and researchers to know how to reach certain population groups. Recruitment processes for sufficiently diverse clinical trial groups are also inherently exclusionary and need to be updated.

Researchers also often work in ways that are predominantly focussed on research, and this can lead to siloed working or working in echo chambers. This is a lost opportunity given that academics tend to be perceived as sources of authority.

Evidence of inequalities. Evidence can lead to greater awareness of inequalities, and policymakers and researchers might be more motivated to try to address inequalities. However, it might also socially reinforce attitudes where people see that other people like them are also not taking the vaccine.

Perceptions of and incentives for public engagement. There might be a reluctance to involve the public in research as researchers might lack the expertise and understanding of how to effectively work with the public. Oftentimes, researchers engage with the public after a research protocol has been finalised with few opportunities to change it.

Participants also highlighted some barriers to health professionals engaging with the public. There are pressures on the National Health Service, which means that opportunities for health professionals to discuss vaccine concerns with the public are not always prioritised. However, healthcare practitioners can explain the pressures and how this might negatively impact on service provision to increase public trust in vaccines.

Participants felt that there was little incentive for biopharmaceutical companies to engage with the public on certain topics. As a result, the incentive structure needs to change to improve the public's trust in the biopharmaceutical industry. Moreover, researchers and those involved in the vaccine development process might be willing to engage with the public but be restricted by commercial confidentiality and not being allowed to share information.

Suggested research themes:

- Vaccine safety.
- Opportunities in needle-free formulation of vaccines.
- Vaccines that prevent transmission
- Self-administration of vaccines.
- A vaccine for the next pandemic and its role in preventing transmission.
- The role of herd immunity in community protection.
- The mode of vaccine delivery, the formulation of vaccines, or the ways in which the vaccine is delivered into the body. Research should explore whether it is possible to self-administer the vaccines in the same vein as home testing of infections.
- Ingredients. Participants suggested formulating a list of ingredients that may be culturally sensitive to create better awareness among the research community of public considerations of vaccine ingredients.



Suggested activities:

- Support labs and clean rooms in industry and universities to open doors to the public to demystify the vaccine development process. Video links and virtual reality technologies could facilitate access to these environments without setting foot in them.
- Face to face interactions with researchers and vaccine developers can help to humanise those involved in vaccine development and demystify the vaccine development process.
- Outreach activities in local communities, for example through local forums and expert hubs in community centres and parks. The public should be represented on committees, in community and engagement forums, such as citizens assemblies and committees.

Solutions

Participants were asked to consider potential solutions to address public considerations linked to vaccine development. They were also asked to vote on the most effective solutions and to discuss these in more detail.

Funding and resources. For both policymakers and researchers, participants highlighted the importance of having resources, such as time, funding (also in the long-term), leadership commitment and supplies to overcome any organisational and bureaucratic barriers. Resources could be scaled across institutions and funders. Participants also highlighted that it is important that the research community and funders value public engagement work.

Funding is especially pertinent in the academic community, where academic career progression heavily relies on publishing papers. Funding could contribute to public engagement co-design in research and ensure that equity and public engagement is a condition of research funding, and a key output in addition to papers.

In terms of vaccine delivery, funding should be in place for healthcare services to conduct home visits to deliver vaccines. Compensation and incentives, such as cash and vouchers, could also be given to those receiving the vaccines. This can be delivered with education and communication initiatives, for example on the vaccine development process.

Research themes. Participants highlighted the need for community-directed research. It is important to consider if the public can be involved in making decisions about what research to prioritise and decide on research funding.

Communication and collaboration. Collaboration mechanisms should be put in place in the long-term between different organisations and disciplines, as well as organisations and the public. Collaboration can help facilitate a shared memory of what works, creating a library of interventions and demonstrating existing diversity in vaccine development. Researchers and the public should be involved early and continuously in clinical and deployment teams.

Communication and collaboration should happen on a continuous basis, be tailored to different audiences, and happen at all stages of the vaccine development and research process. Plain language summaries, videos, animations and infographics were discussed as a means of reaching wider audiences. Diverse stakeholder groups should be involved in drafting and developing public health messaging.

Transparency and listening. It is important to have greater transparency in the vaccine production and delivery process for those involved in policy and decisions about distribution, as well as manufacturers. There is a need to listen to people and their concerns before a pandemic and outside of emergency situations. It is also important to be transparent about uncertainties and potential risks related to vaccine development and delivery, such as the potential side-effects of vaccines.

Information should respond to individual concerns. For example, support for low-uptake communities on healthcare generally can increase trust. These dedicated services could then be utilised in a future pandemic scenario.

For research, participants highlighted that engagement with the public does not necessarily mean that the public writes research protocols. It means engaging with the public as part of the process of designing the research, to provide an opportunity, in an iterative manner, to input and be heard. In the vaccine development process, whilst it might not be possible to take some considerations on board, the aim should be to identify overlap between public and research interests and to provide feedback to the public about why some of their suggestions might not be taken onboard.

Skills and jobs. It is necessary to have increased capacity on the frontline to improve healthcare provision, allowing practitioners more time to engage with patients. Opening up careers in the vaccine sector more generally, including technician roles that do not require a university degree and lowering barriers to work in regulation, could help demystify the vaccine development process.

Regulation and labelling. Participants suggested having less nationalistic labelling of vaccines.

Measures that were found to be most effective.

Policy-makers: funding public engagement activities and to increase face to face interactions between the public and researchers.

For researchers: better communication and collaboration across sectors and novel formulation of vaccines.

Stakeholders

All groups emphasised the need for cross-sectoral and interdisciplinary teams to be involved in the proposed solutions. They emphasised the need for dedicated coordination roles, who would ideally sit in both local government and within universities or industry. Stakeholders who need to be involved:

- Schools, community groups, grassroots organisations, charities, and faith and religious groups
- Public engagement specialists
- Citizens UK, Involve
- Funders
- National and local government
- Research institutions
- Employers
- Members of the general public

Barriers to the success of the measure

Measures need to be closely integrated in the design and delivery of the solution and cannot be treated as an add-on. Other barriers include time pressure of researchers and policymakers, language barriers, lack of interoperability, and insufficient budget.

Enablers to the success of the measure

Participants identified the following enablers of success of the suggested solutions:

- Dedicated and funded roles to coordinate public engagement. These roles should be involved in and have contacts in both research and policy.
- Short-term secondments, both among workshop participants and with other stakeholders, to facilitate greater sharing of skills and best practice.
- Provide the public with a safe space to speak about issues that might seem 'unrelated' to provide them with an opportunity to voice their concerns and questions.
- Learn from other sectors and successes, such as citizen forums on climate change, the European Commission's work with public engagement, and create best practice guidance on what good engagement looks like and how to organise it.
- Make engagement compulsory, for example as a core part of researcher roles, but avoid it being a 'tick box' exercise.

- Focus public engagement activities on local engagement and communities.
- Organise cross-sectoral events and allocate time to researchers and policymakers to attend these events.
- Recognise and manage conflict of interests in policy and public engagement activities.
- Share research findings with the public and other sectors at an earlier point, at pre-publication, to ensure that different stakeholders can input and contribute to research.

Measuring success

A combination of quantitative and qualitative tools is required to measure success. Aspects that should be captured include:

- Outcomes such as further education choices that might result from the activity;
- The extent to which the public feel involved in activities and research;
- Public understandings of the vaccine development process at the start and end of the activity;
- The number of interactions and meetings;
- Characteristics of participants; and
- Self-reporting from those delivering the activities on their confidence in engaging with diverse groups.

Methods that should be employed include monitoring by funders and continuous feedback from those delivering and participating in the activity. In terms of novel vaccine delivery routes, participants suggested measuring whether there are more publicly available vaccines with novel administration locally, nationally, and globally.

Conclusions and next steps

Whilst public and policy engagement promises to address public considerations of vaccines, there remain challenges in involving patients and the public, providing researchers and policymakers with the resources for meaningful public engagement, and coordinating existing and emerging initiatives. To successfully incorporate public perceptions in policy and research, the policy and research community should develop indicators for good community engagement, identify equity measures, build networks, coordinate with the diverse stakeholders involved in vaccine development and delivery, and learn from successes elsewhere. The Vax-Hub can make important contributions in this regard by coordinating policy and public engagement events. However, any initiative should be combined with an understanding and inclusion of target populations. The Vax-Hub will use the ideas generated in this workshop to design public and policy engagement activities, and to include other sectors in this work, including members of the public and industry representatives.

This report was developed by Emily Ryen Gloinson at UCL Engineering's Policy Impact Unit.

Our research

This workshop and report was produced in partnership with UCL STEaPP's Policy Impact Unit (PIU) as part of the work carried out by the Future Vaccine Manufacturing Research (Vax-Hub). Vax-Hub is jointly led by UCL and the University of Oxford and funded by the Department of Health and Social Care's UK Vaccine Network, and managed by the EPSRC.

To find out more, please visit: <https://www.ucl.ac.uk/biochemical-engineering/research/research-and-training-centres/vax-hub>

Vax-Hub team: Vax-Hub is co-directed by Professor Dame Sarah Gilbert (sarah.gilbert@ndm.ox.ac.uk), Pandemic Sciences Institute at the University of Oxford, and Professor Martina Micheletti (m.micheletti@ucl.ac.uk), Department of Biochemical Engineering, UCL. Emily Ryen Gloinson (e.gloinson@ucl.ac.uk), is a policy advisor to the Vax-Hub and is based in the PIU.

For more information on the PIU, please visit <https://www.ucl.ac.uk/steapp/collaborate/policy-impact-unit-1>

Reviewers

Thank you to Jane Doogan, Joe Matthews, Luís Miguel Lacerda, Sara Garfield, Sean Elias and Shoba Poduval.

Annex 1: Summary institutions and participants engaged in the project

1. **Chris Minchell**, Deputy Director Strategy & Analysis COVID Vaccine Unit, UK Health Security Agency
2. **Francis Paynter**, Communications and Advocacy Manager, Coalition for Epidemic Preparedness Innovations
3. **Danny Webster**, Head of Communications COVID-19 Vaccination, NHS England Vaccination and Screening Directorate
4. **Elisia Reid**, Community Engagement Lead, Newham Council
5. **Ellen Schwartz**, Deputy Director of Public Health, Kent County Council
6. **Emma Wroblewski**, PDRA VLP Purification and Characterisation, University of Leeds
7. **Harriet Teare**, Deputy Director Partnerships, Medicines and Healthcare products Regulatory Agency
8. **Hilary Webb**, Policy Officer, Blood Cancer UK
9. **Jenny Bird**, Former Head, UCL STEaPP Policy Impact Unit
10. **Joe Matthews**, Head, UCL STEaPP Policy Impact Unit
11. **Joe McTiernan**, Policy Advisor, UK Health Security Agency
12. **Keri Wong**, Associate Professor, UCL Institute of Education
13. **Kristoffer Halvorsrud**, Research Fellow UCL Department of Applied Health Research
14. **Ludovica Vaiarelli**, Outreach Coordinator, Vax-Hub
15. **Luisa Enria**, Assistant Professor, London School of Hygiene and Tropical Medicine Department of Global Health and Development
16. **Martina Micheletti**, Co-Director / Professor, Vax-Hub / UCL Department of Biochemical Engineering
17. **Matthew DiClemente**, Senior Policy Advisor, Department of Health and Social Care
18. **Rachel Harris**, Innovation Lead – Medicines Manufacturing, Innovate UK
19. **Salome de Sa Magalhaes**, Research Fellow, UCL Department of Biochemical Engineering
20. **Samantha Vanderslott**, Associate Professor, University of Oxford
21. **Sara Garfield**, Lecturer in Pharmacoepidemiology and Drug Safety, UCL School of Pharmacy
22. **Sean Elias**, Public Engagement with Research Lead, University of Oxford Pandemic Sciences Institute
23. **Shoba Poduval**, NIHR Clinical Lecturer in Primary Care, UCL Department of Primary Care and Population Health
24. **Stephen Morris**, Research Fellow, UCL Department of Biochemical Engineering
25. **Vaughan Thomas**, Visiting Professor / Bioprocess Consultant, UCL Department of Biochemical Engineering / Tillingbourne Consulting