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RESEARCH ARTICLE

COVID-19 vaccine hesitancy in an ethnically diverse community: descriptive findings from the Born in Bradford study [version 1; peer review: awaiting peer review]

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Abstract

Background: The roll out of coronavirus disease 2019 (COVID-19) vaccines are now underway in the UK, and ensuring good uptake in vulnerable communities will be critical to reducing hospital admissions and deaths. There is emerging evidence that vaccine hesitancy is higher in ethnic minorities and deprived areas, and that this may be caused by misinformation in the community. This study aims to understand COVID-19 vaccine hesitancy in an ethnically diverse and deprived population.
Methods: Questionnaire surveys were sent to parents in the Born in Bradford study. Cross tabulations explored variation by ethnicity and deprivation. Text from open-ended questions was analysed using thematic analysis.
Results: 535 (31%) of 1727 invited between 29th October-9th December 2020 participated in the study. 154 (29%) of respondents **do** want a vaccine, 53 (10%) **do not.** The majority had not thought about it (N=154, 29%) or were unsure (N=161, 30%). Vaccine hesitancy differed significantly by ethnicity and deprivation: 43% (95% CIs: 37-54%) of White British and 60% (35-81%) in the least deprived areas **do want** a vaccine, compared to 13% (9-19%) of Pakistani heritage and 20% (15-26%) in the most deprived areas. Those that distrusted the NHS were more likely to not want a vaccine (30%, 15-50%). Reasons for not wanting a vaccine were commonly explained by confusion and

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distrust caused by prevalent misinformation.
Conclusions: There is a much higher level of vaccine hesitancy in ethnic minorities, those living in deprived areas and those that distrust the NHS. There is an urgent need to tackle the overwhelming misinformation about COVID-19 that is leading to this uncertainty and confusion about the vaccines. If not addressed there is a high risk of unequitable roll out of the vaccination programme in the UK.

Keywords
Covid-19, vaccine hesitancy, trust, health beliefs, poverty, health inequalities, ethnicity, social determinants of health, cohorts, Born in Bradford

This article is included in the Born in Bradford gateway.

This article is included in the Coronavirus (COVID-19) collection.

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Introduction

The roll out of the first approved coronavirus disease 2019 (COVID-19) vaccine began on 8th December 2020 in the UK. Ensuring good uptake will be critical to reducing hospital admissions and deaths. However, since the beginning of the COVID-19 pandemic there has been what the World Health Organisation has called an 'infodemic': an overwhelming amount of information about COVID-19, much of it unchecked and uncontrolled and spread through social media channels[1]. Recent qualitative research has demonstrated that this overwhelming and contradictory information about COVID-19 has caused confusion, distrust and distress[2]. Significantly, this study found that the greater these feelings of confusion and distress, the less positive people were about COVID-19 vaccination.

A number of research studies in the UK have indicated that 45–64% of the population are likely to accept the COVID-19 vaccines if offered, and that a small proportion (4–9%) say they definitely would not accept a vaccine[2–7]. There are clear indications that a lack of trust of key organisations and exposure to misinformation increases vaccine hesitancy[2,4,6,7].

There are also indications that vaccine hesitancy is higher in ethnic minority and deprived communities[5–7]; however this evidence comes from studies with a very small proportion of ethnic minority participants (6–9%). Given that ethnic minority and deprived communities have been disproportionately affected by the virus that causes COVID-19 (severe acute respiratory syndrome virus 2; SARS-CoV-2)[8], it is critical that vaccine hesitancy and concerns in these communities are well understood so that vaccine up-take can be enhanced.

The Born in Bradford (BiB) research programme has harnessed existing strong relationships with participants in their ongoing birth cohorts to help understand the impact of COVID-19 on ethnically diverse families, many of whom live in deprived communities. This programme of research uses a mixed methods longitudinal adaptive approach to provide actionable intelligence to local decision makers about how best to minimise health inequalities and aid the City's recovery[9]. As part of this programme, longitudinal surveys have been completed with data collection in the first COVID-19 lockdown (April–May 2020)[10], and a follow-up survey in October to December 2020. The latter survey included questions about levels of trust in relation to key organisations and vaccination hesistancy.

This paper reports findings from the second survey of BiB parents, exploring vaccine hesitancy and trust of organisations, by ethnicity and deprivation and aims to provide insights into the reasons why people are uncertain or unwilling to accept the COVID-19 vaccines.

Methods

Study design

A survey of participants in the Born in Bradford cohort study.

Study population

Our sample consists of adult participants from the prospective Born in Bradford Growing Up family cohort study (parents of children aged 9–13)[11] who had taken part in the first round of our COVID-19 survey in the first lockdown (April–June 2020)[9,10].

Mode of delivery and data collection

Surveys were sent out by post or email, dependent on participants' preferences. Follow-up by phone was completed 1–3 weeks later and a reminder postcard/email was sent 3–4 weeks after the first contact. For participants with little or no English, surveys were completed in their main language via phone wherever possible.

Consent

Participants had previously consented to be a part of Born in Bradford and for their research and routine health and education data to be used for research. For this survey, and as approved by the HRA and Bradford/Leeds research ethics committee, verbal consent was taken for questionnaires completed over the phone and logged in the questionnaire database. Implied consent was assumed for all questionnaires completed via post or online.

Measures

Key questionnaire domains for the survey were co-produced with the Bradford Institute for Health Research COVID-19 Scientific Advisory Group[12], and key policy and decision makers within Bradford and communities. Questions were selected or adapted from other relevant questionnaires. The full survey is available as extended data[13].

The survey covered key domains on health, wellbeing and economic insecurity as per the first lockdown questionnaire[10]. We also asked about COVID-19 vaccine hesitancy[7], trust of organisations and flu vaccine uptake for this year (winter 2020/21), see Figure 1.

Ethnicity was captured in self-reported questionnaires administered at baseline recruitment to the cohorts (March 2007 to December 2010) and categorised as 'White British', 'Pakistani Heritage' and Other (there were small numbers of non-White British, non-Pakistani Heritage parents from multiple ethnic groups). We linked residential address (as at 31st March 2019) to the 2019 Index of Multiple Deprivation (IMD) and composed quintiles of deprivation from least to most deprived[14].

Statistical analysis

Descriptive statistics are presented for each of the survey domains. We used cross tabulations (proportions and 95% confidence intervals) to explore differences in trust and vaccine hesitancy by ethnicity and deprivation. We also explored vaccine hesitancy by trust of different key organisations, and by uptake of the seasonal flu vaccine. All statistical analyses were carried out using Stata 15[15].

Text responses to the open questions were explored by thematic analysis[16]. The first 255 responses were analysed by RM and CE, employing an inductive approach where coding and theme development were driven by the content of the responses. A codebook was developed (by RM, CE and BL) while analysing these responses. This codebook focused on separating responses based on whether individuals felt positive about the vaccines or whether they were undecided/ (or felt) negative towards the

57) Which of the following best describes your thoughts about getting vaccinated against coronavirus (Covid-19), once a vaccine becomes available to you? Choose one response

- ◯ I've not yet thought about getting vaccinated against Covid-19
- ◯ I'm not yet sure about getting vaccinated against Covid-19
- ◯ I've decided I DON'T want to get vaccinated against Covid-19
- ◯ I've decided I DO want to get vaccinated against Covid-19

58) What is your main reason for this?

_____

67) For each of the following organisations can you tell us how much you trust them to do the right thing in the Covid-19 pandemic?

	Trust it a great deal	Tend to trust it	Tend to distrust it	Distrust it greatly	Don't know
The Government	◯	◯	◯	◯	◯
The NHS	◯	◯	◯	◯	◯
Your local hospital	◯	◯	◯	◯	◯
Bradford Council	◯	◯	◯	◯	◯
Local voluntary organisations	◯	◯	◯	◯	◯
Schools	◯	◯	◯	◯	◯
Police	◯	◯	◯	◯	◯
Public Health England	◯	◯	◯	◯	◯
Faith organisations (e.g., churches or mosques)	◯	◯	◯	◯	◯

56) Have you had the flu vaccine in the last year?

- ◯ Yes
- ◯ No
- ◯ Don't know

Figure 1. Survey questions on vaccine hesitancy and trust of organisations.

vaccines. Multiple codes were used within each category to explore and effectively summarise their responses. The codebook is available as extended data[13].

The remaining responses were coded by RM and CE alongside frequent discussion with BL to test the strength and validity of the codebook. During this process, thorough and frequent discussion between the researchers took place, allowing adjustments to be made to the original codebook to ensure it was reflective of all responses.

Ethics

This research was approved by the HRA and Bradford/Leeds research ethics committee (BiB Growing Up study 16/YH/0320).

Results

Out of a total of 1727 eligible participants, 535 (31%) participated in the study between 29th October and 9th December 2020.

The mean age of respondents was 42 years (SD 6), with 500 women and 35 men; 234 (48%) were White British, 178 (37%) Pakistani heritage and 74 (15%) from other ethnic groups; 243 (46%) were from the most deprived quintile of IMD. Participants were broadly representative of those who completed the first COVID-19 survey and of those in the entire BiB sample[10], but with a drop of ~5% in participation from Pakistani heritage participants and people in the most deprived quintile of IMD (Table 1).

Trust of organisations

Table 2 shows that the most trusted organisations were the NHS (N=432, 89% (95% CIs), the local hospital (N=415, 85%), and schools (N= 405, 84%). The least trusted were the Government (N= 136, 49%), the local council (N=335, 69%) and faith organisations (N= 326, 67%). There were patterns suggesting differences in trust of organisations by ethnicity but the variance in responses was too high to report on this with confidence. When

Table 1. Profile of sample.

	BiB cohort		BiB GU cohort		COVID-19 Survey Phase 1		COVID-19 Survey Phase 2	
Age	**Mean**	**SD**	**Mean**	**SD**	**Mean**	**SD**	**Mean**	**SD**
Age as at April 2020	39	6	39	6	40	6	42	6
Gender	**N**	**Percentage (95% CI)**	**N**	**Percentage (95% CI)**	**N**	**Percentage (95% CI)**	**N**	**Percentage (95% CI)**
Female	12,450	79.1% (78.4%-79.7%)	4617	89.6% (88.7%-90.4%)	1,502	95.0% (93.8%-96.0%)	500	93.5% (91.0%-95.3%)
Male	3297	20.9% (20.3%-21.6%)	537	10.4% (9.6%-11.3%)	79	5.0% (4.0%-6.2%)	35	6.5% (4.7%-9.0%)
Total	15,747	100%	5154	100%	1,581	100%	535	100%
Ethnicity*	**N**	**Percentage (95% CI)**	**N**	**Percentage (95% CI)**	**N**	**Percentage (95% CI)**	**N**	**Percentage (95% CI)**
White British	4,636	38.5% (37.6%-39.3%)	1272	28.4% (27.1%-29.8%)	638	43.7% (41.2%-46.3%)	234	48.1% (43.7%-52.6%)
Pakistani heritage	5,366	44.5% (43.6%-45.4%)	2523	56.4% (54.9%-57.8%)	600	41.1% (38.6%-43.6%)	178	36.6% (32.4%-41.0%)
Other	2,055	17.0% (16.4%-17.7%)	682	15.2% (14.2%-16.3%)	222	15.2% (13.5%-17.1%)	74	15.2% (12.3%-18.7%)
Missing	393		140		42		14	
Total	12,450	100%	4617	100%	1502	100%	500	100%
IMD Quintile	**N**	**Percentage (95% CI)**	**N**	**Percentage (95% CI)**	**N**	**Percentage (95% CI)**	**N**	**Percentage (95% CI)**
1: Most deprived	9366	59.6% (58.8%-60.3%)	3351	65.1% (63.8%-66.4%)	810	51.7% (49.2%-54.1%)	243	45.8% (41.6%-50.0%)
2	3539	22.5% (21.9%-23.2%)	1202	23.3% (22.2%-24.5%)	447	28.5% (26.3%-30.8%)	155	29.2% (25.5%-33.2%)
3	1365	8.7% (8.3%-9.1%)	348	6.8% (6.1%-7.5%)	159	10.1% (8.7%-11.7%)	71	13.4% (10.7%-16.5%)
4	927	5.9% (5.5%-6.3%)	181	3.5% (3.0%-4.1%)	117	7.5% (6.3%-8.9%)	47	8.9% (6.7%-11.6%)
5: Least deprived	527	3.4% (3.1%-3.7%)	68	1.3% (1.0%-1.7%)	35	2.2% (1.6%-3.1%)	15	2.8% (1.7%-4.6%)
Missing			4		13		4	
Total	15724	100%	5154	100%	1581	100%	535	100%

Table shows Mean and Standard Deviation (SD), or Number (N) and 95% Confidence Intervals (95% CI). IMD = Index of Multiple Deprivation.
* Ethnicity is shown for women respondents (as male ethnicity was collected using different categories)

asked how confident they were that the Government was doing the right thing to stop the spread of COVID-19, 189 (39%) respondents were somewhat or extremely unconfident and 140 (29%) were confident in the Government's approach.

Vaccine hesitancy

Table 3 shows that overall, 154 (29%, 95% CIs: 26-34%) of respondents stated that they **would** want a COVID-19 vaccine, and 53 (10%, 8-13%) said that they **would not** want a vaccine. Most stated they had not thought about it (N= 154; 29%, 26–34%) or were not sure about it yet (N=161; 32%, 27–35%).

Figure 2 shows that there were significant differences in vaccine hesitancy by ethnicity and socioeconomic status: 43% (95% CIs: 37-54%) of White British respondents said that they **do want** a vaccine compared to only 13% (9–19%) of Pakistani heritage

Table 2. **Trust of organisations, and COVID-19 vaccine hesitancy by levels of trust.**

	Total		I've not yet thought about it		I'm not yet sure about it		I've decided I don't want it		I've decided I do want it		Missing
How much do you trust:	**N**	**Perc.**	**N**	**Percentage (95% CI)**	**N**	**Percentage (95% CI)**	**N**	**Percentage (95% CI)**	**N**	**Percentage (95% CI)**	**N**
The Government											
Trust it a great deal	49	10%	10	21% (12%-35%)	17	36% (24%-51%)	4	9% (3%-21%)	16	34% (22%-49%)	2
Tend to trust it	205	39%	58	29% (23%-36%)	62	31% (25%-38%)	12	6% (3%-10%)	66	33% (27%-40%)	7
Distrust it	200	37%	46	23% (18%-30%)	62	31% (25%-38%)	30	15% (11%-21%)	60	30% (24%-37%)	2
Don't know	70	14%	36	51% (40%-63%)	19	27% (18%-39%)	5	7% (3%-16%)	10	14% (8%-25%)	0
The NHS											
Trust it a great deal	226	42%	52	24% (19%-30%)	56	26% (20%-32%)	14	6% (4%-11%)	97	44% (38%-51%)	7
Tend to trust it	239	47%	70	30% (24%-36%)	90	38% (32%-45%)	24	10% (7%-15%)	51	22% (17%-27%)	4
Distrust it	27	5%	11	41% (24%-61%)	6	22% (10%-43%)	8	30% (15%-50%)	2	7% (2%-27%)	0
Don't know	34	6%	19	56% (39%-71%)	8	24% (12%-41%)	4	12% (4%-28%)	3	9% (3%-24%)	0
The local hospital											
Trust it a great deal	212	39%	43	21% (16%-27%)	53	26% (20%-32%)	14	7% (4%-11%)	94	46% (39%-53%)	8
Tend to trust it	234	46%	75	32% (27%-39%)	82	35% (30%-42%)	24	10% (7%-15%)	50	22% (17%-27%)	3
Distrust it	33	5%	12	36% (21%-54%)	10	30% (17%-48%)	5	15% (6%-32%)	6	18% (8%-36%)	0
Don't know	47	9%	22	47% (33%-61%)	15	32% (20%-46%)	7	15% (7%-28%)	3	6% (2%-18%)	0
Bradford Council											
Trust it a great deal	76	15%	16	22% (14%-33%)	26	36% (25%-47%)	6	8% (4%-17%)	25	34% (24%-46%)	3
Tend to trust it	282	54%	77	28% (23%-33%)	82	30% (25%-35%)	25	9% (6%-13%)	93	34% (28%-39%)	5
Distrust it	89	17%	23	26% (18%-37%)	29	33% (24%-44%)	13	15% (9%-24%)	22	25% (17%-36%)	2
Don't know	75	14%	35	47% (36%-58%)	21	28% (19%-39%)	6	8% (4%-17%)	13	17% (10%-28%)	0

Table shows Number (N) and 95% Confidence Intervals (95% CI).

	Total		I've not yet thought about it		I'm not yet sure about it		I've decided I don't want it		I've decided I do want it		Missing
How much do you trust:	**N**	**Percentage**	**N**	**Percentage (95% CI)**	**N**	**Percentage (95% CI)**	**N**	**Percentage (95% CI)**	**N**	**Percentage (95% CI)**	**N**
Local voluntary organisations											
Trust it a great deal	95	19%	24	26% (18%-36%)	26	28% (20%-38%)	10	11% (6%-19%)	32	35% (26%-45%)	3
Tend to trust it	268	52%	71	27% (22%-33%)	85	32% (27%-38%)	26	10% (7%-14%)	81	31% (26%-37%)	5
Distrust it	27	5%	9	33% (18%-54%)	9	33% (18%-54%)	4	15% (5%-35%)	5	19% (8%-39%)	0
Don't know	124	24%	46	37% (29%-46%)	36	29% (22%-38%)	8	7% (3%-12%)	33	27% (20%-35%)	1
Schools											
Trust it a great deal	148	29%	35	24% (18%-32%)	42	29% (22%-37%)	14	10% (6%-16%)	53	37% (29%-45%)	4
Tend to trust it	291	55%	83	29% (24%-35%)	89	31% (26%-37%)	25	9% (6%-13%)	88	31% (26%-36%)	6
Distrust it	43	9%	11	26% (15%-41%)	19	44% (30%-59%)	7	16% (8%-31%)	6	14% (6%-28%)	0
Don't know	41	8%	21	51% (36%-66%)	10	24% (14%-40%)	4	10% (4%-23%)	6	15% (7%-29%)	0
Police											
Trust it a great deal	130	26%	32	25% (19%-34%)	32	25% (19%-34%)	11	9% (5%-15%)	51	40% (32%-49%)	4
Tend to trust it	268	51%	75	29% (23%-34%)	82	31% (26%-37%)	21	8% (5%-12%)	84	32% (27%-38%)	6
Distrust it	51	9%	16	31% (20%-46%)	21	41% (28%-55%)	9	18% (9%-31%)	5	10% (4%-22%)	0
Don't know	73	14%	29	40% (29%-51%)	24	33% (23%-44%)	7	10% (5%-19%)	13	18% (11%-28%)	0
Public Health England											
Trust it a great deal	141	27%	30	22% (16%-30%)	42	31% (24%-39%)	8	6% (3%-11%)	56	41% (33%-50%)	5
Tend to trust it	235	45%	64	28% (23%-34%)	73	32% (26%-38%)	21	9% (6%-14%)	71	31% (25%-37%)	6
Distrust it	58	11%	17	29% (19%-43%)	19	33% (22%-46%)	11	19% (11%-31%)	11	19% (11%-31%)	0
Don't know	88	17%	38	43% (33%-54%)	27	31% (22%-41%)	9	10% (5%-19%)	14	16% (10%-25%)	0
Faith organisations											
Trust it a great deal	101	19%	28	29% (20%-38%)	34	35% (26%-45%)	12	12% (7%-20%)	24	24% (17%-34%)	3
Tend to trust it	243	47%	74	31% (26%-37%)	73	31% (25%-37%)	17	7% (5%-11%)	73	31% (25%-37%)	6
Distrust it	42	8%	6	14% (6%-29%)	14	33% (21%-49%)	9	21% (11%-37%)	13	31% (19%-47%)	0
Don't know	134	26%	42	32% (24%-40%)	40	30% (23%-38%)	11	8% (5%-14%)	40	30% (23%-38%)	1

Table shows Number (N), percentage and 95% Confidence Intervals (95% CI).

Distrust category contains both 'distrust it a great deal' and 'tend to distrust it'.

Table 3. Covid-19 vaccination hesitancy by sociodemographics and flu uptake.

	I've not yet thought about it		I'm not yet sure about it		I've decided I don't want it		I've decided I do want it		Missing	Total
	N	Percentage. (95% CI)	N	Percentage. (95% CI)	N	Percentage. (95% CI)	N	Percentage. (95% CI)	N	N
Total										
	154	**29% (26%-34%)**	**161**	**30% (27%-35%)**	**53**	**10% (8%-13%)**	**154**	**29% (26%-34%)**	**13**	**535**
By ethnicity										
White British	44	19% (15%-25%)	66	29% (23%-35%)	21	9% (6%-14%)	99	43% (37%-50%)	4	**234**
Pakistani	71	41% (34%-49%)	63	36% (30%-44%)	17	10% (6%-15%)	22	13% (9%-19%)	5	**178**
Other	23	32% (23%-44%)	22	31% (21%-43%)	11	15% (9%-26%)	15	21% (13%-32%)	3	**74**
Total										
By IMD Quintile										
1: Most deprived	80	34% (28%-40%)	78	33% (27%-39%)	30	13% (9%-18%)	47	20% (15%-26%)	8	243
2	49	32% (25%-40%)	44	29% (22%-37%)	17	11% (7%-17%)	42	28% (21%-35%)	3	155
3	15	22% (14%-33%)	19	28% (18%-39%)	5	7% (3%-16%)	30	43% (32%-55%)	2	71
4	8	17% (9%-31%)	13	28% (17%-42%)	1	2% (0%-14%)	25	53% (39%-67%)	0	47
5: Least deprived	1	7% (1%-35%)	5	33% (15%-59%)	0	0% (0%-0%)	9	60% (35%-81%)	0	15
By flu vaccine in the last year?										
No	123	33% (28%-38%)	128	34% (30%-39%)	42	11% (8%-15%)	80	21% (18%-26%)	5	378
Yes	25	19% (13%-26%)	30	22% (16%-30%)	10	7% (4%-13%)	69	51% (43%-60%)	1	135

Table shows Number (N), percentage and 95% Confidence Intervals (95% CI).

IMD = Index of Multiple Deprivation

respondents. Pakistani heritage respondents were more likely to be uncertain (36%, 30-44%), or to have not thought about it (41%, 34-49%), rather than stating they would not have a vaccine (10%, 6-15%).

Figure 3 demonstrates significant differences based on levels of deprivation. Of the least deprived quintile of IMD, 60% (35-81%) said that they **do want** a vaccine, compared to 20% (15-26%) in the most deprived quintile.

Figure 4 (see also Table 2) shows that participants who trusted the NHS a great deal were most likely to have decided they want a vaccine (44%, 38-51%), and those that distrusted the NHS were most likely to not want a vaccine (30%, 15-50%).

Figure 5 demonstrates that those that had already had a flu vaccine this year were more likely to want a COVID-19 vaccine (51%, 43-60%).

Reasons for vaccine hesitancy response

Of the 535 returned surveys, 64% (n = 343) offered a reason for their response to the question about accepting a vaccine.

Those that had decided **they do not want a vaccine** often stated that there had not been enough research/evidence, it had been 'rushed through' and they were concerned about the safety of the vaccines. Their responses were generally more suspicious in tone than respondents in the other groups, implying and sometimes

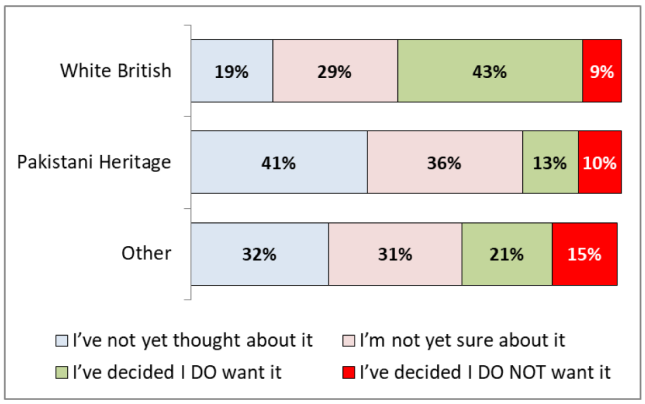

Figure 2. COVID-19 vaccination hesitancy by ethnicity.

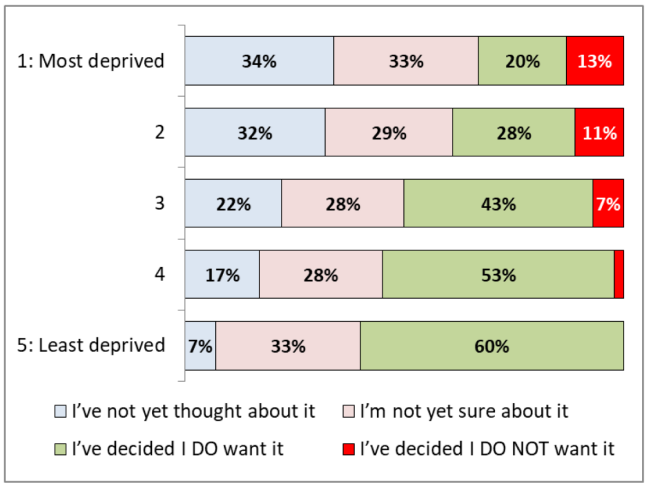

Figure 3. COVID-19 vaccination hesitancy by index of multiple deprivation quintile.

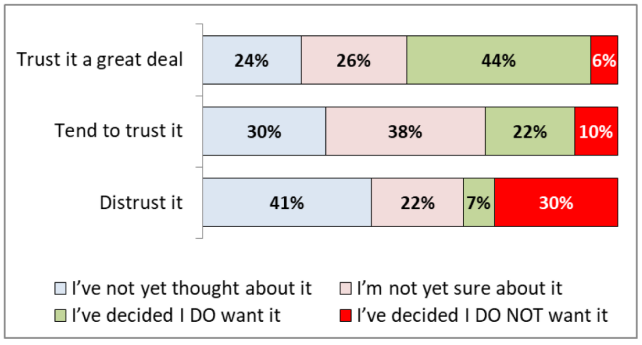

Figure 4. COVID-19 vaccination hesitancy by levels of trust in the NHS.

stating a lack of trust of those that had developed and approved the vaccines:

> *I don't trust the vaccine, it's been rushed through, side effects etc. just haven't been explored enough*

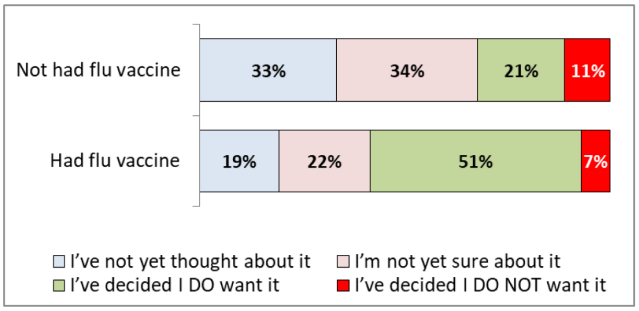

Figure 5. COVID-19 vaccination hesitancy by flu vaccine acceptance.

> *Untrustworthy of ingredients*

> *Do not trust that the vaccine safety testing will have been rigorous enough, due to being very rushed.*

> *I don't trust them*

These responses also showed participants' exposure to misinformation about the COVID-19 vaccines, and this was very explicit in some responses:

> *I'm very suspicious of the reasons for the world's reaction to* COVID-19 *and not sure I can trust what is in the vaccination.*

> *Apparently a fix for* Covid, *but at what cost in the future. Most people who get* Covid *will survive it without a vaccine. Vaccinating everyone is a great risk, as no-one had heard of Corona at the beginning of this year. Millions of people walk round with cancer cells, it's interesting none of these companies have ever looked for a vaccine for those!!*

A small number of respondents felt that they did not need a vaccine; either because they were fit and healthy or were taking other precautions, so not at risk:

> *I'm healthy and symptom free. Plus I don't feel comfortable having an unknown vaccine*

> *Because I'm not in an at risk or vulnerable category.*

> *They're not vegan and I don't agree with vaccines. A healthy diet is the best defense.*

> *Family is in good health so we don't need it*

Those who were **unsure about having a vaccine** expressed concerns about not having enough information to be able to make an informed decision, they were also anxious about not knowing the side effects, the speed with which vaccines had been developed and the safety of the vaccines:

> *Too much of speculations going around that the vaccine is not good so want to know more. Have more info, then will decide.*

> *I would like to see the side effects, if any, before committing. I am not an anti-vaccinator, however because it's new and potentially rushed, would be cautious*

> *I'm really anxious about the vaccination because of the speed in which it is being developed. I worry about possible side effects.*

Similar to those who said they did not want the vaccine, these respondents also indicated that exposure to recent and prevalent misinformation had confused them:

> *[Lack of] confidence in fast track development. I know it is unlikely but thalidomide springs to mind for people who took a new drug. That said I do get the flu vac each year and my children are inoculated so I guess I am confused so far.*

> *Just unsure about* COVID-19 *in general due to people saying it's not real etc. I'm confused.*

For those respondents who indicated that **they had not yet thought about having a vaccine**, it is worth noting that the majority of the responses were returned before a vaccine was available to be administered which influenced some of the responses:

> *Until a vaccine has been made why ask!*

> *Don't expect vaccines to be ready until mid-2021*

> *There's no imminent vaccine for* COVID-19*, nothing to think about yet*

It was also apparent from some responses that people were not aware that a number of COVID-19 vaccines were very close to being approved:

> *Nothing conclusive has been created.*

> *Will be years before vaccine is found*

Other participants who had not yet thought about having a vaccine stated that they were focusing on the present moment and did not have the time/space to think about a vaccine right now:

> *I am focused on getting through the here and now rather than spending time about what might happen in the future*

> *Not thinking about* Covid *anymore fed up of it on TV news everywhere*

Similar to the respondents who were uncertain, many responders who said they hadn't thought about it yet also indicated that they were worried about efficacy, safety and potential side effects of the vaccine.

Discussion

This study describes the levels of COVID-19 vaccination hesitancy, and levels of trust of key organisations, in families living in the deprived and ethnically diverse city of Bradford. The level of acceptance of vaccination was much lower than found in other studies, with just 29% of respondents being sure they would accept a vaccine, compared to 45-64% found in other studies. The majority of respondents remained uncertain, or had not yet thought about vaccination. The reasons for not wanting a vaccine included high levels of suspicion or distrust in those that had developed and approved the vaccines, as well as a belief in misinformation about the safety and/or the speed with which the vaccine had been developed. Similarly, those who remain uncertain expressed the need for more information, and confusion from exposure to prevalent misinformation. Those that hadn't yet thought about vaccination were either focusing on the present moment and didn't want to think about COVID-19 anymore or were unaware that vaccines were imminent and also raised similar safety concerns.

These results highlight a much higher level of vaccine hesitancy in ethnic minorities, those living in deprived areas and those that distrust the NHS. These findings strengthen the key messages from recent qualitative work - that there is an urgent need to tackle the overwhelming misinformation about COVID-19 that is leading to uncertainty and confusion about the need for the vaccine, and in the worst cases, a belief that the vaccine should not be accepted[2].

The results of this survey have been used to inform local policy through the Bradford District Strategic Coordination Group. A communications strategy has targeted different communities with culturally appropriate messages about the vaccine led by trusted role models and faith leaders. This has included high profile vaccine champions aiming to dispel vaccine myths through multiple media channels and developing a grassroots network of COVID-19 leads to provide neighbourhood advice and support.

We suggest that a wider and carefully targeted response is also required to increase vaccine acceptability across the UK, particularly in ethnic minority groups and those living in deprived communities. Most importantly, messaging needs to reassure those who are uncertain or unwilling to think about the vaccines. This messaging needs to be culturally appropriate, provided in non-technical language, and be empathetic to the levels of confusion and distress that people are feeling.

Messaging must come from trusted sources. There was a lack of trust of the Government and local council, but strong levels of trust of the NHS, local hospitals and schools. However those least likely to take-up the vaccine also distrusted the NHS. Use of trusted organisations other than the NHS (e.g. schools), and of trusted community and faith leaders where appropriate, may help to reassure and encourage those who are currently not willing to accept the vaccine.

Strengths and limitations

These findings demonstrate varying levels of trust of key organisations and differential views on vaccine hesitancy based on ethnicity and deprivation. Our study is the first to provide views from a population with a high degree of ethnic diversity and deprivation. The response rate to this study was quite low (31%). The vast majority of responders were female with an average age of 42 years (which is to be expected as the majority of BiB participants are women recruited during their pregnancy). Non-responders, male participants and different age groups may have different views to those reported here. Nevertheless our findings do reflect those reported in other studies, with the level of vaccine hesitancy in White British parents matching that found

in other studies, as well as an increased likelihood of vaccine hesitancy in those from ethnic minorities and/or living in deprived circumstances.

The mixed methods approach, allowing open text responses to illuminate people's views on vaccination, also adds strength to this study. The reasons for uncertainty or unwillingness reflect those found in a recent report[7].

This study was completed before any of the vaccines had been approved for roll out so there are likely to be some changes in perception now and further exploration of this would be valuable.

The longitudinal nature of the BiB cohorts will allow us to explore change over time and we will continue to follow families throughout the pandemic, adding further value to this research. In addition we have access to routine health data for all participants which will allow us to look at vaccine up-take as data become available throughout 2021.

Conclusion

Vaccination hesitancy differs based on ethnicity, level of deprivation and trust of key organisations, with those most at risk of serious impact of the virus being the least likely to accept vaccination. Confusion, distrust and distress caused by prevalent misinformation was a main cause of this high vaccine hesitancy. Effective and equitable roll out of the vaccination programme requires careful, empathetic messaging, targeting those whom it will benefit the most, and a multi-organisational approach to address issues of distrust.

Data availability

Underlying data

Scientists are encouraged and able to use BiB data, which are available through a system of managed open access. The steps below describe how to apply for access to BiB data.

- Before you contact BiB, please make sure you have read our Guidance for Collaborators. Our BiB executive review proposals on a monthly basis and we will endeavor to respond to your request as soon as possible. You can find out about the different datasets which are available here. If you are unsure if we have the data that you need please contact a member of the BiB team (borninbradford@bthft.nhs.uk).
- Once you have formulated your request please complete the 'Expression of Interest' form available here and send to borninbradford@bthft.nhs.uk
- If your request is approved we will ask you to sign a collaboration agreement and if your request involves biological samples we will ask you to complete a material transfer agreement.

Extended data

Harvard Dataverse: Acceptability of Covid-19 vaccination in an ethnically diverse community: descriptive findings from the Born in Bradford study. https://doi.org/10.7910/DVN/Q0SPIQ[13]

This project contains the following extended data:

- Survey questionnaire
- COVID-19 Code book for free text responses

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