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Factors associated with intention to vaccinate against COVID-19 among a sample of people in Australia who regularly use ecstasy and related stimulants

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Key findings:

- At the time of interview, 11% of participants had received at least one dose of the COVID-19 vaccine, noting that this is a relatively young sample and vaccine rollout was mostly concentrated on priority populations during the interview period (April-August 2021).
- Among participants who were unvaccinated, 70% indicated an intention to receive the vaccine.
- Vaccine safety and side effect concerns were the predominantly cited barriers among those who were unsure or did not intend to be vaccinated.
- Compared to those without a tertiary qualification, participants with a university or college qualification were significantly more likely to express intent to be vaccinated.
- Participants who reported smoking tobacco weekly or more frequently in the six months preceding interview had decreased odds of intention to vaccinate.
- Higher trust in the Australian government and higher perceived risk of disease acquisition were both significantly associated with intent to be vaccinated against COVID-19.

Background

There are multiple safe and efficacious COVID-19 vaccines available in Australia (1). Achieving high vaccination coverage is important for both the individual, to prevent morbidity and mortality, and the general population, to mitigate virus transmission. Vaccine hesitancy is a potential threat to high vaccination coverage.

There is emerging literature that suggests people who inject drugs and people with a substance use disorder may be less likely to accept COVID-19 vaccination than the general population (2-4). However, there is currently little evidence on COVID-19 vaccine acceptability among other subgroups of people who use drugs. Given the heterogeneity among people who use drugs, vaccine uptake and hesitancy are likely to differ across subgroups.

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Background (continued)

People who use ecstasy and/or related illicit stimulants are an important subgroup for consideration. They are a generally young group, with those in the 20-29 years age group most likely to use ecstasy and cocaine in Australia (5), and therefore less likely to experience severe symptoms associated with COVID-19 (6). However, there are some individual factors that may increase the risk of severe illness associated with COVID-19. Use of tobacco, e-cigarettes and cannabis is relatively common among this group (7, 8). Given that these substances are typically smoked or 'vaped', use of these substances may increase clinical risk of severe COVID-19 due to potential damage to lung epithelial cells (9), but current evidence varies across substances. Tobacco use has been associated with severe health outcomes after COVID-19 infection (10, 11). However, the evidence around vaping is mixed: one study reported an associated between vaping and more severe COVID-19 symptoms (12), while others found no association between the use of e-cigarettes and COVID-19 hospitalisation (10, 13). Similarly, while there was conjecture that cannabis use may increase risk of severe COVID-19 (14), a recent study found no association between cannabis use and COVID-19 hospitalisation (10). The discordance of these findings may partially be a result of the changing virulence of the SARS-CoV-2 over time, with the recent Omicron variants less likely to replicate in lung cells (15). Finally, alcohol use disorder and smoking methamphetamine may be more common among people who use ecstasy and other illicit stimulants (8), both of which have been hypothesised to increase risk of severe disease (11, 16). Vaccinating everyone at elevated risk of severe health outcomes is vital to avoid preventable morbidity and mortality.

In addition to potentially being at greater risk of severe COVID-19, the typical age of people who use ecstasy and/or other illicit stimulants (i.e., mid-20s) means that they may also drive the spread of SARS-CoV-2 in the community. This may partially be a result of asymptomatic or mild disease reducing the propensity to seek testing, with Australians aged 20-29 years having the highest rate of infection, but the lowest testing rate and case fatality rate among adults (17). Superspreading events have also been attributed to venues frequented by people who use ecstasy and/or other illicit stimulants, such as nightclubs and bars (18). Therefore, it is of public health importance to maximise vaccine coverage among this group to reduce community transmission. This is particularly important given the increased transmissibility of Omicron variants.

Accordingly, this bulletin aimed to explore attitudes toward vaccination among a sample of people in Australia who regularly use ecstasy and/or other illicit stimulants. Specifically, it aimed to determine:

1. The proportion of participants who intended to receive a COVID-19 vaccine;
2. Barriers to vaccination among those who were unsure or did not express intent to receive the vaccine;
3. Sociodemographic, drug use and health factors associated with vaccination or an intention to receive COVID-19 vaccination; and
4. Beliefs and attitudes associated with vaccination or an intent to receive COVID-19 vaccination.

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Methods

The Ecstasy and Related Drugs Reporting System (EDRS) is an Australian surveillance system that monitors trends in drug use, markets and behaviours. It includes annual surveys with a sentinel sample of people who regularly use ecstasy and/or other illicit stimulants. The structured surveys are interviewer-administered, with a median duration of 57 minutes in 2021, and participants are reimbursed $40 for their time. To be eligible for participation, people must be at least 18 years of age (due to ethical constraints), have used ecstasy or other illicit stimulants at least monthly in the preceding six months, and reside in an Australian capital city. The target sample size was 800 (n=100 from each capital city). More detailed methods are available elsewhere (19).

In 2021, data were collected from 23 April to 13 August. For the majority of this time, COVID-19 vaccines were only available to priority populations designated by the Australian Technical Advisory Group on Immunisation, which included healthcare and other priority frontline workers, Aboriginal or Torres Strait Islander people, those with a specified underlying health condition, and people aged 65 years or older. However, as daily case numbers grew in New South Wales and Victoria, some jurisdictions extended access to the broader public in July. At the end of the EDRS interview period, 21% of all Australians had received two COVID-19 vaccine doses (20).

Participants reported how many doses of the COVID-19 vaccine they had received at time of interview. We asked unvaccinated participants 'The Australian Government has announced that the COVID vaccine will be free of charge but not mandatory, do you intend to be vaccinated?'. We considered participants who responded 'definitely yes' or 'probably yes' to have an intention to be vaccinated. Those who were undecided ('I'm to sure yet') or did not intend to be vaccinated ('probably no' or 'definitely no') were asked a follow-up question to ascertain the reasons that they did not intend to be vaccinated.

To establish factors associated with an intention to vaccinate, we combined participants who were already vaccinated or expressed an intent to be vaccinated, and considered participants who were undecided or did not intend to be vaccinated as the referent group. We used univariable logistic regression to assess a number of sociodemographic, health, and drug use variables. These factors were chosen *a prioiri* and included two validated scales. The Alcohol Use Disorders Identification Test (AUDIT) is a 10-item screening tool that assesses alcohol consumption and behaviours; a score of 20 or higher indicates possible alcohol dependence (21). The first question of the Short Form 36 (SF1) was used as an indication of overall general health (22). This question has been shown to be associated with health and risk factors (23).

Similarly, we used univariable logistic regression to assess the association of different vaccination-related attitudes with vaccine uptake/intention to vaccinate. We used four different binary variables: perceived risk of COVID-19 transmission ('not at all' vs. 'slightly', 'moderately', 'very', 'extremely'), perceived risk of COVID-19 severity (aforementioned response options), general vaccine acceptability ('strongly oppose'/'somewhat oppose'/'neither support nor oppose' vs. 'somewhat support'/'strongly support'), and trust in the Australian government regarding COVID-19 information ('very low'/'low'/'intermediate' vs. 'high'/'very high').

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Methods (continued)

In both analyses, factors associated with an intention to vaccinate at $p<0.05$ at the univariable level were retained in the final multivariable model, with age, gender and jurisdiction of interview included regardless of result. Additionally, in the model that assessed attitudinal factors, any sociodemographic, health or drug use factors independently associated with an intention to be vaccinated in the prior model were also incorporated. Magnitude of association is presented as adjusted odds ratios (aOR) with 95% confidence intervals and corresponding *p*-values.

Results

Sample characteristics

Of the 774 people who participated in the 2021 EDRS surveys, 771 responded to the vaccination survey items. The median age of these participants was 24 years (IQR: 21-29). They were mostly male (65%, n=441), resided in stable accommodation (98%, n=669) and had a tertiary qualification (trade/technical or university/college; 58%, n=397). The majority self-reported that their general health was good/very good/excellent (79%, n=540), with one-fifth reporting at least one chronic health condition (20%, n=98).

COVID-19 experiences and attitudes

Approximately half (52%, n=355) had been tested for SARS-CoV-2 in the 12 months preceding interview, with very few (n≤5) reporting a positive result. Most participants reported no concern about acquiring COVID-19 themselves (73%, n=477). However, the majority expressed concern about the severity of COVID-19 if they were to acquire it (72%, n=468).

COVID-19 vaccination uptake and intention

One-in-ten participants (11%; n=88) had received at least one dose of a COVID-19 vaccine at time of interview. Among unvaccinated participants (n=663), three-quarters (70%, n=480) indicated that they intended to receive the COVID-19 vaccine, comprising 52% (n=352) who responded ‘definitely yes’ and 19% (n=128) who responded ‘probably yes’. One-in-ten (10%) were unsure, 7% said ‘probably no’ and 13% said ‘definitely no’.

Barriers to COVID-19 vaccination among participants who were unsure or did not intend to be vaccinated

Among vaccine hesitant participants (n=203), the most commonly cited barriers to vaccination related to safety concerns (49%, n=103) and side effects (28%, n=59; Figure 1). Barriers relating to perceived low risk of disease acquisition (‘I am not at risk of contracting COVID-19) and severity (‘COVID-19 is not that serious in most people’) were cited by 18% (n=36) and 16% (n=25), respectively. The remaining barriers were cited by fewer than one in ten participants who were vaccine hesitant.

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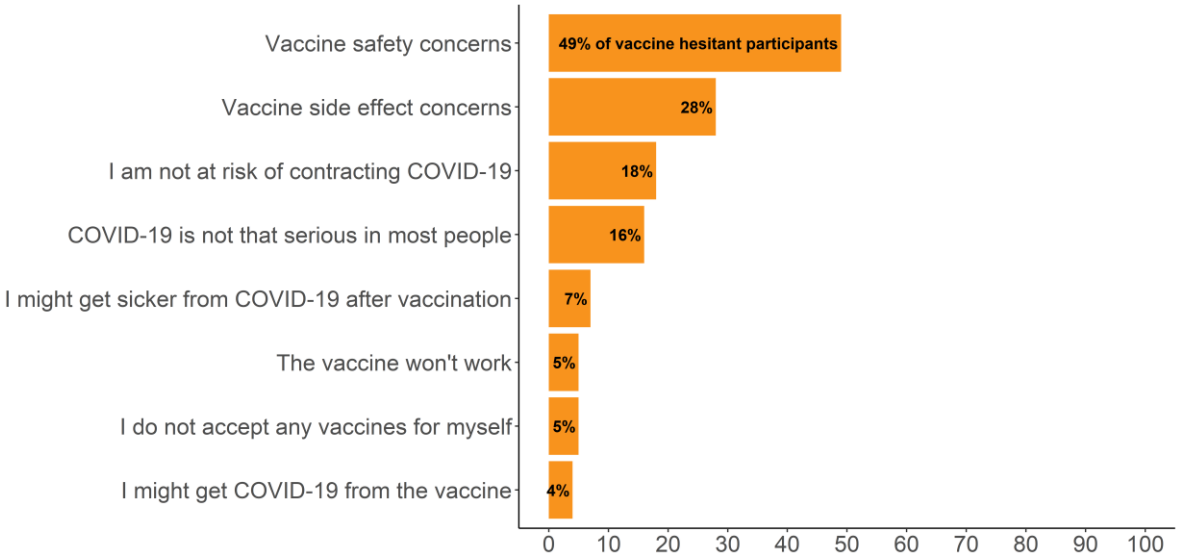
Figure 1: Barriers to COVID-19 vaccination cited by participants who were unsure or did not intend to be vaccinated (n=203).



Results (continued)

Sociodemographic, health and drug use factors associated with intention to be vaccinated against COVID-19

In the multivariable model, a university/college tertiary qualification was significantly associated with intention to be vaccinated, relative to no tertiary qualification (aOR: 3.72, 95% CI: 2.10-6.83; Table 1). Accessing at least one SARS-CoV-2 test in the12 months prior to interview was also associated with intention to be vaccinated (aOR: 1.59, 95% CI: 1.05-2.43). Weekly or more frequent tobacco smoking in the past six months was negatively associated with intent to be vaccinated (aOR: 0.47, 95% CI: 0.28-0.77).

Attitudes associated with intention to be vaccinated against COVID-19

Participants who reported concerns about contracting COVID-19 (aOR: 2.76, 95% CI: 1.43-5.50; Table 2) had significantly higher odds of intent to be vaccinated (Table 2). High or very high trust in the Australian government regarding COVID-19 information (aOR: 10.02, 95% CI: 5.13-21.18) and support of vaccination in general (aOR: 12.09, 95% CI: 6.36-24.03) were also both strongly associated with intention to be vaccinated.

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Table 1. Association of sociodemographic, drug use and health variables with intention to vaccinate against COVID-19.

	All participants (N=771) % (n)	Unsure/do not intend to get vaccinated (N=203) % (n)	Intend to get vaccinated/ vaccinated (N=568) % (n)	OR (95% CI)	p	aOR (95% CI)	p
Sociodemographic characteristics							
Age (years; median [IQR])	24 (21-29)	25 (21-30)	24 (21-28)	0.98 (0.96, 1.01)	0.123	0.98 (0.95, 1.01)	0.227
Gender							
Male	63 (488)	66 (134)	62 (354)	Reference		Reference	
Female	34 (259)	33 (67)	34 (192)	1.08 (0.77, 1.53)	0.641	0.86 (0.55, 1.35)	0.511
Non-binary/gender fluid/other identity	3 (24)	1 (2)	4 (22)	**4.16 (1.2, 26.21)**	0.056	5.98 (1.09, 111.89)	0.094
Jurisdiction							
New South Wales	13 (99)	11 (23)	13 (76)	Reference		Reference	
Australian Capital Territory	13 (99)	12 (25)	13 (74)	0.9 (0.47, 1.72)	0.740	1.15 (0.52, 2.52)	0.733
Victoria	13 (100)	10 (20)	14 (80)	1.21 (0.62, 2.4)	0.580	1.18 (0.5, 2.81)	0.710
Tasmania	13 (100)	7 (14)	15 (86)	1.86 (0.9, 3.95)	0.097	1.72 (0.72, 4.22)	0.224
South Australia	13 (100)	21 (42)	10 (58)	**0.42 (0.22, 0.77)**	**0.005**	0.63 (0.29, 1.39)	0.257
Western Australia	13 (100)	13 (26)	13 (74)	0.86 (0.45, 1.64)	0.651	1.13 (0.5, 2.52)	0.773
Northern Territory	13 (100)	15 (30)	12 (70)	0.71 (0.37, 1.33)	0.281	0.91 (0.42, 1.97)	0.809
Queensland	9 (73)	11 (23)	9 (50)	0.66 (0.33, 1.3)	0.227	0.96 (0.42, 2.24)	0.931
Highest education							
No tertiary qualification	40 (305)	46 (93)	37 (212)	Reference		Reference	
Trade/technical qualification	26 (198)	38 (77)	21 (121)	0.690 (0.47, 1.00)	0.052	0.98 (0.61, 1.59)	0.936
University/college qualification	35 (267)	16 (32)	41 (235)	**3.22 (2.09, 5.08)**	**<0.001**	**3.72 (2.10, 6.83)**	**<0.001**
Accommodation [a]							
Unstable	2 (16)	3 (6)	2 (10)	Reference			
Stable	98 (755)	97 (197)	98 (558)	1.70 (0.57, 4.64)	0.311		

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Table 1 (continued). Association of sociodemographic, drug use and health variables with intention to vaccinate against COVID-19.

	All participants (N=771) % (n)	Unsure/do not intend to get vaccinated (N=203) % (n)	Intend to get vaccinated/ vaccinated (N=568) % (n)	OR (95% CI)	p	aOR (95% CI)	p
Health and health-related behaviours							
General health							
Poor/Fair	19 (150)	25 (50)	18 (100)	Reference			
Good/Very good/Excellent	81 (621)	75 (153)	82 (468)	**1.53 (1.04, 2.24)**	**0.031**	1.18 (0.72, 1.9)	0.513
Tested for SARS-CoV-2 in past 12 months							
No	45 (344)	57 (115)	40 (229)	Reference		Reference	
Yes	55 (426)	43 (88)	60 (338)	**1.93 (1.4, 2.67)**	**<0.001**	**1.59 (1.05, 2.43)**	**0.029**
Lifetime diagnosis of chronic condition [b]							
No	80 (618)	82 (165)	80 (453)	Reference			
Yes	20 (152)	18 (37)	20 (115)	1.13 (0.76, 1.73)	0.554		
Drug use behaviours							
Weekly or higher frequency tobacco use during past 6 months							
No	30 (168)	18 (28)	35 (140)	Reference		Reference	
Yes	70 (395)	82 (130)	65 (265)	**0.41 (0.25, 0.64)**	**<0.001**	**0.47 (0.28, 0.77)**	**0.003**
Weekly or higher frequency e-cigarette use during past 6 months							
No	43 (190)	41 (40)	43 (150)	Reference			
Yes	57 (252)	59 (57)	57 (195)	0.91 (0.58, 1.44)	0.694		
Smoke methamphetamine during past 6 months							
No	86 (663)	76 (155)	89 (508)	Reference		Reference	
Yes	14 (108)	24 (48)	11 (60)	0.38 (0.25, 0.58)	<0.001	0.70 (0.40, 1.22)	0.205

Notes: Bold values denote statistically significant associations (i.e., $p<0.05$). [a] Stable accommodation refers private home (owned, rented or parents'/family's), public housing and boarding house/hostel; unstable refers to couch surfing and rough sleeping or squatting. [b] Chronic conditions included any chronic cardiac, respiratory, kidney or liver disease or condition, diabetes, HIV, cancer and cerebrovascular disease.

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Table 2. Association of attitudes with intention to vaccinate against COVID-19.

	All participants (N=771) % (n)	Unsure/do not intend to get vaccinated (N=203) % (n)	Intend to get vaccinated/ vaccinated (N=568) % (n)	OR (95% CI)	p	aOR (95% CI) ^	p
Concerned about contracting COVID-19							
No	71 (526)	84 (165)	66 (361)	Reference		Reference	
Yes	29 (215)	16 (31)	34 (184)	2.71 (1.8, 4.2)	<0.001	**2.76 (1.43, 5.50)**	**0.003**
Concerned about their health if they did contract COVID-19							
No	28 (208)	45 (87)	22 (121)	Reference		Reference	
Yes	72 (530)	55 (108)	78 (422)	2.81 (1.99, 3.98)	<0.001	1.23 (0.69, 2.19)	0.474
Trust in Australian government regarding COVID-19 information							
Very low/low/intermediate	56 (428)	92 (183)	44 (245)	Reference		Reference	
High/very high	44 (335)	9 (17)	56 (318)	13.97 (8.51, 24.42)	<0.001	**10.02 (5.13, 21.18)**	**<0.001**
General attitude toward vaccination							
Strongly oppose/ generally oppose/neither support nor oppose	18 (141)	51 (104)	7 (37)	Reference		Reference	
Generally support/ strongly support	82 (630)	49 (99)	93 (531)	15.08 (9.87, 23.47)	<0.001	**12.09 (6.36, 24.03)**	**<0.001**

Notes: ^Age, gender, jurisdiction, highest level of education, frequency of tobacco smoking (±weekly) and past 12 month COVID test included in multivariable model.

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Discussion

Among our sample of people who regularly use ecstasy and/or other illicit stimulants, approximately one-in-ten had received at least one COVID-19 vaccine dose at time of interview. This is within the range of the Australian general public first dose coverage during the survey period (April-August 2021), which began at 6.5% and increased to 38.0% (24). Among unvaccinated participants, most (70%) intended to receive the vaccine. Again, this was similar to the general public, with vaccine acceptability ranging from 69-78% during the survey period (25).

Participants who were unsure or unwilling to be vaccinated primarily cited concerns regarding vaccine safety and side effects as barriers to uptake. This aligns with barriers most commonly cited among the Australian general public at a similar point in time (26), as well as in a sample of people in Australia who regularly inject drugs (3). Combined, these findings reiterate the importance of providing vaccine messaging in parallel with vaccination delivery to improve trust in vaccination, especially in the context of a pandemic when information evolves rapidly.

Vaccine uptake or an intent to be vaccinated was associated with education level, past 12-month SARS-CoV-2 testing, and tobacco use. Specifically, participants with a university/college qualification were more likely to be vaccinated or report an intention to receive the COVID-19 vaccine. This is consistent with two Australian studies of the general public, which found that lower education levels were associated with decreased willingness to vaccinate (27, 28). It also aligns with the role of education as a key social determinant of health (29). Thus, to achieve maximum vaccine coverage, vaccine messaging campaigns must be inclusive and presented in plain language (30), and should focus on countering misconceptions about the vaccine (e.g., that it is unsafe) and the disease itself (e.g., that it is a mild illness). The association between past 12-month SARS-CoV-2 testing uptake and an intention to be vaccinated for COVID-19 was not unexpected, and indicates a correlation between different health behaviours to mitigate COVID-19 acquisition and transmission.

Concerningly, participants who reported smoking tobacco at least weekly in the six months preceding interview were less likely to report an intention to receive the vaccine. This finding reflects the findings of studies in the United Kingdom (31) and Hong Kong (32). While it is unclear what is driving this association among our sample, other studies with similar observations have suggested that this association may be related to the generally lower socioeconomic status of smokers (31) or related to a widely circulated myth that tobacco smoking is protective against severe COVID-19 (32, 33). People who smoke tobacco are also a group who are already engaging in a potentially harmful behaviour despite public health messaging, so this association may reflect a group who are less amenable to public health advice in general. Given tobacco smoking is a known risk factor for increased clinical severity of COVID-19 (10), it is important that vaccine messaging reiterates known risk factors for severe disease. This is particularly so among young adults, who may believe they are at low risk of severe COVID-19.

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Discussion (continued)

Unsurprisingly, higher perceived risk of disease acquisition, as well as general vaccine acceptance were all strongly associated with intent to receive the COVID-19 vaccine. This is consistent with previous research, which has found that intent to receive the COVID-19 vaccine was positively correlated with disease risk perception (34). The same is true for other vaccines, like influenza (35). However, it is important to note that the 2021 EDRS interviews took place prior to and at the beginning of the Delta wave of cases in Australia, and before the emergence of the Omicron variant. At this phase of the pandemic, Australia had experienced relatively low case numbers, with a peak daily case number of 419 during the survey period. Case numbers have since increased exponentially, and it seems likely that this has resulted in an increased perception of disease acquisition risk, which in turn may have impacted vaccine hesitancy. Indeed, by January 2022 77% of all Australians had received two doses of the vaccine (20). However, as of April 2022, uptake of a third 'booster' dose has plateaued, with 60% of the eligible population (those aged 12+ years) having received three doses. Therefore, it is possible that hesitancy or reluctance to adhere to the revised vaccination schedule has increased again since early 2022.

Interestingly, trust (or lack thereof) in the Australian government regarding COVID-19 information was the strongest 'attitudinal' factor associated with intent to receive the vaccine. This reflects findings in a study of vaccine acceptability in five major cities globally (36), demonstrating that these findings are not unique to Australia. These findings illustrate the importance of governments in generating confidence in vaccines, particularly those viewed as 'new' or fast-tracked vaccines with limited data on long-term health outcomes/potential adverse effects. Indeed, in a recent opinion piece, Atwell and colleagues argued that the term 'vaccine hesitancy' places the onus of low vaccine uptake on individuals, rather than the government (37). However, it remains the responsibility of governments to drive vaccine demand generation and trust through educational messaging campaigns, and to make vaccines available and conveniently accessible. Increasing vaccine literacy and acceptability through effective vaccine communication will also be key to future pandemic preparedness.

Conclusion

Our sample of people in Australia who regularly use ecstasy and/or other illicit stimulants reported similar levels of vaccine uptake and intent to vaccinate as the general public. Barriers to vaccination reported by vaccine hesitant participants also aligned with those of the general public. Of particular concern was the negative association between smoking tobacco and intention to receive the COVID-19 vaccine. It is important to reiterate behavioural risk factors associated with severe disease, especially among population groups who are generally at lower risk of clinical complications. The strong association between trust in government and intention to vaccinate reiterates the important role governments play in vaccination demand creation.

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Participating researchers and research centres

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