


BMJ Open Jeelo Dobara (Live Life Again): a cross-sectional survey to understand the use of social media and community experience and perceptions around COVID-19 vaccine uptake in three low vaccine uptake districts in Karachi, Pakistan

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ABSTRACT

Objective To gather preliminary insights through formative research on social media usage, and experiences, attitudes and perceptions around COVID-19 and COVID-19 vaccination in three high-risk, underserved districts in Karachi, Pakistan.

Design Cross-sectional mixed-method design.

Participants 392 adults (361 surveys and 30 in-depth interviews (IDI)) from districts South, East and Korangi in Karachi, Pakistan.

Main outcome measures Social media usage and knowledge, perception and behaviour towards COVID-19 infection and vaccination.

Results Using social media was associated with an increased probability of getting vaccinated by 1.61 units. Most of the respondents (65%) reported using social media, mainly to watch videos and/or keep in touch with family/friends. 84.76% knew of COVID-19 while 88.37% knew about the COVID-19 vaccination, with 71.19% reported vaccine receipt; reasons to vaccinate included belief that vaccines protect from the virus, and vaccination being mandatory for work. However, only 56.7% of respondents believed they were at risk of disease. Of the 54 unvaccinated individuals, 27.78% did not vaccinate as they did not believe in COVID-19. Despite this, 78.38% of respondents scored high on vaccine confidence. In IDIs, most respondents knew about COVID-19 vaccines: 'This vaccine will create immunity in your body. Therefore, I think we should get vaccinated', and over half knew how COVID-19 spreads. Most considered COVID-19 a serious public health problem and thought it important that people get vaccinated. However, there was a low-risk perception of self as only a little over half felt that they were at risk of contracting COVID-19.

Conclusion With our conflicting results regarding COVID-19 vaccine confidence, that is, high vaccine coverage but low perception of risk to self, it is likely that vaccine coverage is more a result of mandates and

STRENGTHS AND LIMITATIONS OF THIS STUDY

- ⇒ Our study includes both structured questionnaires and in-depth interviews, which better equipped us to tease out the true beliefs regarding the COVID-19 vaccines.
- ⇒ To increase local generalisability of the results, we collected data from varied districts of Karachi, a megacity with a population of 20 million where 60% of the population lives in slums or unstructured areas.
- ⇒ Our study ensured equal gender representation.
- ⇒ We did not have a standard measure for COVID-19 vaccine confidence at the time of our study.

coercion than true vaccine confidence. Our findings imply that interactive social media could be valuable in fostering pro-vaccine sentiment.

INTRODUCTION

The COVID-19 pandemic has claimed over 6 million lives globally,¹ with 30 630 deaths and 1.5 million confirmed cases since 2019 in Pakistan alone.² The COVID-19 vaccines brought hope for an end to the pandemic, however, while willingness to vaccinate was on the rise in 2020 when Pfizer announced its COVID-19 vaccine, this global trend masked geographical and temporal variations.³ Despite being free-of-cost, the huge cascade of viral misinformation, on and offline, compromised public confidence in the COVID-19 vaccine world over. As a result, many countries, including Pakistan opted to introduce vaccine mandates restricting access to work,

travel and school for unvaccinated individuals. Regardless of success, some have suggested that mandates or coercive policies may act as breeding grounds for conspiracy theories and may not be sustainable in the long term.⁴⁻⁶ It has been suggested that future work on vaccine uptake should focus on developing and analysing effective and equitable strategies to foster and promote evidence-based health literacy including the use of digital platforms.⁷

The pandemic with the ensuing lockdowns brought on an unprecedented rapid increase in social media use globally⁸; lockdown measures imposed to limit COVID-19 spread left people isolated with limited contact to the outside world, resulting in social media becoming a key method for many to stay in touch and keep informed. As a result, social media has overtaken traditional forms of media (eg, television, newspapers, magazines) for health-related information globally.⁹ The ability of individuals to rapidly create and share content on social media without editorial oversight has led to the spread of false claims, conspiracy theories and pseudoscientific therapies, regarding the diagnosis, treatment, prevention, origin and spread of COVID-19.¹⁰ This abundance of (mis)information on COVID-19 and its vaccine became an online focus of intense discourse; Twitter reported COVID-19-related tweets every 45 ms in April 2020.¹¹ In February 2020, the director general of the WHO declared an infodemic with this 'overabundance of information', with the WHO deploying dedicated social media teams and technical risk communication strategies to track and respond to fake news.¹²⁻¹³ Unlike the objective tone used by most mainstream journalists, news content and imagery that generates strong emotion are more likely to catch attention and be shared; negative emotion increases the probability of virality and the reason for the rapid spread of fake news.¹⁴ Emotional response to social media content thus needs to be accounted for (such as, stirring anecdotes and images) to interest audiences and convey the importance of COVID-19 vaccine rather than only facts and figures.¹⁵⁻¹⁶ This can only be achieved through an inclusive participatory approach during the designing and implementation of digital media content.⁷⁻¹⁷⁻¹⁸

Similar to global trends, there was a massive increase in social media usage during the pandemic in Pakistan, with 61.3 million internet users (21% increase between 2020 and 2021) and 20.6% of the 220 million population are now on social media.¹⁹ Given the continued vaccine hesitancy towards the COVID-19 booster vaccine in Pakistan, as suggested in a recent study,²⁰ and an overburdened healthcare system, research is required to develop a robust social media health promotion campaign to combat misinformation and improve vaccine confidence. Furthermore, if Pakistan is to keep with the global shift towards a digital public health system, it is vital that this does not result in widening of inequities in health seeking behaviour, such as the negative impact on routine childhood immunisation uptake noted during COVID-19.²¹⁻²² Pakistan's population is a mosaic of diverse cultures and ethnicities, and to develop effective provaccine sentiment

we need to understand our local audiences and their experiences to ensure equitable access to health information.¹⁸

The aim of our study was to gather preliminary insights through a cross-sectional survey on people's social media usage, as well as experiences, perceptions and behaviours around COVID-19 and its vaccines in three poor vaccine uptake districts of Karachi, Pakistan.

METHODS

Study design and participants

This study followed a cross-sectional mixed-method design and surveyed 361 adults and 30 in-depth interviews (IDI) between December 2021 and January 2022. Using OpenEpi, we calculated the sample size of $n=286$ using 40% COVID-19 vaccine hesitancy reported in the 2021 Ipsos survey, considering a CI of 95% and 80% power.²³⁻²⁴ The systematic survey was done using a random start, and systematic interval of one household following the right-hand rule to create a systemic procedure to minimise surveyors bias; the households sampling was initiated from the expanded programme on immunisation centre of each selected union council (UC: the smallest geographic administrative unit). We spun a pen on the ground and moved in the direction in which the pen came to rest. The first residential structure on the right side within the village was identified and surveyed, following which we selected the next household with an interval of one household and so on, till the required sample size was achieved. Any household member above the age of 18 was eligible to be surveyed. We ensured 50% of participants were women for equal gender representation. IDIs were conducted to supplement the survey using a convenience sampling method. Field officers hired by the programme team recruited participants who agreed to interviews which took an average of 45 min. The IDI sample was also segregated along the lines of gender.

The 12 UC selected in districts South, East and Korangi of Karachi, Pakistan, were based on:

1. Poor uptake of routine childhood immunisations as per official records from the Government of Sindh's electronic immunisation registry—where Districts Korangi, South and East had a median vaccination rate of 33.2%, 40.6% and 39.1%, respectively, of children born in 2020²⁵ (recommended is >85%). Routine childhood immunisation served as a proxy for COVID-19 immunisation rates, as COVID-19 vaccination data were not available at the district level.
2. High COVID-19 positivity rates as reported by the Government of Sindh's daily situation report, where District East had the highest number of active COVID-19 cases reported in Karachi at the time, followed by Korangi and South (887, 551 and 179, respectively, as on 26 October 2021).
3. High smartphone coverage; Pakistan has a teledensity of 87.74% and a 51.24% penetration of 3G/4G subscribers.

Questionnaire items

Participants were surveyed using a 39-item questionnaire made up of 5 sections: demographics, knowledge of COVID-19 and its vaccine, perceptions towards COVID-19 and its vaccine, behaviour towards COVID-19 and its vaccine, social media access and usage (online supplemental materials 1 and 2). Due to time constraints, the questionnaire was based on lead investigators knowledge of the local population and incorporated feedback from the field team after pilot testing. We developed a vaccine confidence score (0–6) based on ‘yes/no’ responses to five COVID-19-related questions: (1) Do you agree with the statement: ‘COVID-19 should be treated as a serious concern for the general well-being of the public?’; (2) Do you agree with the statement that ‘every eligible person should get vaccinated to protect themselves and others from COVID-19?’; (3) Do you take any precautionary measures for protection from COVID-19?; (4) Do you encourage others to take precautionary measures against COVID-19? and (5) Have you received a COVID-19 vaccine yet?

Patient and public involvement

This cross-sectional survey did not include patient or public involvement in study designing, commenting on outcomes, interpreting results or reviewing manuscript. However, all participants received information letters of and signed consent forms if willing to participate.

Statistical analysis

We calculated the percentage distribution of demographic variables of the total population, and the percentage difference between genders and χ^2 test using complete case analysis to assess statistical significance. For multi-select answers we used the `mrtab` command to handle multiple responses which are stored as separate variables. We constructed a Bayesian model assuming Bernoulli distribution for both vaccine confidence and vaccination status. We also assumed non-informative distribution of the parameters, and obtained the posterior distributions using the Markov chain Monte Carlo method. We set five simultaneous sampling sequences, each consisting of 10 000 random samples. Sampling convergence was evaluated by visually inspecting a trace plot. Analysis was done using STATA V.14-2 (StataCorp 2015).

A thematic analysis was conducted to analyse the responses from the IDI using software MAXQDA Standard version 2022 (VERBI Software).

RESULTS

Survey

Table 1 summarises the descriptive statistics of the sample. Out of 361 respondents, 25.21% had no formal education, 54.29% had a monthly income below PKR30 000 (circa US\$148; minimum wage in Pakistan is PKR25 000 (circa US\$124)), 35.73% were homemakers (72% of which were women) and 33.8% self-employed (49% of which were men).

Table 1 Demographic description of survey participants (N=361)

	Male (n=181)		Female (n=180)	
	Mean	SD	Mean	SD
Age	33.21	11.85	34.65	10.85
	n	%	n	%
Education				*
None	31	17.13	60	33.33
Primary	29	16.02	32	17.78
Secondary	67	37.02	57	31.67
Higher secondary	15	8.29	9	5.00
Bachelors and above	39	21.55	22	12.22
Married				*
No	73	40.33	41	22.78
Yes	108	59.67	139	77.22
Occupation				*
Housework	0	00.00	129	71.67
Daily wage earner	26	14.36	2	1.11
Self-employed	92	50.83	30	16.67
Private sector	27	14.92	5	2.78
Government sector	7	3.87	4	2.22
Unemployed	29	16.02	10	5.56
Average household income (PKR)				*
<30 000	70	38.67	126	70
30 000–50 000	51	28.18	36	20
>50 000	20	11.05	6	3.33
Do not want to disclose	40	22.1	12	6.67

* χ^2 test with $p < 0.05$ of %difference between %female and %male. PKR, Pakistan Rupee.

Table 2 shows respondents’ access to digital technology and social media. Out of 361 respondents, 57.34% had their own smartphones, of which there were more men than women (%difference 21.29, $p=0.00$), and 9.42% used smartphones belonging to someone else; of these, most were women (%difference 6.7, $p=0.00$). Of the 64.54% who had access to the internet, most were men (%difference 15.71, $p=0.00$). Social media was used by 65.65% of respondents, and the top three ranking platforms were WhatsApp (55.12%), YouTube (42.66%) and Facebook (33.80%). Comparing gender preferences between platforms, a significant difference in preference was only seen for Facebook, which was preferred by women more than men (%difference 31.94, $p=0.000$). Of the 237 social media users, 76.79% reported checking their social media at least once a day, using it mainly to watch videos (73.84%) and keep in touch with family and friends (40.93%). Only 12.24% used social media as a source of news and information.

Table 2 Respondents access to digital technology and social media (N=361)

	Male (n=181)		Female (n=180)	
	n	%	n	%
Phone access				
Do you have access to a smartphone?				*
I have a personal smartphone	123	67.96	84	46.67
I use a smartphone that belongs to someone else in the house	11	6.08	23	12.78
No, I have access to a feature phone	34	18.78	33	18.33
No, I don't have access to any phone	13	7.18	40	22.22
Internet access				
Do you use the internet?				*
No	50	27.62	78	43.33
Yes	131	72.38	102	56.67
Social media				
Which social media platforms do you use the most?†				
Facebook	90	49.72	32	17.78*
Whatsapp	108	59.67	91	50.56
Snapchat	10	5.52	6	3.33
Snack video	12	6.63	9	5
TikTok	26	14.36	35	19.44
Youtube	83	45.86	71	39.44
Instagram	13	7.18	5	2.78
Don't use any social media platform	50	27.62	74	41.11
Other	2	1.1	1	0.56
For which activities do you use social media most for?†				
Watch videos	103	78.63	72	67.92
Watch cooking shows	1	0.76	27	25.47
Watch/read religious content	26	19.85	9	8.49
Games	20	15.27	8	7.55
Personal interests and hobbies	14	10.69	21	19.81
Keep in contact with friends/family	48	36.64	49	46.23
Access news/information	21	16.03	8	7.55
Work	33	25.19	7	6.6
Other	1	0.76	6	5.66
How often do you use social media?				
				*
A few times a day	12	9.16	29	27.36
Once a day	113	86.26	69	65.09
Once or twice a week	1	0.76	1	0.94
Not frequently	5	3.82	7	6.60

* χ^2 test with $p < 0.05$ of % difference between %female and %male.
 †Multiselect answers.

Table 3 presents the knowledge, perceptions and behaviours regarding COVID-19 infection and vaccine among our sample. Of the 361 respondents, 84.76% were aware of COVID-19, with a greater awareness among women (%difference 17.09, $p=0.00$), and 88.37% knew of the COVID-19 vaccines, with a greater awareness among

women (%difference 13.23, $p=0.00$). 22.16% of respondents had been infected with COVID-19 or knew someone who had, with a little over half perceived themselves at risk of infection (56.79%)—with more women considering themselves at risk (%difference 16.38, $p=0.00$). 85.04% of respondents perceived COVID-19 as a serious

Table 3 Knowledge, perceptions and behaviours towards COVID-19 disease and its vaccines (N=361)

	Male (n=181)		Female (n=180)	
	n	%	n	%
Do you know about COVID-19?	Knowledge			*
No	43	23.76	12	6.67
Yes	138	76.24	168	93.33
Have you or anyone close to you ever been infected with COVID-19?				
No	141	77.9	140	77.78
Yes	40	22.1	40	22.22
Do you know about COVID-19 vaccines?				*
No	33	18.23	9	5
Yes	148	81.77	171	95
Do you know any places where people can go to get vaccinated for COVID-19?				
No	5	2.76	8	4.44
Yes	176	97.24	172	95.56
Do you consider yourself as being at risk of getting infected with COVID-19?		Perception		*
No	93	51.38	63	35
Yes	88	48.62	117	65
Do you agree with the statement: 'COVID-19 should be treated as a serious concern for the general well being of the public'?				*
No	35	19.34	19	10.56
Yes	146	80.66	161	89.44
In what ways has COVID-19 pandemic affected your life?†				
My job	75	41.44	88	48.89
My household income	133	73.48	144	80
My child's schooling	162	34.25	81	45
My education	27	14.92	31	17.22
My travel	26	14.36	54	30
My leisure activities	4	2.21	15	8.33
My relationships	21	11.6	18	10
Didn't affect my life	9	4.97	9	5
Is your daily routine still altered/affected as the result of the COVID-19 pandemic?				*
No	96	55.81	76	44.44
Yes	76	44.19	95	55.56
Have you witnessed or heard of any adverse effects due to COVID-19 vaccines?				
No	114	62.98	106	58.89
Yes	67	37.02	74	41.11
If yes: Has the information around COVID-19 impacted your decision to get vaccinated?				*
No	44	65.67	35	47.3
Yes	23	34.33	39	52.7
Do you agree with the statement that 'every eligible person should get vaccinated to protect themselves and others from COVID-19'?				
No	27	14.92	19	10.56
Yes	154	85.08	161	89.44
Do you take any precautionary measures for protection from COVID-19?		Behaviour		
No	18	9.94	23	12.78

Continued

Table 3 Continued

	Male (n=181)		Female (n=180)	
	n	%	n	%
Yes	163	90.06	157	87.22
Do you encourage others to take precautionary measures against COVID-19?				*
No	38	20.99	20	11.11
Yes	143	79.01	160	88.89
Have you received a COVID-19 vaccine yet?				*
No	37	20.44	67	37.22
Yes	144	79.56	113	62.78
If yes: What were your reasons to get vaccinated?†				
It will fully protect me	66	45.83	67	59.29
I am at risk of COVID-19 infection and vaccine will help to reduce the severity of illness	22	15.28	18	15.93
My doctor advised me	3	2.08	7	6.19
Family and friends advised	9	6.25	11	9.73
Some information in the media recommended it	2	1.39	4	3.54
It is mandatory at my workplace	23	15.97	14	12.39
For travel on public transport	8	5.56	7	6.19
Only children of vaccinated parents can attend school	7	4.86	6	5.31
To continue my education	4	2.78	3	2.65
To go to parks, restaurants, cinemas, shrines, etc.	2	1.39	1	0.88
So that I may not transfer the virus to other people	3	2.08	0	0
I needed the vaccination card	24	16.67	9	7.96
Other reasons	2	1.39	4	3.54
If yes: Have you received both doses?				
No	5	4.42	2	1.39
Yes	108	95.58	142	98.61
If no: Would you be willing to get fully vaccinated for COVID-19?				
No	15	40.54	39	58.21
Yes	22	59.46	28	41.79
If no: What is the main reason for not wanting to get vaccinated?†				
Not eligible due to a pre-existing health issue	1	6.67	5	12.82
I don't think the vaccine will protect me from COVID-19	4	26.67	4	10.26
People can die after taking the vaccine	2	13.33	8	20.51
It can cause infertility	1	6.67	1	2.56
I don't trust the government's vaccines	3	20	8	20.51
Covid doesn't exist	6	40	9	23.08
I am afraid of the side effects of the vaccines	1	6.67	8	20.51
Social media warns against receiving COVID-19 vaccine	0	0	4	10.26
Family/friends recommend against it	0	0	1	2.56
Doctors/other health professionals do not recommend it				
It is against my religious beliefs	0	0	2	5.13
Other	1	6.67	5	12.82
Do you know of anyone who paid to get the vaccination card without actually getting vaccinated?				
No	159	87.85	152	84.44

Continued

Table 3 Continued

	Male (n=181)		Female (n=180)	
	n	%	n	%
Yes	21	11.6	21	11.67
I know of multiple people in this regard	0	0	4	2.22
Prefer not to disclose	1	0.55	3	1.67
Confidence Score (%)				
0	6	3.31	3	1.67
20	6	3.31	5	2.78
40	7	3.87	10	5.56
60	22	12.15	19	10.56
80	36	19.89	45	25
100	104	57.46	98	54.44

* χ^2 test with $p < 0.05$ of %difference between %female and %male.
 †Multiselect answers.

infection—more women than men (%difference 8.79, $p=0.02$)—with the pandemic having the most impact on their household income (76.73%), and still affecting the daily routine of 49.85% of respondents—more women than men (%difference 11.37, $p=0.04$).

At the time of the survey 39.06% of respondents had witnessed or heard of vaccine side effects, of these, 43.97% said that it had impacted their decision to get vaccinated—more women were affected (%difference 18.37, $p=0.03$). Of the 54 people not wanting to get vaccinated, the main reasons stated was that they: (1) did not believe COVID-19 was real (27.78%), (2) did not trust the government vaccines (20.37%), (3) believed that people could die from taking the vaccine (18.52%), (4) were afraid of the vaccine side effects (16.67%) and (5) believed that the vaccine would not protect them from COVID-19 (14.81%). Despite this, the majority of the 361 respondents (87.26%) believe that every eligible person should get vaccinated.

Surveying behaviour towards COVID-19 and its vaccine, 88.64% of total respondents admitted taking precautionary measures against infection, and 83.93% encouraged others to do the same. Nearly three-quarters of the respondents had already received their first dose of COVID-19 vaccination—more men vaccinated

(%difference 16.78, $p=0.000$)—and 98.28% of those vaccinated have received both doses. Of the 257 respondents having been vaccinated, reasons for getting vaccinated include that they: (1) believed it would fully protect them (51.75%), (2) believed it would help reduce the severity of disease (15.56%), (3) needed it for work (14.4%) and (4) needed the vaccination card (12.84%). The six-level confidence score which shows high COVID-19 vaccine confidence among respondents (78.39%) with no significant difference between the genders.

The Bayesian logistic regression analysis showed a slight, albeit not significant, increased probability of 0.11 unit (CrI 95% -1.47 to 1.44) in vaccine confidence in individuals who used social media (table 4). However, analysis examining vaccination status recorded a more significant 1.61 unit (CrI 1.54 to 1.61) higher probability of being vaccinated in those individuals using social media, as compared with those who did not.

In-depth interviews

We interviewed 16 men and 14 women. For both men and women, the average age was 37 years. On average, most women were self-employed or identified as homemakers, whereas men were working for private organisations or were otherwise self-employed.

Table 4 Bayesian logistic regression analysis of association of social media usage with COVID-19 vaccine confidence and vaccination status (N=361)

	Vaccine confidence		Vaccinated	
	Mean	95% CrI	Mean	95% CrI
Social media usage	0.11	-1.47 to 1.44	1.61	1.54 to 1.61
Age	0.01	-0.03 to 0.04	0.05	0.05 to 0.05
Gender	-0.20	-0.86 to 0.44	0.81	0.79 to 0.81
Education	-0.19	-0.43 to 0.04	-0.13	-0.13 to -0.132

CrI, credible interval.

Partial knowledge and misinformation informed respondents' behaviour around COVID-19 and its vaccines. 63.3% of respondents claim they knew how the COVID-19 virus spreads. However, only 10% of the respondents correctly identified that everyone can be at-risk of contracting it. Moreover, initial experience around people who contracted COVID-19 also at times misinformed them about virus transmission. 96.6% of respondents knew about the existence of the COVID-19 vaccines and 93.3% also claimed that they knew the vaccines can provide protection against COVID-19. However, respondents were still unsure of how vaccines work and, therefore, hesitant towards getting vaccinated against COVID-19.

First of all, there is fear, I have no idea if it would react badly with my body... My heart is not satisfied and convinced to get vaccinated.

Respondents both among men and women were certain about the preventive measures required for protection against COVID-19, and recited them the way they heard them communicated via mass media.

We have to wash hands regularly, use sanitizer, wear masks, and if there are 6 to 8 people gathered and sitting together, we make sure that we maintain distance and don't sit too closely.

83.3% of the respondents were in agreement when asked if they think it is important to get vaccinated. However, there was a low-risk perception of self as only 56.6% of respondents felt that they were at-risk of contracting COVID-19, sharing a higher need for older populations to get vaccinated. Moreover, respondents expressed positive affirmations regarding the COVID-19 vaccines based on the following: to protect themselves as well as others from contracting COVID-19 and to build immunity against the virus. Positive perceptions surrounding the vaccine indicated that getting vaccinated had created ease with 90% of respondents stating that it reduces the chances of a COVID-19 outbreak. In addition, respondents highlighted that by getting the COVID-19 vaccine they have increased mobility and can resume their work that had slowed down during lockdown. This is in-line with 53.3% reporting that the pandemic has had adverse social and economic effects on people. Furthermore, lockdowns had caused social isolation as people were unable to meet loved ones or celebrate religious and cultural holidays. A significant impact on mental health was expressed by a few respondents as they recognised that the uncertainty and fear surrounding COVID-19 caused a lot of distress to themselves and their families. An effect on children's schooling was also reported as school closures led to a shift towards remote learning.

In contrast to these findings, few interviewees mentioned a lack of belief in COVID-19 in their communities.

People are taking it as a joke, then many people began contracting it and dying so now some people

believe it. Most people are not taking it seriously and are taking it as a joke.

Those who had lived experiences of COVID-19 or had witnessed close family and friends affected by COVID-19 were more likely to believe that the virus is real and were aware of symptoms and precautionary measures.

Until one does not experience it for themselves, they do not understand the environment or situation. When I contracted COVID-19, I realized that COVID-19 is real and exists.

Trust in the sources of information for health concerns also came across as an important factor affecting the practices and behaviour around COVID-19 and vaccines. Healthcare professionals were deemed most trustworthy by the respondents when seeking information pertaining to health. However, it was also observed that respondents mostly referred to their local community general practitioners as their source of information for any news related to public health concerns. Most respondents also claimed to have trust in information shared by the government with regard to COVID-19. Both among men and women, respondents claimed it to be a part of their civic duty and responsibility to act as prescribed by the government bodies.

We are aware that since the government of Pakistan has mandated the vaccine it is our duty to get vaccinated and try to move towards living a normal life.

Respondents regarded friends and family as another highly trustworthy source of information in relation to health concerns. Most respondents either mentioned lived experiences of their relatives or of someone they knew when referring to their belief or disbelief in COVID-19 vaccines. In addition to this, personal stories of lived experiences were also deemed credible by the respondents.

Information is only worth trusting if you have lived through that ordeal.

Mixed opinions were shared by the respondents about media in general and social media in particular being a trustworthy source of information for health concerns. Moreover, respondents claimed that they used other sources to further verify information that they receive through social media such as family, friends and healthcare professionals. Scientific facts, figures and explanations alone were not given much credit by the respondents.

An estimated 93.3% of respondents reported taking precautions against COVID-19. Respondents shared various preventive measures they adopted measures on a routine basis against COVID-19, such as wearing masks (33.3%) and washing/sanitising hands (60%). Other measures mentioned included wearing gloves, getting vaccinated, washing dirty clothes and physical distancing. An importance was also placed on guiding others to

follow Standard Operative Procedures (SOPs) with 90% stating that they advised others to observe SOPs.

I've stopped my children from attending public gatherings. Closed spaces should be avoided, such as cafes where people are having food in an enclosed space. Masks are necessary; I have also told my children that gloves should be worn at all costs.

Three categories were evident for respondents' reasons to get vaccinated: due to health concerns, to obtain vaccination cards and because it is mandated by the government. Awareness that the vaccine would boost their immunity and satisfaction that they are now protected after getting the COVID-19 vaccine was also observed.

I had to get the vaccine shot because I go outside for work and after I come home I need to protect my nieces and nephews.

Reasons mentioned for needing vaccination cards included: to be able to travel, visit the hospital and to be able to collect salary from the bank.

I made the right decision, because I had applied for a job and they had told me that they will not employ me till I get vaccinated. So when I applied for the job I handed in a copy of my vaccine card as well.

Furthermore, getting vaccinated because it is mandated was also a prominent finding from the interviews.

DISCUSSION

This study demonstrates a high social media use in an otherwise underserved population in Pakistan, with those using social media having a higher likelihood of being vaccinated against COVID-19. Results regarding COVID-19 knowledge, perception and behaviours are however contradictory. To our knowledge, this is the first time such a comprehensive analysis has been conducted.

There is a clear variation in social media usage across the globe (20%–87%)¹⁰ and within Pakistan²⁶; there is 30% higher social media usage in this study's sample as compared with the national average, while a recent study from Multan (a city in Punjab Province), whose study participants were from a higher-income group, reported 69.4% higher social media usage than the national average.^{10 19 26} With the increase in affordability of digital technology, it is of no surprise that social media has become the preferred platform of communication and entertainment across all population strata. As people look to their friends and family for validation of the information they find on social media, future interventions that target these individuals is more likely to influence how they feel about COVID-19 and other health interventions rather than standard medical information alone.¹⁴

Despite a high level of COVID-19 knowledge reported in our data, risk perceptions and disease attitudes were low, with lived experience leading to a stronger belief in COVID-19. A high COVID-19 vaccination rate, with only

50% of respondents believing the vaccine would protect them, suggests that a high vaccine confidence score as per our survey may not accurately reflect true feelings regarding COVID-19 vaccination. In line with the results of our survey, the IDIs revealed that COVID-19 vaccines were perceived as a means to restore mobility and social relationships in the face of the pandemic. Several respondents highlighted the importance of vaccines in relation to physical and mental health concerns. The acquisition of vaccine cards, however, was one of the most prominent reasons for vaccination or vaccine significance in the IDIs. These government-issued identification cards enhance employment and educational opportunities. In addition to cards, restrictions and lockdowns negatively impacted respondents' social relationships, making it difficult for them to meet their loved ones.

The success of Pakistan's COVID-19 vaccine uptake (>130 million vaccinated to date)² was due to mandates rather than demand generation, as we continue to see vaccine hesitancy despite high vaccination rates. The enormously high vaccine confidence score we noted in our data was also cause for concern and while the IDIs revealed some nuance, there is still more to be explored. This opens the realm to consider the possibility that respondents did not feel comfortable sharing their real views about COVID-19 vaccines since the government had enforced strict mandates and coercion, especially prior to vaccine availability whereby people were forcibly placed in isolation facilities and movement curtailed. This was reinforced by the noted change in narrative by interviewees once the recordings were turned off. Keeping this in mind, we aim to explore field narrative reports through project implementation which may reveal more authentic sentiments around COVID-19 vaccines.

As we were not able to statistically validate our questionnaire, and a validated Vaccine Confidence Index was not yet available, this was a limitation of our study. By incorporating both the survey and IDIs, we were able to gain a deeper understanding of influencing factors surrounding COVID-19 and COVID-19 vaccine uptake that gave strength to our findings. While we collected data across three districts within Karachi to ensure generalisability of results, as 50% of Sindh's population resides in Karachi, with 60% residing in slum or unstructured areas, this study's results are only applicable to other regions of the country with comparable urban conditions and may not be applicable in rural settings. With large gender disparities with regard to access to digital technology and health-care across the country, we ensured that we had equal gender distribution to strengthen our results and reflect a gender-informed lens.

CONCLUSION

The contradictory responses to questions regarding COVID-19 vaccination in our survey and IDIs suggest that vaccine mandates and limited mobility may have been prominent reasons to get vaccinated rather than trust

in the COVID-19 vaccine itself. Furthermore, our data suggest interactive social media to be a valuable health education tool. Future work should, therefore, consider the use of participatory and non-traditional research tools to gauge true perceptions around a complex pandemic virus, such as COVID-19 to generate provaccine content for social media campaigns.

Twitter Anokhi Ali Khan @anokhialik and Mehek Ali @desi_thumka

Contributors The study was designed by AAK, MA and MK. All three implemented the study and collected data. AAK, MB and SAHR did the statistical analysis, while KK and FP conducted thematic analysis of IDIs with statistical analysis support from TS. AMT and UUR supported the design of tools and field implementation. AP supported implementation and manuscript preparation. AAK and MA drafted the initial manuscript and all authors participated in reviewing the draft and assisting with revisions. All authors approved the final version of the manuscript. The authors would also like to acknowledge and thank the Field Officers and Supervisor hired for the project who conducted the survey and IDIs, and to IRD Pakistan for providing institutional support. Lastly, the authors thank AAHO for providing the opportunity to conduct this imperative research work. AAK is responsible for the overall content as the guarantor.

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