Tackling COVID-19 Vaccination Inequity in Liverpool

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July 2022

FOREWORD

Poverty and health are linked. The COVID-19 pandemic has provided the 'perfect storm' in Liverpool, exposing and exacerbating existing inequalities[1]. Ward Level data show that people living in the most deprived wards in Liverpool had the lowest level of COVID-19 vaccination uptake and the most hospital admissions in 2021. Reaching the unimmunized remains a challenge with a 40% difference in uptake between the most and least deprived wards. One of the biggest tools we have at our disposal remains the COVID-19 vaccination programme. However, COVID vaccine hesitancy is a national problem. At the end of May 2022, 2.98 million adults in England remained unvaccinated, with a further 1.5 million only having received one dose of a COVID-19 vaccine[2].

The pilot project 'Reducing vaccine inequity in Liverpool' builds on the Liverpool School of Tropical Medicine's (LSTM) experiences of tackling health inequity in the Global South and uses COVID-19 vaccination as a lens. This report describes the development and piloting of a community-led intervention to understand COVID vaccine hesitancy in the Central Liverpool Primary Care Network (CLPCN) and develop data-driven interventions to tackling health equity. This pilot and the lessons learned are designed to underpin future research and approaches to health equity in the wider Liverpool City region.

"I did it for" pop-up exhibition at the Florrie, L8

[1] *https://www.local.gov.uk/perfect-storm-health-inequalities-and-impact-covid-19*
[2] *https://committees.parliament.uk/publications/23019/documents/168825/default/*

ACKNOWLEDGEMENTS

This pilot was a work of partnership, breaking down silos and sharing resources. Multiple stakeholders and partnerships made this work possible. The community volunteers and the community champions who gave their time willingly and worked above and beyond, the network engagement leads from the Central Liverpool PCN, the GP leads and the public health practitioners - thank you for working so well together with each other and with us. Thanks also to the community organisations and groups who supported this and other initiatives to help their communities to get vaccinated.

These include: Pagoda Arts; Chinese Wellbeing; Irish Community Care; Granby Toxteth Development Trust; Merseyside Somali Community Association; Liverpool Arabic Centre; Firefit Community Hub (Torus Foundation); Merseyside Polonia; Merseyside Refugee Support Network, Refugee Women Connect, University of Liverpool International Advice and Guidance Group and the Chinese Students Union.

Within Liverpool City Council a big thank you to Matt Ashton, Paula Parvulescu, Emer Coffey, Shane Knott, Sue Cumming, Heather Dickinson and the wonderful community champions lead, Gosia McKane. We also thank Liverpool Clinical Commissioning Group (now NHS Cheshire and Merseyside Intergrated Care Board) with thanks to Gemma Melia, CIT Central team member and to Danielle Wilson who patiently updated the CIT data dashboards. A special acknowledgement to the awesome "can do" overseas vaccine record validation service (OVRVS) team from St Helen's, led by Karen Birchall, Directorate Manager for the Mass Vaccination Service. Karen's team validated hundreds of overseas vaccinations at three University of Liverpool pop-up events.

Thank you to everyone else who has participated, learned, shared and amplified the messages from this project.

CIT North pop-up event at The People's Hub, L4

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Acronyms

CCG	Clinical Commissioning Group
CDI	Capacity Development International
CIT	Community Innovation Team
CLPCN	Central Liverpool Primary Care Network
CPD	Continuing Professional Development
CTR	Click-through Rate
EMIS	Egton Medical Information Systems
GP	General Practitioner
ICB	Integrated Care Board
LMICs	Low- and middle-income countries
LSTM	Liverpool School of Tropical Medicine
LWH	Liverpool Women's Hospital
NIMS	National Immunisation Management System
OVRVS	Overseas Vaccine Record Validation Service
PAEI	Publicly Available Electronic Information
PCN	Primary Care Network

A COMMUNITY-BASED APPROACH TO REDUCING INEQUITY OF COVID-19 VACCINATION UPTAKE: KEY FINDINGS FROM PILOT PHASE AND IMPLICATIONS FOR SCALE-UP

Background to the project

Problems with vaccine inequity and vaccine hesitancy are well documented globally. International experience in addressing health equity and rollout of public health interventions highlights that context specific, local solutions are needed, driven and owned by those communities who are most affected. Our research and programme implementation in low-and middle-income countries uses tried and tested methods applied in both rural and urban settings of extreme poverty for improving equity and uptake of health services.

Our approach

Bringing lessons from the global south we used our three-pronged approach to tackle vaccination inequity in Liverpool (Figure1) that has been successful in tackling maternal and newborn health inequities in Kenya and HIV testing uptake in Southern Africa. A short film *https://youtu.be/QnVZj0rSZ6A* captures our approach to this pilot project to assist learning and rollout to other PCNs. Central to the premise was the need to bring diverse stakeholders together at community level to collect, review and use local data.

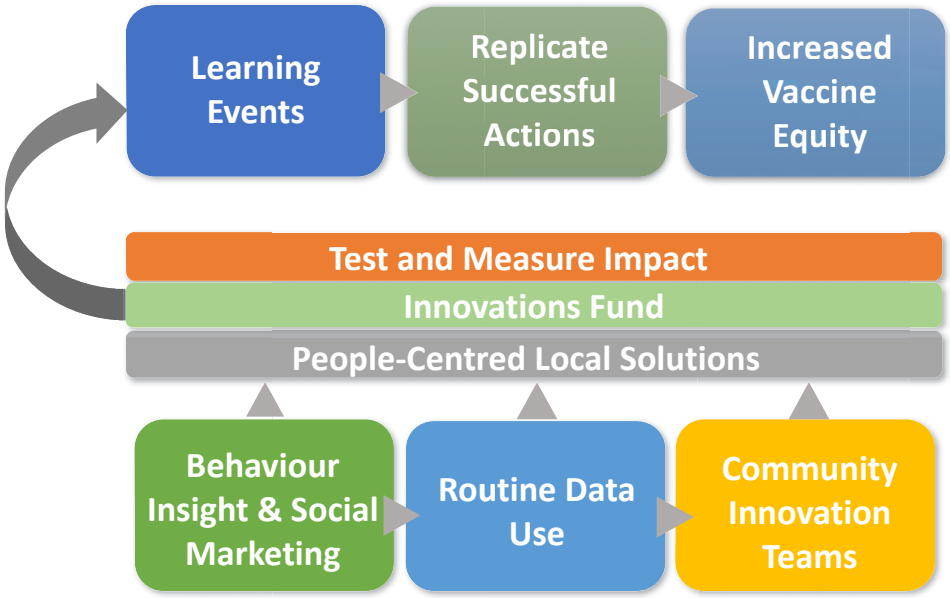


Figure 1 Three-pronged approach used to tackle vaccination inequity.

A desk review revealed substantial literature on vaccine hesitancy in general. However, this focused almost exclusively on people from ethnic minority backgrounds and pregnant women, with no available studies on vaccine hesitancy among white men. Three Community Innovation Teams (CITs) were formed representing different stakeholders from their communities (volunteers, community champions, community organisations, primary care providers, network engagement leads, public health, and others). The CITs analyse local data, and develop, test and refine creative community solutions to increase vaccine uptake in their target population. CIT members use their local knowledge combined with the results from behavioural insights surveys to understand and further explore barriers to vaccination uptake. This fostered dialogue and creative problem solving among the multidisciplinary members. The teams developed innovative approaches targeting each of three distinct populations and geographic areas in CLPCN, identified through a review of equity gaps in vaccination data.

- CIT North has been targeting white men <50 years;
- CIT Central has been working to understand apparent rates of unvaccinated Chinese students in St James and Brownlow group Practice;
- CIT South has been targeting women (all ethnicities) of reproductive age in the L8 postcode.

A small set of indicators were agreed for each CIT based on target population and intervention focus, and user-friendly dashboards were used by the CITs to monitor and measure change. The three community innovation teams came together to present lessons learned, share knowledge, and celebrate success at a combined learning event in May 2022. This learning event was not the end of the process but was intended to inspire action and allow innovations to be refined based on learning from other teams.

CITs were established representing different stakeholders from their communities and received a phased approach to capacity development outlined in Figure 2. This involved short, intense bursts of training followed by implementation of actions and change plans. Bi-weekly team meetings were used to track progress and coach and support the CITs.

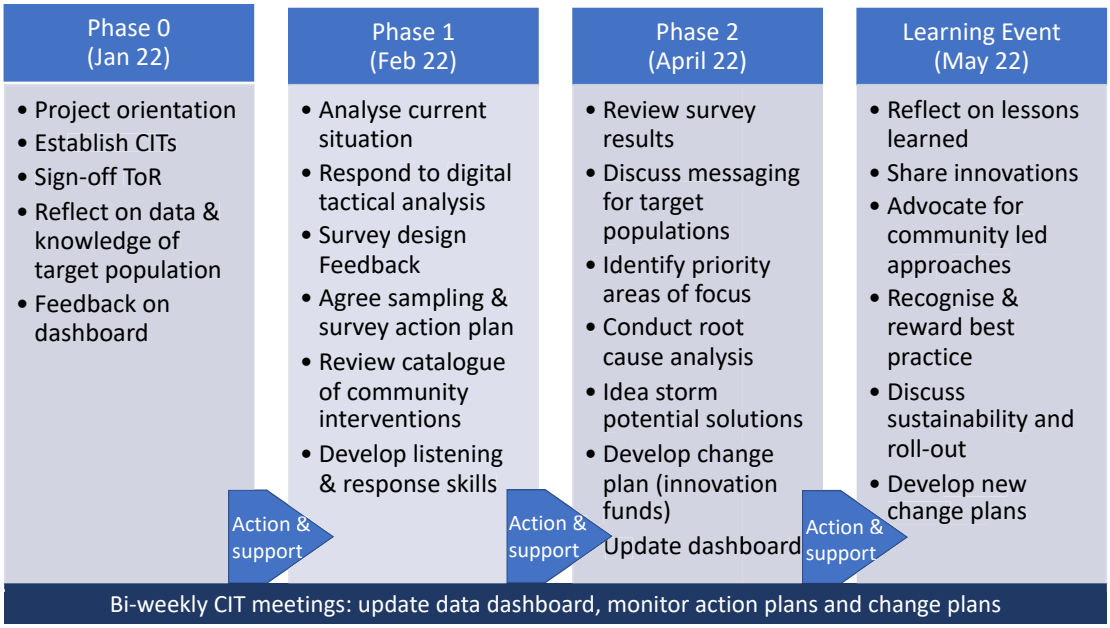


Figure 2 Capacity development approach for the vaccine equity project.

Rapidly changing context

This report covers the period between 6th December 2021 and 15th July 2022. During this time there has been a rapidly changing COVID-19 context both in England and in Liverpool, with the emergence of Omicron, the reintroduction and removal of restrictions, the cessation of track and trace and end to home testing. The national vaccination programme has also changed rapidly. Additional boosters for older people were made an urgent focus in September 2021 and boosters and vaccination were recommended for younger children and 12-15s. The programme expansion affected the concentration of effort on addressing inequalities. Overseas vaccines were not initially recognised by the NHS and those vaccinated in China could not get these vaccines validated and recorded in the system until late February 2022, with many Chinese students therefore appearing as unvaccinated. COVID-19 is widely regarded as being 'over' or 'behind us' with the media more focused on the war in Ukraine and the cost-of-living crisis.

Key achievements Dec 2021 – July 2022

- Catalysed new collaborations and resource sharing with Liverpool Clinical Commissioning Group (now NHS Cheshire and Merseyside Intergrated Care Board), Liverpool Public Health, primary care and communities work together on vaccine equity.
- Analysed and used baseline routine data to identify gaps in vaccine coverage locally.
- Established and trained three community innovation teams that included those already working with target populations and representatives of the target populations.
- Conceptualized and used a systematic approach based on the 5Cs of vaccine hesitancy (convenience, confidence, complacency, collective responsibility, and calculation) to review the literature, design market research and develop interventions.
- Analysed publicly available electronic information

(PAEI) being accessed by the unvaccinated.
- Conducted a behavioural insights survey with 384 individuals in the catchment areas of CIT North and South (175 unvaccinated) to gain behaviour insights.

- Conducted a survey with 258 Chinese students to determine prevalence of vaccine coverage.
- Determined the root causes of poor data quality amongst Chinese students in Brownlow group practice.
- Estimated that 59% of Chinese students in GP records were probable ghost patients[3].
- Facilitated 261 Chinese (and other international) students to get their overseas vaccines validated.
- Held 9 pop-up events around the city, having one-to-one conversations with the vaccine hesitant and facilitating vaccination for the unvaccinated.
- Had over 500 engagements on vaccination issues with a North West audience at the Bluedot science and music Festival, at Jodrell Bank Observatory in Cheshire
- Developed and implemented three user-friendly dashboards.
    - reduced number of unvaccinated white men<50 in the three CIT north practices (Vauxhall, Marybone and Kensington) from 1,870 to 1,645 (12%). This is significantly different from the 6% reduction seen across other demographic groups.
    - reduced number of unvaccinated women of reproductive age (16-49 years) in CIT south practices (The Dingle; Princes Park; The Elms; Abercromby) from 2,957 to 2,643 (11%). This is significantly different from the 7% reduction seen across other demographic groups.

CIT South presenting at learning event

- Developed 22 personalised and localised good news video stories *https://youtu.be/8ImYDEofi6s* from men and women living in inner city Liverpool that have been added to the GP playlist for all Liverpool GP practices.
- Hosted an interactive, multidisciplinary learning event *https://sway.office.com/Q5UORmxdDlWoLaQd* to stimulate learning and debate around our approach with more than 60 participants representing key stakeholders working in the field of vaccine equity and community led approaches.
- CIT South champion interviewed by BBC Radio 4 *https://twitter.com/DPH_MAshton/status/1547144205667123200* about community-led approaches to vaccine hesitancy
- Vaccine equity project highlighted as excellent practice on addressing health inequalities in the Northwest region: COVID-19 vaccination programme newsletter, Issue 26, 30 June 2022. *https://us1.campaign-archive.com/?e=__test_email__&u=dcbc05f9d996a81ceb99ede1c&id=add675f477*
- Amplified good news video stories and photos through an unbranded social media campaign.
    - NHS NW targeted campaign of white British men aged 16-39 of lower socio-economic groups tested branded and unbranded versions of project video stories and photos. The programmatic campaign got 81,988 impressions and 747 clicks; social ads campaign got 314,362 impressions and 1107 clicks. We are currently awaiting vaccine uptake data.
    - Hitch marketing 3-week digital hyper-localised advertising campaign using Facebook, twitter and google. Over 1.65 million impressions with video content performing better than static content and 13,792 clicks to the campaign page.
- Toured a pop-up photo exhibition *https://youtu.be/ovyO0MegYj8* across a range of community spaces (The Florrie, Town Hall, LSTM, Everton People's Hub, Firefit Hub, Bluedot Festival) and commitment from the Liverpool University Teaching Hospitals to host the exhibition for a year across the three sites.
- Co-developed a video *https://youtu.be/z35Ij0nl0jA* with Liverpool Women's Hospital. Consultant Obstetrician Dr Alice Bird responds to frequently asked questions about COVID-19 vaccine and pregnancy.
- Developed new family friendly public engagement materials including a COVID 'riskometer', a kids COVID quiz; 'meet the young Professor Genius' sessions and the 'tree of emotions'.

Young Professor Genius "Matteo" at Bluedot Festival

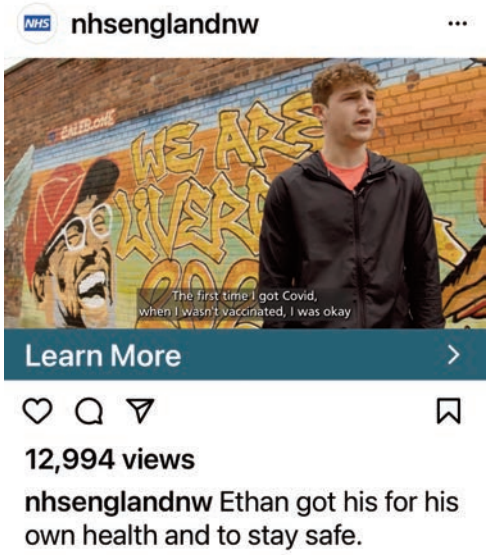
[3] *Patients who no longer live in the GP catchment area, yet still remain on the practice list.*

Emerging themes on vaccine hesitancy

We triangulated data from the literature, from the experiences of the community champions, volunteers, and GPs and from the behavioural insights survey in CIT north and south. We found few gender or geographical differences in the emerging themes but note that GP registration was lower in unvaccinated men than unvaccinated women out of those surveyed and that white men were particularly hard to reach. Overall, people know how and where to get vaccinated if they want to and said they found it convenient to do so. Digital literacy and language were still an issue for refugee and migrant populations (e.g., Roma) but most said they would still not vaccinate at this stage in the pandemic even if these barriers were overcome.

Vaccine hesitancy in Liverpool appears related to ***low confidence*** in the efficacy and safety of the vaccines among both men and women. ***Pregnancy and fertility*** emerged as big issues for both populations, although more so for women.

There is widespread ***mistrust of government*** and health services among the unvaccinated. Instead, the top trusted influencers/sources of information for the unvaccinated in Liverpool are social media, friends, and family.



Media campaigns, government and City Council messages are unlikely to work. Linked to mistrust, we found that ***government and NHS branded messaging is less effective.*** The programmatic unbranded campaign showed 25% more clicks and 3 x platform benchmark for Click-through Rate (CTR). Using the NHS socials (Facebook and Instagram) showed 3 times more clicks and engagement for unbranded video content.

Levels of complacency are high, especially among white men, and there is limited evidence of a feeling of collective responsibility to vaccinate. The unvaccinated reported ***increasingly entrenched views*** over time and only 7% of unvaccinated men under 55 years old and 12% of women of childbearing age we reached in the behavioural insights survey were willing to consider vaccination in the future.

COVID vaccination is ***no longer perceived by*** communities in Central Liverpool to be a relevant priortity and community activities that focus on COVID alone are therefore unlikely to succeed.

Recommendations for addressing COVID-19 vaccine hesitancy in deprived areas

- Making vaccination more convenient is no longer likely to impact uptake.
- Initiatives to promote vaccine uptake in the most deprived wards in Liverpool need to be linked to the wider health and well-being agenda as the perceived relevance of vaccination decrease.
- Encouraging, localised and personalised messages that are not branded by manufacturers, government or the local council are likely to have a greater impact with the unvaccinated in the most deprived wards.
- There remains opportunity to target women of reproductive age with information and messages that improve confidence in vaccine safety and efficacy in pregnancy in those wishing to get pregnant in future.
- Complacency could be addressed by framing the vaccine as something that boosts or improves natural immunity and appeals to collective responsibility.
- Major resources would be required to tackle vaccine hesitancy especially among white men under 50 years old and the cost per person reached will be high. Reaching unvaccinated becomes increasingly difficult over time.

Lessons learned from the pilot to inform scale-up

Lesson 1: The sustainability of future integrated community-led interventions to address vaccination inequalities should be embedded into existing community engagement structures and processes of the NHS and Liverpool City Council.

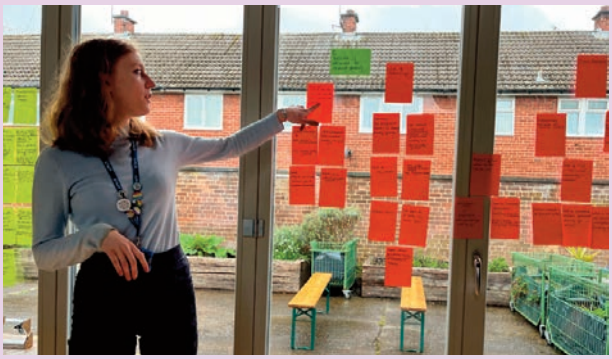
We believe our integrated community-led approach can sustain but it requires continued commitment and needs to be situated within existing structures. The most appropriate existing core funded structures that could lead this approach are health equity, social prescribing and community engagement teams, although not all PCNs have these. Providing sustained support to the CITs would avoid a short term 'projectitis' mentality and provide predictable long-term funding. This pilot has demonstrated the potential of a bottom-up approach to complex public health challenges bringing together stakeholders and target populations to address health equity. The CIT model builds on social capital theory and is human-centred. The CIT structure has enabled different stakeholders to collaborate and act effectively. Community champions are trusted messengers within their own communities and are well placed to reach out to unvaccinated members of their own community. Currently the champions are from ethnic minority communities on short term funding, and this creates a fragile structure that does not necessarily meet the needs of unvaccinated white men or women of reproductive age. The Community Innovation Teams in Central Liverpool PCN have now been trained in transferable skills and methods including data analysis, root cause analysis and solution development. These skills can equally be applied to the wider health and wellbeing agenda. ***CITs need to be embedded within existing funded structures to sustain and community champions need to reflect the target populations.***

Prof Matt Ashton at learning event

PCN leadership, ownership and vision were important components in the pilot. We observed the challenge of competing priorities for busy GPs and the need to find ways to engage with PCNs and practices that will make it as easy as possible to share the learning and make the benefits to them and their patients explicit.This approach facilitates continuing professional development (CPD) and capacity development towards practitioner revalidation and has multiple other benefits in terms of leadership training, burn out prevention and job satisfaction.
Advocacy is needed with other PCNs to ensure early buy-in if this is to be rolled out. An early agreement with the PCN to ensure joint data use and ownership is an important first step. Central to this approach, is the ability of CIT members being able to access and triangulate routine data, analyse it for root causes and use it to monitor their impact. We recommend proactively fostering a joint approach underpinned by ***early data sharing agreements.***

Lesson 2: Short term funding for technical assistance and communication can bolster the community-led approach.

CIT establishment and capacity development requires kick starting, and facilitation/technical assistance are essential. There is a big capacity gap in analysing the root causes of problems; matching budgeted activities to suggested local solutions that address the identified root causes, and monitoring impact. We used a phased training approach, and we recommend that this continues as teams learn by doing between sessions. A period of coaching and support ensures the teams bond, skills are practiced, and teams meet regularly. External technical capacity and organisation are needed for the first 6-12 months to support this in any PCN. Once trained, teams can apply lessons learned to any health inequity in their local area. We found that the clinical commitments and pressures on NHS staff meant that few were able to fully attend training, and this required the flexibility of the external training team to re-arrange



CIT South Root Cause Analysis Training

sessions, do catch up work and review and shorten training content. While external facilitation is recommended as projects start up, the longer-term aim is to develop the capacity of existing CIT members as local trainers. If PCNs can commit to these guiding principles it will likely lead to increased staff capacity and ultimately contribute to job satisfaction.

Public health messages in Liverpool should be localised and personalised. Expertise in local communication campaigns using face-to-face, press, radio and social media is required. Messaging embedded in the learning from the community innovation teams and tested in

local communities is more likely to work. Community innovation team members can be supported and trained in communication and messaging. This needs to be within the context of an overall communications strategy with expert support and resources available to CITs including briefing documents, access to platforms, artists, photographers, videographers and logistical support.

Lesson 3: Engaging community members in the co-production of future research will improve its relevance

We involved the CIT members as researchers in the pilot and this not only developed their capacity but also ensured the behavioural insights survey had rich data. Further research is needed to document the added value, effectiveness and sustainability of existing community champions in their interface role as trusted public health messengers between communities and primary care. There is also a gap in understanding of the transferability of this model to PCNs who do not have these funded roles. Participatory research methods that have been successful in low and middle income countries (rather than market research) e.g., journals, Photovoice, longitudinal insights are particularly appropriate and research expertise in this area should be included in a scale-up phase. Formal research with ethical approval would allow for additional exploration of sensitive areas and we recommend that this is done with trained community co-researchers.

STRATEGIC DIRECTION, STAKEHOLDER ENGAGEMENT AND COORDINATION

Literature review on vaccine hesitancy We conducted a rapid desk review in December 2021 with the aim of communicating common determinants of COVID-19 vaccine hesitancy and showcasing community level strategies addressing vaccine hesitancy among relevant populations. We reviewed literature from January 2019 to December 2021 and used the 5Cs framework (confidence, complacency, convenience, calculation and collective responsibility) to summarise findings and compiled a catalogue of successful interventions used elsewhere. Findings were presented during the January 2022 kick off meeting and project training. Prominent determinants of vaccine hesitancy among pregnant women, ethnic minorities, and adolescents were well described and a lack of research among white men was noted. The review concluded confidence and complacency were prominent barriers to vaccine uptake - with confidence remaining low and complacency predicted to increase as pandemic fatigue increases and the sense of urgency dissipates. Improving vaccination access, addressing issues of digital poverty (convenience issues) showed promise in addressing uptake early on in the pandemic. As time went on more emphasis was placed in the literature on providing trusted messengers and increasing confidence in vaccine efficacy and safety. The findings were used as a starting point by the CITs and Hitch, giving direction on where to target research activities in Liverpool and guidance on what had been tried and tested elsewhere. The 5Cs framework was used to guide CIT training, survey development and intervention design.

Baseline data analysis, geographic focus, and target populations In December 2021 we reviewed data in the National Immunisation Management System (NIMS) and Egton Medical Information Systems (EMIS), disaggregating the vaccine cascades for each of the 9 GP practices in the CLPCN by age, gender, and ethnicity. We also examined postcodes with the lowest uptake, mapping their geographical locations to individual student residences and streets in the most deprived wards. Vaccination rates were higher among women than men, high among the over 50s, and higher still among the over 70s. We assigned practices to a community innovation team based on proximity, working relationships and similarities in demographic profiles of the unvaccinated. We then defined three very different target populations based on the largest equity gaps.

- **CIT North (Vauxhall, Brownlow Kensington and Marybone):** White men under 50 years old; data provided by the CCG showed 1,870 unvaccinated white British and white other men (Polish, Roma etc.) of all ages (18-50 years old). 11 postcodes with low uptake were prioritised.
- **CIT Central (Brownlow Group Practice and St James):** Chinese students; data provided by the CCG showed 7,489 unvaccinated in these two practices (75% of the total student population). 19 student residences were identified.
- **CIT South (Abercromby, Brownlow Princes Park, The Elms, Dingle Park):** Women of reproductive age (16-49 years old) of all ethnicities; data provided by the CCG showed 2,957 unvaccinated younger women, with more unvaccinated women than men in Abercromby practice; the links with the Liverpool Women's Hospital and the existing expertise of the community champions. 12 postcodes were prioritised.

Kick off meeting and community walkabout (Jan 2022) We hosted a kickoff meeting attended virtually by 38 stakeholders including LCC public health, Central Liverpool Primary Care Network, community champions, third sector and private sector. This introduced the project, showcased the approach in sub-Saharan Africa and presented literature review findings and baseline data analysis. Community champions and other

stakeholders involved in improving vaccine equity shared key messages and learning from what had already been tried in Liverpool (vaccine bus, pop up event at the mosque, telephone follow ups). The meeting was immediately followed by two community walkabouts (in Toxteth and Kensington) that allowed CIT members to meet and exposed them to the streets and postcodes with lowest uptake of vaccination. The walkabout encouraged champions to introduce important landmarks and community influencers (e.g., hairdressers, newsagents, gathering points for casual labour pick up, places of worship and vaccination sites). Participants were asked to consider 4 questions: 1) What do these streets tell us? 2) In your experience why are people not vaccinating here? 3) Who do people trust in this community and how can we involve them? (shopkeepers/barbers/ betting shops/religious leaders/ other community figures) and 4) Where do young people meet? What about white British men? Pregnant women?

Coaching and support to CITs The Community Mobiliser, Amina Ismail, has provided coaching and support to the CITs in the form of bi-weekly meetings, contribution to training days and via regular communication using WhatsApp Groups and email. Each CIT receives regular updates via WhatsApp to encourage progress on action points that were agreed at the Bi-Weekly meetings for example, increasing survey uptake or identifying volunteers to distribute promotional material. She has provided logistical support to meeting and pop-up events, facilitated training and catalysed resource sharing (e.g., with Liverpool Women's hospital and CIT South). Having an overview over all three Community Innovation Teams supports the CITs to share good practice, identify resources and disseminate information. The support for the CITs has included working with different stakeholders to improve collaborative working reflective of a community-led approach to achieve vaccine equity.

Survey of Chinese students (March 2022) LSTM supported the contracting of a mathematical modeller to estimate the extent to which ghost patients and name errors are affecting data quality. A short survey tool was developed by Taegtmeyer and Doyle and refined by the Chinese student representatives and CIT members (See CIT Central case study, page 16).

Learning Event (May 2022) The Liverpool Vaccine Equity Project hosted a 1-day Learning Event to help stakeholders working on health equity in the Central Liverpool Primary Care Network (PCN) to communicate the results of their quality improvement interventions, share lessons learned and strategise about next steps. The learning event multi-media report *https://sway.office.com/Q5UORmxdDlWoLaQd* is a "living document" that outlines what changes have happened in the communities, the impacts that the community innovation teams have had on the attitudes to and uptake of COVID-19 vaccination, and how communities and health care staff plan to sustain positive change in the longer term.

Chinese Pop-up event at the Student Guild

Learning event at The Florrie, L8

CIT Blog Training and Public Engagement Event at LSTM

Training in blog writing (July 2022) CIT members were given an additional capacity development opportunity to help them further refine key messages from this work and improve their writing skills through developing and posting blogs and vlogs. Each CIT has committed to publishing at least one blog to increase the visibility and learning from the project. The **International Health Policies Global Newsletter** with a wide global health reach has committed to publishing one of these blogs.

Hosting CITs at LSTM – a public engagement visit (July 2022)
We invited CIT members to LSTM for a public engagement event that showcased LSTMs work, provided a tour of the buildings (snake house, mosquitoes) and enabled them to meet LSTM staff. Professor Bertie Squire, Dean of Clinical Sciences and International Public Health presented an overview of projects delivered by LSTM in the UK/Liverpool with links to the Global South, summarising about LSTM's core business and the important role of Community and Public Engagement in research projects. The CIT teams in turn shared their project journey with LSTM staff and provided further insight into the project approach of a multidisciplinary team tackling health inequity. CIT Teams and LSTM staff had the chance to network and identify opportunities for future collaboration.

FACILITATION AND TECHNICAL SUPPORT TO COMMUNITY INNOVATION TEAMS

Capacity Development International played a core role in supporting the design and implementation of the pilot project, building on years of experience in capacity development in the Global South. Dr Vicki Doyle provided a flexible technical support role to the project in developing the capacity strengthening model. Ema Kelly worked closely with her in the development of dashboards and innovation fund templates.

Human Centred approach to Creative Problem Solving

The training strategy underpinned the development of the core content of the phased training which consisted of short and intense 1.5 day training workshops, followed by implementation of actions and change plans with bi-weekly team meetings used to coach and support the CITs. The voice of the community has been central to all discussions, combining local insights with data to ensure that ideas and interventions focus on community needs. CDI worked closely with Hitch Marketing who were given space within the programme to present behavioural insights survey design, develop communication skills and to factor in feedback from community champions, volunteers, and primary care practitioners. All training workshops were conducted separately for each CIT to reduce risk of COVID-19 infection. Initial **phase 0** training focused on project orientation, agreeing the CIT Terms of Reference and membership, review of vaccine uptake data combined with local insights/understanding of context and feedback on the draft data dashboard. **Phase 1** training for CIT North and South focused on existing data and knowledge related to the 5 Cs framework, presentation, and discussion of publicly available electronic information, practice and feedback on the behavioural insights survey tool, sampling discussion and development of a survey action plan to reach the unvaccinated target population. **Phase 1** training for CIT Central focused on understanding apparent low rates of vaccine uptake and on identifying and analysing barriers to data quality in the Chinese student population. This included analysing data flow and data quality challenges, development of a problem statement, root cause analysis, solution development and completion of an innovation fund application based on the root cause analysis. CIT central recognised the need to conduct a survey of Chinese students to better understand vaccination status, data errors, GP registration status and demand for validation of overseas vaccinations. **Phase 2** training for CIT North and South focused on reviewing uptake data and survey findings, development of a problem statement, root cause analysis, solution development and completion of an innovation fund application based on the root cause analysis. Both CIT South and North identified the need to develop personalised and localised good news stories, address misinformation, and reach out to their target population through strategic pop-up events in the local community and through targeted social media campaigns. CITs also identified the need for additional training in social media communication and tools. The focus of **Phase 2** training for CIT Central was to analyse the Chinese student survey findings and to update their innovation plan based on these findings.

Training workshop with CIT South

Learning Event Design

CIT training and application of learning culminated in a Learning Event where all three CITs met for the first time. Building on CDI's experience of learning event design, the "Festival of Learning" was created to be an interactive forum for learning, sharing, celebration, evaluation and advocacy. Multiple methods (storyboards, key notes, panel discussion, market of learning, awards) were used to ensure an inclusive approach stimulating participation across cadres and levels. There was minimal use of PowerPoint; instead, a range of visual, auditory and kinaesthetic learning styles were utilised. The Learning Event created a space for healthy debate around how to tackle vaccine hesitancy and address inequity through an integrated community led approach. Community voices were heard, and local government policy makers gained insights and a more in-depth understanding about the practical on the ground reality of the CITs work.

Champions Champion Awards

Other CIT training Needs
CDI identified additional capacity development needs for the CITs around communicating key messaging to the CIT target populations. CDI supported and developed the scope of work for two additional training sessions that were delivered in June/July 22, after the phased training programme was completed.

- Social media training, delivered by Hitch
- Blog training, delivered by LSTM

Conceptualising and designing good news stories and pop-up photo exhibition
Dr Doyle played a core role in conceptualising and designing local communication messages. She took ideas from the formative stage through to briefing artists, working with them to finalise products and ensuring videos, photos and other media were exhibited, used and seen. CDI and the LSTM community mobiliser worked closely with the CITs and Bright Moon Media to recruit community members and film and photograph them for the good news video stories and "I did it for…" photo exhibition. This has resulted in high quality, powerful, localised and personalised video and photographic assets which have been promoted using old and new media. Liverpool CCG has promoted these assets across all GP practices. NHS NW conducted a targeted campaign of white British men aged 16-39 of lower socio-economic groups. Dr Doyle suggested they tested branded and unbranded versions of video and photo assets which proved to be successful. She also worked closely with Hitch marketing to co-develop a 3-week digital hyper-localised advertising campaign on Facebook, twitter and google. Dr Doyle had the idea for the pop-up photo exhibition and has been the driving force behind identifying venues and facilitating logistics and support. There is continued engagement with a range of commercial and public spaces. The vaccine equity team had over 500 engagements with a North West audience at the Bluedot Festival LSTM stand. New family friendly public engagement materials including a COVID 'riskometer', a kids COVID quiz; 'meet the young Professor Genius' Sessions and the 'tree of emotions' were developed and tested at the festival.

Filming Good News stories at LWH

BEHAVIOURAL INSIGHTS AND SOCIAL MARKETING

Hitch Marketing Ltd. have used bespoke methodologies to understand the reasons for vaccine inequity in the central Liverpool region. This has involved several approaches including a discovery survey, Publicly Available Electronic Information (PAIE), and the facilitation of a behavioural insights survey. Building on their considerable experience working on public health initiatives, this enabled Hitch to develop and adapt appropriate tools and methods in close collaboration with LSTM, CDI and the CITs.

Discovery Survey Hitch developed a short 'discovery survey' for community stakeholders to complete. The purpose was to gather information on known and perceived barriers to vaccination uptake in the target population. The survey did not receive much engagement; therefore, the low number of completions did not provide much actionable data. Hitch and LSTM agreed to drop further analysis and not to encourage more completions from the community stakeholders. Alternatively, Hitch engaged the community champions at the phase-1 training.

Publicly Available Electronic Information (PAEI)
Working in partnership with our external partner James Patrick, Hitch produced a report of Publicly Available Electronic Information (PAEI). 'Public' is defined as information published in HTML, PDF or other common formats on the internet, and which can be gathered lawfully and ethically by a person or algorithm using the internet, or via Application Programming Interface (API) queries made to third-party platform providers. Common topics of misinformation that people in Liverpool are looking at

- Examples of the emotionally driven online content vaccine hesitant people in Liverpool engage with.
- Popular content formats, for example photographs and very short videos are the format most engaged with by vaccine hesitant audiences.
- Suggestions for an appropriate colour palette based on what the vaccine hesitant audience in Liverpool engaged with.
- Suggestions for the best time of day (07.45, 08.30, 10.30, 11.30, 16.05, and 22.30) to post on social media to get the best engagement from the target audiences.

Behavioural Insights Survey
The behavioural insights survey had 3 key objectives:

1. To explore reasons for vaccine hesitancy/refusal among unvaccinated target populations in Central Liverpool PCN.
2. To investigate how vaccine hesitancy may differ depending on vaccine dose (e.g., none, 1 dose, 2 doses or 2 doses plus booster) and CIT target populations
3. To make recommendations for supporting behaviour change among CIT target populations

The process involved co-creation and piloting of a survey tool with members of CIT North and CIT South. Trained CIT members also became data collectors and were an integral part of door-to-door and telephone data collection. The full survey report describes the tool development and data collection methods. In summary 384 surveys were completed (n=175 unvaccinated, n=82 partially vaccinated, n=114 fully vaccinated).

The main barrier to vaccine uptake appears to be **confidence**. Unvaccinated people doubt the safety and efficacy of the vaccine, with concerns that newer vaccines carry more risk than established vaccines. Women of child-bearing age have concerns about the impact the vaccine may have on pregnancy and fertility. Additionally, there is a low level of trust in the information from the Government about vaccines amongst all target groups. **Complacency** is also a key issue amongst unvaccinated people. Covid-19 vaccination is not seen as a priority for this group. They also tend to think that their own immunity is better than the vaccine. This was evident in the qualitative analysis as participants spoke about being 'young and healthy' or how their 'natural immunity' was better than the vaccine. **Calculation** also presented important barriers. Participants think that the vaccine does not reduce the chance of being infected. They also felt they knew where to find reliable information about the vaccine. However, their top sources of trusted information for unvaccinated came from social media, friends, and family. For the vaccinated there was greater trust in GPs, NHS and government websites.

Social media training
The social media training session engaged with members of the Community Innovation Teams within Liverpool with the aim of upskilling team members, so they can effectively promote vaccine equity messages. The social media training included 16 representatives from organisations in Liverpool from diverse backgrounds with varying knowledge about using social media as a tool for promotion. Training focused on social media channels such as Facebook, Instagram and Twitter. The attendees were provided insights regarding appropriate hashtags and length of posts in addition to learning how to post on intended channels. The session also provided advice and guidance on how to increase social media engagement on different channels by utilising simple strategies and accessible tools. To funnel down further and focus on the vaccine equity campaign, the training included findings from the publicly available electronic information ranging from ideal times to post social media in Liverpool, type of content that the campaign's target audience engages with and direction on how to communicate well. The training also provided insight into communicating vaccine equity messages effectively as a majority of the attendees had basic knowledge of social media but were equipped with tools that could assist them in strategically promoting this campaign.

Impact of paid advertisement

A digital advertising campaign was commissioned to address vaccine hesitancy in Liverpool. Utilising data gathered from the previous phase, the campaign focused on hyper targeting community groups in Liverpool through digital channels. The ad targeted men aged 18-50 in the north of Liverpool and women between 18-45 in the south of Liverpool. Three primary channels were selected for the delivery: Facebook, Twitter and Google. The assets used were a mixture of static images and videos, all utilising local residents narrating their COVID-19 vaccine narrative.

Across the various mediums, the adverts generated just shy of 1.5 million impressions, as well as 13,400 clicks to find out more about the vaccine and where it could be booked. Google Display Ads generated the broadest reach, with an average cost per click of roughly 6 pence. Viewers of the adverts on Facebook were more expensive to reach, with an average cost per click of 69p, but these ads were able to generate more discussion and engagement - one of the advantages of using a social channel.

Interestingly, the comments on most adverts were generally civil and quite mundane, but the comments for the advert targeted at white men in North Liverpool were particularly heated, with references to replacement theory, Bill Gates, and vaccine side effects. Whilst we had expected to see a range of negative comments (we were specifically targeting an audience who were expected to be, at best, on the fence around vaccination), it was interesting that it was primarily the White British Male audience who were leading the way in this regard. Regardless of this, the generation of over 10,000 clicks to learn more certainly suggests that the campaign was reaching people who were open to taking the next step on their 'journey'. A further breakdown of clicks, impressions, and engagement is available in the accompanying breakdown report.

COMMUNITY INNOVATION TEAM CASE STUDIES

CIT North

In CIT North our activities focused on reaching unvaccinated white men under 50 years. The three GP Practices had a similar ethnicity patient profile, although there were differences in the age profile of patients with Marybone having a higher student population. We triangulated data from the literature, the experiences of the community champions, volunteers, GPs and from the behavioural insights survey in CIT north postcodes. We found that GP registration was lower in unvaccinated men and that white men were particularly hard to reach. Overall, white men <50 knew how and where to get vaccinated if they wanted to and said they found it convenient to do so. Digital literacy and language were still an issue for migrant populations (e.g. Roma) but most said they would still not vaccinate at this stage in the pandemic even if these barriers were overcome. Vaccine hesitancy in North Liverpool appeared related to low confidence in the efficacy and safety of the vaccines, including among men. Our root cause analysis revealed four main reasons why white men are vaccine hesitant relating to issues of confidence 1) Institutional mistrust (government, local council and health care providers) 2) Choices are based on unreliable or biased information 3) Lack of trust in vaccine effectiveness and 4) Fear of side effects.

A root cause analysis highlighted a lack of localised data and messaging for the target population. This led to the development of an innovation plan, that set out to develop good news stories to counter act misinformation. CIT North decided on the following two interventions linked to the root cause analysis, 1) develop and test simple messaging that addresses confidence issues in white men under 50 and 2) Get the messaging out holding pop up events at existing community events and to gain expert support to craft social media messaging.

We produced three key messages that were tested on a focus group of vaccinated and unvaccinated white men, 1) boost your natural immunity, 2) personal choice and 3) enhance your health. A myth buster leaflet with 5 frequently asked questions relevant to our target population was created by a GP in collaboration with the CIT team members. It also contained life expectancy data highlighting existing health inequalities in Liverpool. The CIT North team recruited local men, representative of the target profile, who were willing to share their COVID vaccination experience in the form of good news stories. Although it was challenging to identify white men who were willing to share their vaccination stories, the CIT North team members spoke to their local community and vaccinated patients in GP practices and successfully recruited 10 white men. They were filmed in North Liverpool locations by a local videographer with links to the local area.

CIT North at Lee Jones Community Centre

The CIT North team used their knowledge and expertise of the local community to identify existing pop-up events that could act as a platform to disseminate educational leaflets and hold 1:1 conversation with white men under 50 and their families about vaccine hesitancy. Through hosting pop-up events the CIT North team were able to provide reliable information and an opportunity for their target audience to ask questions. The first pop-up event (June 2022) at Everton in the Community, The Peoples Hub had 30 contacts. The second pop-up event at Vauxhall Community Pantry (July 2022) working collaboratively with the CLPCN social prescribing team, had 60 contacts. Further events are planned at Everton Blue Base Pantry Day and Walton Community Shop and Hub.

Challenges: Identifying community events and venues accessed by white men under 50 meant that the opportunities to discuss vaccine hesitancy with our target audience were limited as community events are mainly attended by women and families. Alternative entry points are being explored (pubs, gyms etc.)

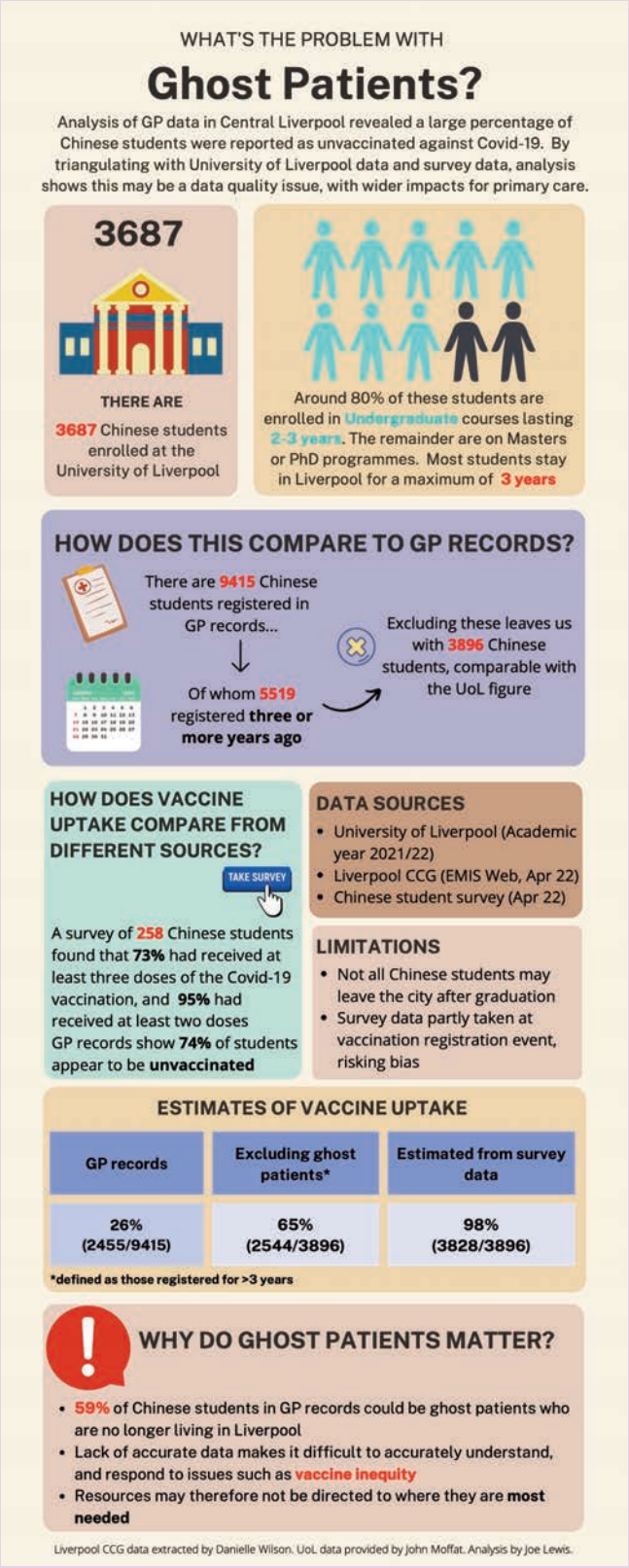
CIT Central

The CIT Central team brought together a variety of stakeholders interested in understanding the reasons for vaccine hesitancy in the Chinese international student community. Their collaboration extended beyond Liverpool to Merseyside, working with the ICB formerly CCG, Pagoda Arts, Chinese Wellbeing, Liverpool Public Health, Brownlow Practice, University of Liverpool students, Chinese Student Union, University of Liverpool International Advice and Guidance Group, St Helens Overseas Vaccine Record Validation Service (OVRVS), Liverpool OVRVS and Merseycare NHS Trust. In CIT Central we took a different approach since we suspected data quality issues from the outset. We confirmed that the poor quality of routine data means a true estimate of the scale of vaccine hesitancy in Chinese students is not possible. This is true of the student population in several practices. There are four main reasons for appearing as unvaccinated in the GP database: 1) truly unvaccinated; 2) name errors; 3) vaccinated in China but not verified in UK and 4) ghost patients. In summary there are limited resources and incentives to correct ghost patients in the general practice database. This particularly impacts Brownlow Group Practice where the majority of international students coming to Liverpool register. Chinese students report they find the NHS very difficult to navigate. They are reluctant to register with GPs and find data errors such as incorrect names and dates are common in their records. They reported going to A&E directly in an emergency and back to China for dental treatment and planned care.

An innovation fund application was developed using the root cause analysis. The plan focused on conducting a survey of students' vaccination status and needs, investigating the number of ghost patients registered as unvaccinated through modelling the data, implementing pop-up events to support Chinese students to validate their vaccination status, registering with a GP and dealing with registration issues.

A survey of 258 Chinese students revealed that 95% had been vaccinated in China, that 87% of respondents were registered with a GP and few students de-register from the GP practice when they leave. 18% reported name errors with the GP practice. The number of ghost patients proved difficult to estimate due to no data sharing agreements between Brownlow Group Practice and the universities.

Convenience and communication are important for Chinese students wishing to validate overseas vaccinations. Validation pop-up events were promoted through Chinese social media platforms, student ambassadors, translation of materials and interpreters at events, involving multiple players e.g., University of Liverpool, St Helen's Overseas Vaccine Record Validation service, Chinese Student Union and third ' sector members.



International Vaccine Validation Pop-up event at Student Guild

The CIT central team conducted three pop up events in collaboration with the St Helen's team. The first two events were with Chinese students and the final with all international students. 261 students were validated. The CIT Central team identified there is still a demand for international students to validate their overseas vaccinations. Following the last pop-up event 17 international student details were added to a waiting list, to receive phone calls to attend the next pop up. The OVRVS service is now available in both Aintree and the Pierhead, the CIT Central team are also referring international students to the National Booking Service. The team agreed to promote the Liverpool OVRVS service to international students using the University of Liverpool text messaging service.

Forthcoming events: Throughout the project, barriers experienced by Chinese students accessing GP practices has been a consistent issue. Therefore, the CIT Central team will run a seminar with Brownlow staff to discuss Chinese health seeking behaviour led by community experts. The CIT Central team are also working with their key stakeholders to develop an educational resource for September 2022 to support international students on how to access and use UK health services. With continued high student interest in the overseas vaccine validation service, CIT Central plan to deliver a quarterly vaccine validation pop up at the University of Liverpool Student Guild.

Challenges: Governance surrounding data sharing between Brownlow and external partners hindered a more accurate estimate of ghost patients as only aggregate data could be used.

CIT South

The CIT South team brought together a GP, Network Engagement Leads, Liverpool Public Health, Care-Coordinators, Community Champions, a Community Researcher, Liverpool Maternity Services and Liverpool Women's Hospital. Stakeholders worked collaboratively throughout the project to identify reasons for vaccine hesitancy and co-ordinate their efforts to increase vaccine uptake in women of childbearing age 18 – 49 years of age. The CIT South team triangulated the experiences of the community champions, volunteers and GPs combined with the behavioural insights survey in CIT south. The root cause analysis identified three main themes for vaccine hesitancy in south Liverpool relating to confidence in the vaccine 1) vaccine efficacy 2) vaccine safety 3) fertility. In CIT South GP practices 66% of women of childbearing age are vaccinated and 12% of surveyed unvaccinated women said they would consider getting vaccinated in the future. The team tackled root causes correlated with a lack of localised information through education and communication. It became apparent through surveying the community that unvaccinated women of childbearing age in south Liverpool rely on friends, family, and social media providers e.g., Facebook, Instagram and TikTok as their main source of reliable information. A range of interventions were proposed to address the root causes identified by the team, and informed the basis of the innovation fund application. The CIT South team highlighted the need for joint working with the Liverpool Women's Hospital. CIT South developed a myth buster to provide their target audience with reliable vaccination information. By working with local partners, they were able to obtain vaccination data of women of childbearing age in south Liverpool. Planning led to further opportunities to work with health professionals, Liverpool Public Health, and midwives from the Liverpool Women's Hospital to discuss vaccine efficacy at pop-up events and address perceptions of safety of the vaccine during pregnancy. Working with local community and faith groups the team were keen to promote messaging to the target audience.

CIT South's root cause analysis led to the prioritisation of creating Good News Stories by local women of childbearing age sharing their vaccination experience. Using EMIS, Liverpool Women's Hospital social media platforms and CIT South links with women of childbearing age, the team were able to identify a wide range of participants for the good news stories. To tackle misinformation, CIT South team also worked collaboratively with Liverpool Public Health, CCG and Liverpool Women's Hospital to create a video of frequently asked questions answered by Clinician Obstetrician Alice Bird. The video contains questions asked by women of childbearing age that the CIT South team encountered throughout their discussions in the community. The CIT South team also developed and translated a myth buster leaflet, 'Protect Your Future Baby' to address concerns around safety and efficacy of the vaccine. The CIT South team also identified a series of strategic pop-up events. At the LWH in May they made 154 contacts, 4 women and 1 partner were vaccinated, 40 % of these women were still hesitant about the vaccine with the majority concerned about side effects from the booster. The second LWH pop-up event in June had 140 contacts, and 2 vaccinations. During the session, most women of childbearing age were already vaccinated or reported to be concerned about taking the booster during pregnancy. The Refugee asylum link pop-up event created an opportunity for the CIT South team to speak to different individuals and offer the vaccination to those eligible. Those in attendance of the refugee week pop-up event were mostly interested in asking questions and finding out more information. The CIT South team also had a stand at the "L8 A Better Place Community Fair", where the team made contact with over 120 people, 1 person vaccinated and 30 blood pressure checks were done.

CIT South Pop-up event at Firefit, L8

Forthcoming events: CIT South team are bolstering communications by developing a Community Newsletter to promote the new vaccination roll out and advise the south Liverpool community of vaccine and booster eligibility. The CIT South newsletter will also provide details of vaccination clinics, circulate myth buster information, and promote good news stories within the community.

Challenges: CIT South sought to obtain data for the vaccination status of pregnant women, identifying at which stage in their pregnancy they were vaccinated. However LWH data collection systems and processes are still under development and this data was not available to the Team.

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