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# BMJ Open

## COVID-19 vaccination acceptance among community members and health workers in Ebonyi state, Nigeria: study protocol for a concurrent-independent mixed method analyses of intention to receive, timeliness of the intention to receive, uptake, and hesitancy to COVID-19 vaccination and the determinants

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Manuscripts

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4 1 **Title:** COVID-19 vaccination acceptance among  
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6 2 community members and health workers in Ebonyi  
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9 3 state, Nigeria: study protocol for a concurrent-  
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11 4 independent mixed method analyses of intention to  
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## 24 Abstract

25 **Introduction** The coronavirus disease 2019 (COVID-19) pandemic has gravely affected the  
26 lives and economies of the global population including Nigeria. The attainment of herd  
27 immunity through mass COVID-19 vaccination is the most promising control strategy,  
28 however, the deployments of COVID-19 vaccinations are facing challenges of non-acceptance.  
29 Despite the efforts of the Nigerian government and COVAX facility in making COVID-19  
30 vaccination more available/accessible, the vaccination rate remains unexpectedly very low in  
31 Nigeria and Ebonyi state. It is thus important to investigate the acceptability of COVID-19  
32 vaccinations and to elucidate the explanations for the very low coverage rate. This study aims  
33 to evaluate and explore COVID-19 vaccination acceptance and the determinants among  
34 community members and health workers in Ebonyi state, Nigeria.

35 **Methods and analyses** The study is an analytical cross-sectional survey with a concurrent-  
36 independent mixed method design. Quantitative data will be collected from all consenting  
37 community members aged 15 years and above in 28 randomly selected geographical clusters  
38 (villages/settlements), through structured interviewer-administered questionnaire household  
39 survey, using KoBoCollect installed in android devices. Quantitative data will be collected  
40 from all consenting health workers, selected via convenience and snowball techniques, through  
41 self-administered questionnaire survey distributed via online social media platforms  
42 (WhatsApp and Facebook). Qualitative data will be collected from purposively selected  
43 community members and health workers through focus group discussions. Quantitative  
44 analyses will involve descriptive statistics, generalized estimating equations (for community  
45 members data), and generalized linear model (for health workers data). Qualitative analyses  
46 will employ the thematic approach.

47 **Ethics and dissemination** Ethical approval for this study was obtained from the Ebonyi State  
48 Health Research and Ethics Committee (EBSHREC/15/01/2022-02/01/2023) and verbal  
49 consent will be obtained from participants. Study findings will be reported at local, national,  
50 and international levels in peer-reviewed journals and conferences as appropriate.

51 **Trial registration number** Registration is ongoing with ISRCTN

## 54 **Strengths and limitations of this study**

- 55 ➤ Our study will be the first geographical-community based study, using mixed method  
56 approach, to investigate COVID-19 vaccination acceptance (the intention to receive,  
57 timeliness of the intention to receive, uptake, and hesitancy) in the context where there is  
58 very low vaccination rate despite relative vaccine availability and public access to  
59 vaccination.
- 60 ➤ The study will be implemented after prospective registration with ISRCTN and based on  
61 available/accessible or disseminated protocol.
- 62 ➤ The study is prone to reporting bias due to the questionnaire-based data collection method  
63 and the convenience and snowballing sampling will make the health worker survey prone  
64 to selection bias.

## 75 **Introduction**

76 Coronavirus disease 2019 (COVID-19), a severe acute respiratory syndrome disease caused by  
77 severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), emerged by the end of 2019  
78 and became a pandemic. By 3rd January, 2022, the COVID-19 pandemic has affected more  
79 than 346 million persons and has taken over 5.5 million lives globally with more than 7.9  
80 million cases and over 162000 deaths in Africa.<sup>1</sup> By 26th January, 2022, the total number of  
81 recorded confirmed cases of COVID-19 and COVID-19 related deaths were respectively over  
82 252000 and 3100 in Nigeria and 2064 and 32 in Ebonyi state.<sup>2</sup> The pandemic has overstretched  
83 the capacity of many countries health care delivery and have disrupted the global economy due  
84 to lockdown measures<sup>3-7</sup>

85 Amongst the available control measures, perhaps the most cost-effective and sustainable  
86 control strategy is mass COVID-19 vaccination (with safe and effective vaccines). COVID-19  
87 vaccination reduces the incidence, severity, and death from COVID-19,<sup>8-11</sup> and offers the  
88 safest, surest, and fastest way of achieving herd immunity especially when all population  
89 groups including adults and children are vaccinated<sup>9-14</sup> because both adults and children are  
90 susceptible to COVID-19 infection.<sup>15-17</sup> However, the deployments of COVID-19 vaccinations  
91 are facing some challenges such as non-acceptance and misinformation propagated by anti-  
92 vaccine campaigners. Non-acceptance and/or delay in accepting vaccinations/hesitancy had  
93 become a major public health challenge over the past decade<sup>18,19</sup> and was noted as one of the  
94 top ten threats to global health in 2019.<sup>20</sup> Moreover, the unprecedented disruptive impact of the  
95 pandemic with the associated conspiracy theories being propagated in conventional and social  
96 media, and the unprecedented rapid development and introduction of COVID-19 vaccines have  
97 generated an atmosphere of uncertainty and confusion which have further limited the  
98 acceptance of COVID-19 vaccination<sup>21-23</sup>

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2  
3 99 COVID-19 vaccination started in March, 2021 in Nigeria under the COVAX initiative.<sup>24,25</sup>  
4  
5  
6 100 Although the Nigerian government, with the support of the COVAX facility, is scaling up the  
7  
8 101 availability/access to COVID-19 vaccination, the coverage rate is still very low in Nigeria,  
9  
10 102 including Ebonyi state and Nigeria was not among the only five countries in Africa expected  
11  
12 103 to meet the target of about 40% COVID-19 vaccination coverage by end of 2021.<sup>26</sup> As of 26th  
13  
14 104 January, 2022, only about 4.6% of eligible Nigerians had received the second dose of COVID-  
15  
16 105 19 vaccination,<sup>27</sup> about 10.5% had received the first dose,<sup>28</sup> and Ebonyi state had about the  
17  
18 106 least coverage rate in Nigeria.<sup>29</sup> Moreover, these coverage rates are among the current eligible  
19  
20 107 population of 18 years and above and, the rates among the population at risk, which is what is  
21  
22 108 considered with regards to herds immunity, would be a fraction of the above.  
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26  
27 109 Although the incidence of COVID-19 in Nigeria has been relatively lower compared to many  
28  
29 110 other countries, high acceptance of COVID-19 vaccination among Nigerians is important in  
30  
31 111 order to prevent any possible upsurge of the disease especially due to new strains of the virus.  
32  
33 112 Resurgence of COVID-19 infections and COVID-19 related deaths are common especially  
34  
35 113 among populations with low COVID-19 vaccination coverage.<sup>9-11</sup>  
36  
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39 114 Although the issue of stock-out of COVID-19 vaccines and vaccination syringes cannot be  
40  
41 115 ignored in Nigeria and other African countries,<sup>26</sup> the slow pace of coverage may be partly due  
42  
43 116 to non-acceptance/hesitancy among the populace and health workers as we have observed  
44  
45 117 anecdotally in Ebonyi state. However, to our knowledge, the extent of COVID-19 vaccination  
46  
47 118 acceptance and the determinants among community members and health workers, as well as  
48  
49 119 the degree to which the very low COVID-19 vaccination coverage is explained by non-  
50  
51 120 acceptance as against non-availability/non-access, have not been rigorously investigated  
52  
53 121 especially in Nigeria and particularly in Ebonyi state. Such investigation has become more  
54  
55 122 imperative since the introduction and scale up of COVID-19 vaccination across Nigeria. The  
56  
57 123 understanding of context-specific determinants of vaccination acceptance is a necessary  
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3 124 strategy in addressing the problem of non-acceptance of new vaccines such as the current  
4  
5 125 COVID-19 vaccines.<sup>30</sup>  
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7

8 126 COVID-19 vaccination intentions among populations were assessed at the early phase of the  
9  
10 127 pandemic by studies across the world<sup>12-14,31-60</sup> and in Nigeria (mostly based on social media  
11  
12 128 platforms and among health workers)<sup>61-67</sup> during the development/clinical trial stage of  
13  
14 129 COVID-19 vaccines. Few studies were done at the early stage of the introduction and  
15  
16 130 deployment of COVID-19 vaccination.<sup>68,69</sup> However, these studies were done when COVID-  
17  
18 131 19 vaccination had not been introduced for public use or was just being introduced. Thus, the  
19  
20 132 perceptions of vaccination-related attributes such as importance, safety or side-effects, and  
21  
22 133 effectiveness were perhaps largely distal. Moreover, the findings of those studies might  
23  
24 134 markedly vary from that of studies conducted in situations where COVID-19 vaccination is  
25  
26 135 readily/relatively available/accessible and there are close/real experiences/perceptions of  
27  
28 136 vaccination activities and vaccination-related adverse events. Also, since the implementation  
29  
30 137 of COVID-19 vaccination in Nigeria, the amplification of reports of serious side-effects and  
31  
32 138 deaths following vaccination is common in the social media.  
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39 139 Moreover, decline in the intention to receive COVID-19 vaccination after the vaccine became  
40  
41 140 available have been reported across countries.<sup>70</sup> Anecdotal evidence shows that the initial  
42  
43 141 waves of fear of COVID-19 among the people, including health workers, has markedly waned  
44  
45 142 overtime especially in Ebonyi state and Nigeria as a whole where the pandemic has been much  
46  
47 143 less severe compared to some other climes. As a result, it is not surprising that COVID-19  
48  
49 144 vaccination uptake is reportedly very low and more importantly, the drive to scale up the  
50  
51 145 availability and uptake of COVID-19 vaccination may be up against an unexpected bottle-neck  
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53 146 if there is no intention or delayed intention to receive the vaccination among the people.  
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3 147 This study aims to evaluate and explore COVID-19 vaccination acceptance (the intention to  
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5 148 receive, timeliness of the intention to receive, uptake, and hesitancy) and the determinants  
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7 149 among community members and health workers in Ebonyi state, Nigeria, in order to generate  
8  
9 150 evidence to inform policy interventions and strategies on optimal COVID-19 vaccination  
10  
11 151 acceptance and coverage.  
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### 15 152 **Study objectives**

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18 153 The primary objectives are to assess/evaluate the following among community members and  
19  
20 154 health workers in Ebonyi state, Nigeria:  
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- 23  
24 155 1. The intention to receive COVID-19 vaccination
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26  
27 156 2. Timeliness of the intention to receive COVID-19 vaccination
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30 157 3. The uptake of COVID-19 vaccination
- 31  
32  
33 158 4. The hesitancy to COVID-19 vaccination
- 34  
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36 159 5. The determinants of COVID-19 vaccination acceptance (the intention to receive,  
37  
38 160 timeliness of the intention to receive, uptake, and hesitancy)
- 39  
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41  
42 161 6. The predictive power of acceptance factor compared with availability/access factor  
43  
44 162 regarding the intention to receive, timeliness of the intention to receive, and uptake of  
45  
46 163 COVID-19 vaccination

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49 164 The secondary objectives are to assess/evaluate the following among community members  
50  
51 165 and health workers in Ebonyi state, Nigeria:  
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- 54  
55 166 1. The COVID-19 experiences and perceptions
- 56  
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58 167 2. The COVID-19 vaccination expectations and perceptions
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3 168 3. The COVID-19 vaccination process experiences and perceptions (availability/access  
4  
5 169 factor)

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8 170 4. The knowledge, attitude, and practices about COVID-19

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11 171 5. The sources of information about COVID-19

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14 172 6. The perceptions about COVID-19, COVID-19 vaccine/vaccination, and COVID-19  
15  
16 173 vaccination process

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18  
19 174 7. The determinants of COVID-19 experiences and perceptions, COVID-19 vaccination  
20  
21 175 expectations and perceptions, and COVID-19 vaccination process experiences and  
22  
23 176 perceptions

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26 177 8. The determinants of knowledge, attitude, and practices about COVID-19

27  
28  
29 178 9. The determinants of the sources of information about COVID-19

30  
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34 179 **Study hypotheses**

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36  
37 180 The primary hypotheses include:

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40 181 1. Strong COVID-19 experience and perception increases COVID-19 vaccination acceptance

41  
42 182 (increases the intention to receive, timeliness of the intention to receive, and uptake and

43  
44 183 reduces hesitancy) compared with not strong COVID-19 experience and perception

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46  
47 184 2. Increase in COVID-19 experiences and perceptions score increases COVID-19 vaccination

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49  
50 185 acceptance

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53 186 3. Good COVID-19 vaccination expectation and perception increases COVID-19 vaccination

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56 187 acceptance compared with poor COVID-19 vaccination expectation and perception

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3 188 4. Increase in COVID-19 vaccination expectations and perceptions score increases COVID-  
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5 189 19 vaccination acceptance  
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8 190 5. Acceptance factor (COVID-19 risk-COVID-19 vaccination benefit perception or disease  
9  
10 191 risk-remedy benefit perception (DR-RB or DRRB perception)) is significantly associated  
11  
12 192 with COVID-19 vaccination acceptance  
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16 193 6. Positive COVID-19 vaccination process experience and perception (positive  
17  
18 194 availability/access factor) increases the intention to receive, timeliness of the intention to  
19  
20 195 receive, and uptake of COVID-19 vaccination compared with negative COVID-19  
21  
22 196 vaccination process experience and perception (negative availability/access factor)  
23  
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25

26 197 7. Increase in COVID-19 vaccination process experiences and perceptions score increases the  
27  
28 198 intention to receive, timeliness of the intention to receive, and uptake of COVID-19  
29  
30 199 vaccination  
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34 200 8. Acceptance-availability/access factor is significantly associated with the intention to  
35  
36 201 receive, timeliness of the intention to receive, and uptake of COVID-19 vaccination  
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40 202 9. Increase in acceptance factor score increases the intention to receive, timeliness of the  
41  
42 203 intention to receive, and uptake of COVID-19 vaccination compared with increase in  
43  
44 204 availability/access factor score  
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47 205 The secondary hypotheses include:  
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50 206 1. Knowledge, attitude, and practices about COVID-19 are significantly associated with:  
51  
52 207 COVID-19 vaccination acceptance; COVID-19 experiences and perceptions; COVID-19  
53  
54 208 vaccination expectations and perceptions; and COVID-19 vaccination process experiences  
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56 209 and perceptions  
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3 210 2. Sources of information about COVID-19 are significantly associated with: COVID-19  
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5 211 vaccination acceptance; COVID-19 experiences and perceptions; COVID-19 vaccination  
6  
7 212 expectations and perceptions; COVID-19 vaccination process experiences and perceptions;  
8  
9 213 and knowledge, attitude, and practices about COVID-19  
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12

13 214 3. Sociodemographic characteristics are significantly associated with: COVID-19 vaccination  
14  
15 215 acceptance; COVID-19 experiences and perceptions; COVID-19 vaccination expectations  
16  
17 216 and perceptions; COVID-19 vaccination process experiences and perceptions; knowledge,  
18  
19 217 attitude, and practices about COVID-19; and sources of information about COVID-19  
20  
21  
22

23 218 4. Professional or work-related attributes of health workers are significantly associated with:  
24  
25 219 COVID-19 vaccination acceptance, COVID-19 experiences and perceptions; COVID-19  
26  
27 220 vaccination expectations and perceptions; COVID-19 vaccination process experiences and  
28  
29 221 perceptions; knowledge, attitude, and practices about COVID-19; and sources of information  
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31 222 about COVID-19  
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35 223 The hypothesized relationships between the independent factors and the outcome measures are  
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37 224 shown in the study's conceptual framework in figure 1. The conceptual framework was  
38  
39 225 designed based on the study hypotheses which were informed by published data on COVID-  
40  
41 226 19 and COVID-19 vaccination and the "3Cs" Vaccine Hesitancy Model by The SAGE  
42  
43 227 Working Group on Vaccine Hesitancy.<sup>18</sup>  
44  
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47

48 228 In the conceptual framework (figure 1), strong COVID-19 experience and perception  
49  
50 229 (compared with not strong experience and perception) and increase in COVID-19 experiences  
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52 230 and perceptions score are expected to be associated with decrease in complacency about  
53  
54 231 COVID-19 vaccination which will result in increase in the intention to receive, timeliness of  
55  
56 232 the intention to receive, and uptake and decrease in hesitancy to COVID-19 vaccination  
57  
58 233 (increase in COVID-19 vaccination acceptance). Likewise, good COVID-19 vaccination  
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234 expectation and perception (compared with poor expectation and perception) and increase in  
235 COVID-19 vaccination expectations and perceptions score are expected to be associated with  
236 increase in confidence in COVID-19 vaccination which will lead to increase in COVID-19  
237 vaccination acceptance.

238 Positive COVID-19 vaccination process experience and perception (compared with negative  
239 experience and perception) and increase in COVID-19 vaccination process experiences and  
240 perceptions score are expected to be associated with increase in convenience in COVID-19  
241 vaccination and then increase in the intention to receive, timeliness of the intention to receive,  
242 and uptake of COVID-19 vaccination. Acceptance factor is expected to be associated with  
243 increase in COVID-19 vaccination acceptance compared with availability/access factor.

244 As depicted in the conceptual framework (figure 1), knowledge, attitude, and practice about  
245 COVID-19; sources of information about COVID-19; sociodemographic characteristics; and  
246 professional or work-related attributes are expected to be associated with decrease in  
247 complacency, increase in confidence, and increase in convenience in COVID-19 vaccination  
248 and then increase in COVID-19 vaccination acceptance. These background characteristics are  
249 also expected to be associated with COVID-19 experiences and perceptions, COVID-19  
250 vaccination expectations and perceptions, and COVID-19 vaccination process experiences and  
251 perceptions (figure 1).

## 252 **Methods and analyses**

### 253 **Design**

254 The study is an analytical cross-sectional survey with a concurrent-independent mixed data  
255 collection and data analysis and interpretation method. In this design, the quantitative and  
256 qualitative aspects of the study will be implemented simultaneously and independently of each

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2  
3 257 other.<sup>71</sup> The study protocol development was guided by the Standard Protocol Items:  
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5 258 Recommendations for Interventional Trials (SPIRIT) 2013 checklist and the Strengthening the  
6  
7 259 Reporting of Observational Studies in Epidemiology (STROBE) 2007 checklist for cross-  
8  
9  
10 260 sectional studies.

### 13 261 **Study area**

16 262 The study will be implemented in Ebonyi state which is located in south-eastern geopolitical  
17  
18 263 zone of Nigeria with land area of 5,953 sq. km. The population of the state is projected to be  
19  
20 264 3,313,228 in 2021 based on the 2006 national census figure and a growth rate of 2.8% and  
21  
22 265 christianity is the mostly practiced religion. Ebonyi state has 13 Local Government Areas  
23  
24 266 (LGAs) including the state capital (Abakaliki LGA) and 171 political wards.<sup>72</sup> Each LGA is  
25  
26 267 made up of political wards and autonomous communities. Each autonomous community is  
27  
28 268 made up of larger villages called autonomous villages which consist of smaller villages or  
29  
30 269 settlements. Each village/settlement has a head or traditional leader. Most parts of Ebonyi state  
31  
32 270 are rural and there are only six towns (urban or semi-urban areas), five of which are LGAs  
33  
34 271 capitals with the adjoining areas.<sup>73</sup>

37  
38  
39  
40 272 The federal ministry of health (FMOH) and its agencies provide the overarching guidance and  
41  
42 273 policy framework for public and private health service delivery in in all states in Nigeria  
43  
44 274 including Ebonyi state. The FMOH provides health services in the state through tertiary health  
45  
46 275 facilities while the state ministry of health (SMOH) provides health service through secondary  
47  
48 276 health facilities (general hospitals). The SMOH and the state primary health care development  
49  
50 277 agency (SPHCDA) provide health care in the local governments through primary health care  
51  
52 278 (PHC) facilities. There is at least one PHC centre in each political ward. The national primary  
53  
54 279 health care development agency (NPHCDA) provides policy guidance and coordination for  
55  
56 280 immunisation/vaccination services in all states in Nigeria including Ebonyi state. The  
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3 281 NPHCDA provides vaccines and related products while the SMOH and SPHCDA coordinates  
4  
5 282 the implementation of immunisation/vaccination service delivery in the state (and LGAs)  
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7  
8 283 through the tertiary, secondary, and primary health care PHC facilities.  
9

## 10 11 284 **Participants**

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13  
14 285 The participants will include clusters, the community members within clusters, and health  
15  
16 286 workers in Ebonyi state. A cluster in this study is a geographical community  
17  
18 287 (village(s)/settlement(s)) which is the immediate catchment area of a PHC centre. Clusters that  
19  
20 288 will be eligible for inclusion in the study are those with at least 200 households or a population  
21  
22 289 of 1000 people, whose PHC centres are providing basic maternal and child health care services  
23  
24 290 including routine childhood immunisation, that can be easily accessed with a car, and where  
25  
26 291 the cluster heads give verbal consent/permission. In each of the selected clusters, community  
27  
28 292 members aged 15 years and above who give verbal consent/assent will be eligible to participate  
29  
30 293 in a population-based household survey. Health workers (clinical and non-clinical staff) in  
31  
32 294 public and private health care sectors, including the patent medicine vendors (PMVs), who  
33  
34 295 work or live in Ebonyi state and give verbal consent will be eligible to participate in a health  
35  
36 296 worker survey. Community members aged 15 years and above who have resided in the  
37  
38 297 community for at least one year and who give verbal consent/assent will be eligible to  
39  
40 298 participate in community-based focus group discussions (FGDs) while health workers (clinical  
41  
42 299 and non-clinical staff) who work or live in Ebonyi state, have at least one year of working  
43  
44 300 experience, and give verbal consent will be eligible to participate in health worker-based FGDs.  
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## 50 51 301 **Independent factors and outcome measures**

## 52 302 **Independent factors, categories, scoring, and grading**

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3 303 The independent factors among community members and health workers (see table 1) are  
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5 304 almost the same with few differences which include: occupation, monthly income, and  
6  
7 305 residence among the community members; and professional or work category/cadre, years of  
8  
9 306 working experience, and level of work among the health workers.

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11  
12  
13 307 The independent factors are listed under seven headings labelled A–I: COVID-19 experiences  
14  
15 308 and perceptions; COVID-19 vaccination expectations and perceptions; COVID-19 vaccination  
16  
17 309 process experiences and perceptions (availability/access factor); Acceptance factor (COVID-  
18  
19 310 19 risk-COVID-19 vaccination benefit perception); Acceptance-availability/access factor;  
20  
21 311 Knowledge, attitude, and practice about COVID-19; Source of information about COVID-19;  
22  
23 312 Sociodemographic characteristics; and Professional or work-related attributes. These three  
24  
25 313 factors – COVID-19 experiences and perceptions; COVID-19 vaccination expectations and  
26  
27 314 perceptions; and COVID-19 vaccination process experiences and perceptions – will be  
28  
29 315 respectively measured using eight, five, and five questionnaire items each having five  
30  
31 316 categories grouped into positive and negative and scored from 0–4 as depicted in table 1.

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36  
37 317 The scoring will create three new continuous variables: COVID-19 experiences and  
38  
39 318 perceptions score (ranging from 0–32 for each participant); COVID-19 vaccination  
40  
41 319 expectations and perceptions score (ranging from 0–20); and COVID-19 vaccination process  
42  
43 320 experiences and perceptions score (ranging from 0–20). These continuous variables will then  
44  
45 321 be graded on two-level scales such that scores  $\geq 75\%$  of the total versus  $< 75\%$  will respectively  
46  
47 322 be considered to be: strong versus not strong COVID-19 experience and perception; good  
48  
49 323 versus poor COVID-19 vaccination expectation and perception; and positive versus negative  
50  
51 324 COVID-19 vaccination process experience and perception.

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55  
56 325 Acceptance factor will be created, as the combination of COVID-19 experiences and  
57  
58 326 perceptions plus COVID-19 vaccination expectations and perceptions, and defined as COVID-



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Table 1: Independent factors and their categories and category scores and grading among community members and health workers						
Independent factors	Categories (Scores)					
	Positive category			Negative category		
COVID-19 experiences and perceptions						
1. How fearful are you about getting COVID-19?	Very fearful (4)	A little fearful (3)	Not sure (2)	Not fearful (1)	Not fearful at all (0)	
2. How possible is it for you to get COVID-19?	Highly possible (4)	A bit possible (3)	Not sure (2)	Not possible (1)	Not possible at all (0)	
3. How possible is it for you to get severe COVID-19?	Highly possible (4)	A bit possible (3)	Not sure (2)	Not possible (1)	Not possible at all (0)	
4. Have you ever had COVID-19?	Yes, surely (4)	Yes, think so (3)	Not sure (2)	No, think so (1)	No, surely (0)	
5. Have you ever had severe COVID-19?	Yes, very serious (4)	Yes, a bit serious (3)	Not sure (2)	No, not serious (1)	No, not serious at all (0)	
6. Do you know any person who have had COVID-19?	A very close person (4)	A close person (3)	A distant person (2)	A very distant person (1)	No person (0)	
7. Do you know any person who have had severe COVID-19?	A very close person (4)	A close person (3)	A distant person (2)	A very distant person (1)	No person (0)	
8. Do you know any person who have died from COVID-19?	A very close person (4)	A close person (3)	A distant person (2)	A very distant person (1)	No person (0)	
Total	(32 <sup>H</sup> )	–	–	–	(0 <sup>L</sup> )	
COVID-19 experiences and perceptions score						
9. Extent of COVID-19 experience and perception (COVID-19 risk perception) <sup>A</sup>	Strong experience and perception (high risk perception)	–	–	–	Not strong experience and perception (low risk perception)	
10. COVID-19 vaccination expectations and perceptions						
11. How important is it for you to receive COVID-19 vaccination?	Very important (4)	Important (3)	Not sure (2)	Not important (1)	Not important at all (0)	
12. How fearful are you about having severe side-effect from COVID-19 vaccination?	Not fearful at all (4)	Not fearful (3)	Not sure (2)	A little fearful (1)	Very fearful (0)	
13. What protection against COVID-19 will you get from receiving COVID-19 vaccination?	Full protection (4)	Partial protection (3)	Not sure (2)	No protection (1)	No protection at all (0)	
14. How do you trust the health workers who give COVID-19 vaccination?	Trust them very much (4)	Trust them (3)	Not sure (2)	Do not trust them (1)	Do not trust them at all (0)	
15. How do you trust the government who made COVID-19 vaccination available?	Trust them very much (4)	Trust them (3)	Not sure (2)	Do not trust them (1)	Do not trust them at all (0)	
Total	(20 <sup>HH</sup> )	–	–	–	(0 <sup>LL</sup> )	
COVID-19 vaccination expectations and perceptions score						
16. COVID-19 vaccination expectation and perception level (COVID-19 vaccination benefit perception) <sup>B</sup>	Good expectation and perception (high benefit perception)	–	–	–	Poor expectation and perception (low benefit perception)	
17. COVID-19 vaccination process experiences and perceptions (availability/access factor)						
18. Ever heard about COVID-19 vaccination?	Many times (4)	Once/few times (3)	Not sure (2)	No time (1)	No time at all (0)	
19. Know a COVID-19 vaccination place?	A very close place (4)	A close place (3)	A far place (2)	A very far place (1)	No place (0)	
20. Frequency of COVID-19 vaccination at the vaccination place?	Daily, down to twice a week (4)	Once a weekly (3)	Once in two-four weeks (2)	No fixed time (1)	Do not know (0)	
21. Queue at the vaccination place?	No queue (4)	Short queue (3)	Do not know (2)	Long queue (1)	Very long queue (0)	
22. How caring are the health workers at the vaccination place?	Very caring (4)	Caring (3)	Not sure (2)	Not caring (1)	Not caring at all (0)	
Total	(20 <sup>HHH</sup> )				(0 <sup>LLL</sup> )	
23. COVID-19 vaccination process experiences & perceptions score (availability/access factor score)						
24. COVID-19 vaccination process experience and perception level (availability/access factor level) <sup>C</sup>	Positive experience & perception (availability & access factor)	–	–	–	Negative experience & perception (availability & access factor)	
Acceptance factor level	Defined as COVID-19 risk-COVID-19 vaccination benefit perception or disease risk-remedy benefit perception level. Categories: High disease risk-high remedy benefit perception or high-high DR-RB perception, high-low DR-RB perception, low-high DR-RB perception, and low-low DR-RB perception					
Acceptance factor score	Defined as COVID-19 risk perception score plus COVID-19 vaccination benefit perceptions score or DR-RB perception score					
Acceptance-availability/access factor level	High-high-positive, High-high-negative, High-low-positive, High-low-negative, low-high-positive, low-high-negative, low-low-positive, low-low-negative					

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Table 1: Continued

Independent factors	Categories (Scores)				
	Positive category			Negative category	
Knowledge, Attitude, and Practice					
28. Knowledge score					
29. Level of knowledge of COVID-19 <sup>D</sup>	Good knowledge	–	–	–	Poor knowledge
30. Attitude score					
31. Level of attitude towards COVID-19 & COVID-19 vaccination <sup>E</sup>	Good attitude	–	–	–	Poor attitude
32. Practice score					
33. Level of practices about COVID-19 <sup>F</sup>	Good practice	–	–	–	Poor practice
34. Source of information about COVID-19	Interpersonal (Family members/Relatives/Friends, Other health workers, Place of work, Place of worship/Religious forums); Traditional media (Television, Radio, Prints (Newspaper/Magazine)); Internet, social media, & SMS ( WhatsApp, Facebook, Internet sites, Bulk SMS/Text messages)				
35. Main source of information	Interpersonal; Traditional media; Internet, social media, & SMS				
36. Most trusted source of information	Interpersonal; Traditional media; Internet, social media, & SMS				
37. Sociodemographic characteristics					
38. Gender	Male, Female				
39. Age					
40. Marital status	Married, Divorced, Separated, Widowed, Never married (single)				
41. Educational level	No formal education, Some primary, Completed primary, Some secondary, Completed secondary, Tertiary (diploma, first degree, masters/PHD/other equivalent)				
42. Occupation*	Farmer, Trader, Other-self-employment, Private paid work, Government paid work, Housewife, Student, Apprentice, Youth service (Corper), None				
43. Residence*	Rural, Semi-urban/Urban				
44. Usual monthly income (NGN) & income score	Income categories: “no income” up to “more than 300,000” with interval of 20,000, giving 18 categories. “no income” is scored “one” & the score increases by “one” for each higher category up to the highest score of 17				
45. Professional or work-related attributes <sup>A</sup>					
46. Professional cadre or work category	non-Clinical staff, Clinical staff (PMV, health attendant, JCHEW, CHEW, CHO, nurse/midwife, medical laboratory scientist, medical laboratory technologist, pharmacist, pharmacy technician, house officer, medical officer, medical doctor in specialist training, specialist medical doctor)				
47. Years of working experience					
48. Level of work (primary place of work)	Primary health care level (facility), Secondary health care level (facility), Tertiary health care level (facility)				

<sup>H</sup>Highest attainable COVID-19 experiences and perceptions score for each participant (<sup>L</sup>Lowest attainable score). <sup>A</sup>COVID-19 experiences and perceptions score of >=75% of the highest attainable score of 32 is strong experience and perception, <75% is less strong experience and perception. <sup>H<sup>H</sup></sup>Highest attainable COVID-19 vaccination expectations and perceptions score for each participant (<sup>L<sup>L</sup></sup>Lowest attainable score). <sup>B</sup>COVID-19 vaccination expectations and perceptions score of >=75% of the highest attainable score of 20 is good expectation and perception, <75% is poor expectation and perception. <sup>H<sup>H<sup>H</sup></sup></sup>Highest attainable COVID-19 vaccination process experiences and perceptions score (<sup>L<sup>L<sup>L</sup></sup></sup>Lowest attainable score). <sup>C</sup>COVID-19 vaccination process experiences and perceptions score of >=75% of the highest attainable score of 20 is positive experience and perception, <75% is negative experience and perception. <sup>D</sup>Knowledge score of >=75% of the highest attainable score of 44 is good knowledge, <75% is poor knowledge (lowest attainable score is 0) (44 knowledge items scored “1” for each correct response and “0” for each incorrect response). <sup>E</sup>Attitude score of >=75% of the highest attainable score of 80 is good attitude, <75% is poor attitude (lowest attainable score is 16) (each of 16 attitude items respectively scored from “1” to “5” or “5” to “1” as appropriate for “strongly disagree”, “disagree”, “not sure”, “agree”, & “strongly agree”). <sup>F</sup>Practice score of >=75% of the highest attainable score of 24 is good practice, <75% is poor practice (lowest attainable score is 0) (24 practice items scored “1” for each correct response and “0” for each incorrect response). \*Among only community members. <sup>A</sup>Among only health workers. PMV=Patent Medicine Vendor. JCHEW=Junior Community Health Extension Worker. CHEW=Community Health Extension Worker. CHO=Community Health Officer.

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328 19 risk-COVID-19 vaccination benefit perception (disease risk-remedy benefit perception  
 329 (DR-RB/DRRB perception)). Acceptance factor will be in contrast to availability/access factor  
 330 (COVID-19 vaccination process experience and perception). Acceptance-availability/access  
 331 factor will be created as the combination of acceptance and availability/access factors.  
 332 Acceptance factor score (ranging from 0–52 for each participant as the sum of disease-risk  
 333 perception score (0–32) and remedy-benefit perception score (0–20)) and availability/access  
 334 factor score (ranging from 0–20) will be converted to percentages of the maximum attainable

1  
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3 335 score for each participant so that the power of acceptance factor and availability/access factor  
4  
5 336 in predicting COVID-19 vaccination acceptance can be compared by comparing the percentage  
6  
7  
8 337 point increase in scores. The predictive power of disease-risk perception and remedy-benefit  
9  
10 338 perception will also be compared using similar technique.

11  
12  
13 339 Basic knowledge, attitude, and practices about COVID-19 will be assessed, scored, and  
14  
15 340 categorised as stated in the legend of table 1.

### 18 341 **Outcome measures**

20  
21 342 The outcome measures are as defined in table 2. The primary outcomes among community  
22  
23 343 members and health workers include the intention to receive, timeliness of the intention to  
24  
25 344 receive, uptake, and hesitancy to COVID-19 vaccination. The secondary outcomes include  
26  
27 345 COVID-19 experiences and perceptions, COVID-19 vaccination expectations and perceptions,  
28  
29 346 COVID-19 vaccination process experiences and perceptions, knowledge of COVID-19,  
30  
31 347 attitude towards COVID-19 and COVID-19 vaccination, practices about COVID-19, main  
32  
33 348 source and most trusted source of information about COVID-19.

### 38 349 **Measurement of independent factors and study outcomes**

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41  
42 350 Quantitative data will be measured through population-based household survey using  
43  
44 351 structured community members questionnaire and health worker survey using structured health  
45  
46 352 worker questionnaire. The community members questionnaire and the health workers  
47  
48 353 questionnaire are virtually the same except for the absence of identification section and the  
49  
50 354 professional/work-related attributes in the sociodemographic section of the health worker  
51  
52 355 questionnaire. The questionnaire was designed with the guide of data published by other  
53  
54 356 studies,<sup>12,31,39,44</sup> the Report of the SAGE Working Group on Vaccine Hesitancy,<sup>18</sup> the WHO  
55  
56 357 vaccination coverage questionnaire,<sup>74</sup> and basic facts about COVID-19 on WHO website.<sup>75</sup>  
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**Table 2: Outcome measures and their definitions**

SN	Primary Outcomes	Definitions
	<u>Among community members</u>	
1.	The intention to receive COVID-19 vaccination	The proportion of community members aged 15 years and above, who have not received COVID-19 vaccination, who intend (or plan) to receive COVID-19 vaccination that is available for them to receive. The component outcomes are those who will surely go and receive and those who think they will go and receive the vaccination. This outcome is in contrast to those who do not intend (or plan) to receive COVID-19 vaccination that is available for them to receive – consisting of those who are not sure, those who think they will not go and receive, and those who will surely not go and receive the vaccination.
2.	Timeliness of the intention to receive COVID-19 vaccination	The time (in days or weeks) that community members aged 15 years and above, who intend (or plan) to receive COVID-19 vaccination, intend (or plan) to take before they go and receive the vaccination. The component outcomes are the intended time to vaccination among those who will surely go and receive and those who think they will go and receive the vaccination.
3.	The uptake of COVID-19 vaccination	The proportion of community members aged 18 years and above who have received COVID-19 vaccination
4.	The hesitancy to COVID-19 vaccination	The proportion of community members aged 18 years and above who have not received COVID-19 vaccination due to reasons that include only non-acceptance factor rather than only real/perceived non-availability/non-access factor or both non-acceptance and real/perceived non-availability/non-access factors. Non-acceptance factor is defined as consisting of one or more of: perceptions that the vaccination is not important, vaccine is not safe, vaccine is not effective, vaccine is new and/or waiting for others to take it first, and hearing of many bad stories about the vaccine. Real/perceived non-availability/non-access factor is defined as consisting of one or more of: ignorance of vaccination availability, ignorance of place and/or time of vaccination, long distance to vaccination site, being too busy, being ill and did not go for vaccination, being ill and went for vaccination but was not given, long waiting time, vaccine stock-out, absence of vaccinator, closure of health facility. The non-acceptance and real/perceived non-availability/non-access factors will be measured as the reasons given by respondents regarding why they have not received COVID-19 vaccination
5.	The intention for the children to receive COVID-19 vaccination	The proportion of community members aged 15 years and above who intend (or plan) for their children to receive COVID-19 vaccination if it is available for them to receive. The component outcomes are those who will surely take their children to receive and those who think they will take their children to receive the vaccination. This outcome is in contrast to those who do not intend (or plan) for their children to receive COVID-19 vaccination if it is available for them to receive – consisting of those who are not sure, those who think they will not take their children to receive, and those who will surely not take their children to receive the vaccination
6.	Timeliness of the intention for the children to receive COVID-19 vaccination	The time (in days or weeks) that community members aged 15 years and above, who intend (or plan) for their children to receive COVID-19 vaccination, intend (or plan) to take before they take their children to receive the vaccination. The component outcomes are the intended time to vaccination for their children among those who will surely take their children to receive and those who think they will take their children to receive the vaccination
	<u>Among health workers</u>	
7.	The intention to receive COVID-19 vaccination	As for community members above
8.	Timeliness of the intention to receive COVID-19 vaccination	As for community members above
9.	The uptake of COVID-19 vaccination	As for community members above
10.	The hesitancy to COVID-19 vaccination	As for community members above
SN	Secondary Outcomes	Definitions
	<u>Among community members</u>	
1.	COVID-19 experiences and perceptions	COVID-19 experiences and perceptions score among community members aged 15 years and above
2.		The proportion of community members aged 15 years and above who have strong COVID-19 experience and perception (in contrast to those who have less strong experience and perception)
3.		The proportion of community members aged 15 years and above who have the positive categories of COVID-19 experiences and perceptions (in contrast to those who have the negative categories)
4.	COVID-19 vaccination expectations and perceptions	COVID-19 vaccination expectations and perceptions score among community members aged 15 years and above
5.		The proportion of community members aged 15 years and above who have good COVID-19 vaccination expectation and perception (in contrast to those who have poor expectation and perception)
6.		The proportion of community members aged 15 years and above who have the positive categories of COVID-19 vaccination expectations and perceptions (in contrast to those who have the negative categories)
7.	COVID-19 vaccination process experiences and perceptions	COVID-19 vaccination process experiences and perceptions score among community members aged 15 years and above
8.		The proportion of community members aged 15 years and above who have positive COVID-19 vaccination process experience and perception (in contrast to those who have negative experience and perception)
9.		The proportion of community members aged 15 years and above who have the positive categories of COVID-19 vaccination process experiences and perceptions (in contrast to those who have the negative categories)

Table 2: Continued		
SN	Secondary Outcomes	Definitions
10.	The knowledge of COVID-19	Knowledge score among community members aged 15 years and above
11.		The proportion of community members aged 15 years and above who have good knowledge of COVID-19 (in contrast to those who have poor knowledge)
12.	The attitude towards COVID-19 and COVID-19 vaccination	Attitude score among community members aged 15 years and above
13.		The proportion of community members aged 15 years and above who have good attitude towards COVID-19 and COVID-19 vaccination (in contrast to those who have poor attitude)
14.	The practices about COVID-19	Practice score among community members aged 15 years and above
15.		The proportion of community members aged 15 years and above who have good practice about COVID-19 (in contrast to those who have poor practice)
16.	The main source of information about COVID-19*	The proportion of community members aged 15 years and above whose main source of information about COVID-19 is interpersonal; traditional media; or Internet, social media, & SMS.
17.	The most trusted source of information about COVID-19*	The proportion of community members aged 15 years and above whose most trusted source of information about COVID-19 is interpersonal; traditional media; or Internet, social media, & SMS
	<u>Among health workers</u>	
18.	COVID-19 experiences and perceptions	As for community members above
19.	COVID-19 vaccination expectations and perceptions	As for community members above
20.	COVID-19 vaccination process experiences and perceptions	As for community members above
21.	The knowledge of COVID-19	As for community members above
22.	The attitude towards COVID-19 and COVID-19 vaccination	As for community members above
23.	The practices about COVID-19	As for community members above
24.	The main source of information about COVID-19	As for community members above
25.	The most trusted source of information about COVID-19	As for community members above

\* Interpersonal source includes Family members/Relatives/Friends, Other health workers, Place of work, Place of worship/Religious forums; Traditional media source includes Television, Radio, Prints (Newspaper/Magazine); Internet, social media, & SMS source includes WhatsApp, Facebook, Internet sites, Bulk SMS/Text messages.

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359 The electronic versions of both questionnaires were programmed using the KoBoToolbox  
 360 software and were pre-tested in non-participating clusters.

361 The community members questionnaire will be interviewer administered. The interviewers will  
 362 administer the electronic questionnaire with KoBoCollect installed in their android phones or  
 363 tablet devices. The interviewers will receive two days training on how to administer the  
 364 electronic questionnaire. The training will include a detailed review and explanation of the  
 365 questionnaire items, how to obtain consent from respondents, interview techniques, the  
 366 translation of key words in the questionnaire to local language, household revisiting techniques,  
 367 and how to collect data and upload completed forms with KoBoCollect.

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3 368 During the household survey, all the households will be enumerated and household members  
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5 369 aged 15 years and above in households where verbal consent is given will be enlisted and  
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7  
8 370 assigned unique numbers on a separate paper form before administering the anonymised  
9  
10 371 electronic questionnaire. To enhance coverage and response, local residents who have good  
11  
12 372 knowledge of the cluster environment will preferably be the interviewers so that they can visit  
13  
14 373 households when household members are expected to be around and revisit up to three times  
15  
16 374 as necessary. The community members questionnaire has seven sections: Identification  
17  
18 375 (including cluster number, household number, participant number); Sociodemographic  
19  
20 376 characteristics; COVID-19 vaccination acceptance; COVID-19 experiences and perceptions;  
21  
22 377 Basic knowledge of COVID-19; Attitude towards COVID-19 and COVID-19 vaccination; and  
23  
24 378 Practices about COVID-19.  
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29 379 The health worker questionnaire will be self-administered and the web link for the electronic  
30  
31 380 questionnaire will be distributed via social media platforms such as WhatsApp and Facebook.  
32  
33 381 The health workers questionnaire has six sections: Sociodemographic characteristics; COVID-  
34  
35 382 19 vaccination acceptance; COVID-19 experiences and perceptions; Basic knowledge of  
36  
37 383 COVID-19; Attitude towards COVID-19 and COVID-19 vaccination; and Practices about  
38  
39 384 COVID-19.  
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44 385 Qualitative data will be measured through focus group discussions (FGDs) with community  
45  
46 386 members and health workers. A total of 20 FGDs with community members will be carried out  
47  
48 387 across 10 clusters with two FGDs (one male-FGD and one female-FGD) per cluster. A total of  
49  
50 388 15 FGDs with health workers will be conducted, five with non-clinical staff and 15 with clinical  
51  
52 389 staff (five at PHC facilities, two at secondary health facilities, and three at tertiary health  
53  
54 390 facilities). The investigators will conduct the FGDs using FGD guide prepared in English and  
55  
56 391 respectively pre-tested in non-participating clusters and among some health workers who will  
57  
58 392 later be exempted from the study. The FGD guides contain step-by-step instructions and both  
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3 393 open-ended and more targeted questions designed to explore the participants' perceptions about  
4  
5 394 COVID-19, COVID-19 vaccine/vaccination, COVID-19 vaccination process, and the  
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7  
8 395 determinants of COVID-19 vaccination acceptance.  
9

10  
11 396 Before commencement of each FGD, the investigators will collect background data of  
12  
13 397 participants including age, sex, marital status, level of education, occupation or cadre, and years  
14  
15 398 of working experience as appropriate. The community members FGDs will be conducted in  
16  
17 399 local language and the health workers FGDs in English. Each FGD will consist of 8–9  
18  
19 400 participants (comprising a moderator, a note taker, and the respondents) and will last for about  
20  
21 401 45 minutes to one hour. The FGDs will be audio-recorded, the health workers FGDs will be  
22  
23 402 transcribed and community members FGDs will be translated and transcribed verbatim into  
24  
25 403 English.  
26  
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29

#### 30 404 **Data management and quality control**

31  
32  
33 405 The skip logic and validation criteria in KoBoToolbox software was utilized when  
34  
35 406 programming the electronic questionnaire to enhance the quality of data collection. To  
36  
37 407 minimise the potential bias in assessing the association between COVID-19 and COVID-19  
38  
39 408 vaccination related experiences and perceptions and uptake of COVID-19 vaccination, the  
40  
41 409 questionnaire items on these factors are subdivided into two subgroups: “have not received  
42  
43 410 COVID-19 vaccination” and “have received COVID-19 vaccination” and the items in each  
44  
45 411 subgroup are framed differently, respectively in present tense versus in past tense. For example,  
46  
47 412 those whose response to a preceding question indicate that they have not received COVID-19  
48  
49 413 vaccination will subsequently respond to the questions: “How fearful are you that you may  
50  
51 414 have very serious side-effect if you receive COVID-19 vaccination?” “How fearful are you  
52  
53 415 about getting COVID-19?” etc. In contrast, those who have received COVID-19 vaccination  
54  
55 416 will subsequently respond to the questions: “Regarding your experiences and perceptions  
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3 417 before the day you received the first dose of COVID-19 vaccination: How fearful were you  
4  
5 418 that you might have very serious side-effect if you received COVID-19 vaccination?" "How  
6  
7 419 fearful were you about getting COVID-19?"  
8  
9

10  
11 420 To enhance the validity of the questionnaires, after the first drafts, they were several rounds of  
12  
13 421 systematic review-discussion-correction-redrafting by the research team. During this iterative  
14  
15 422 process, attention was paid to relevance of the questionnaire items to the study objectives and  
16  
17 423 the logical flow and order, wording, framing, clarity and appropriateness of the questions. The  
18  
19 424 validation process continued until the final version of the questionnaires which were then pre-  
20  
21 425 tested. During the pre-test, respondents' understanding and interpretation of the items and the  
22  
23 426 options, their response time to individual items and time taken to complete a questionnaire  
24  
25 427 were assessed and the completed questionnaires were reviewed for any problems. Minor  
26  
27 428 adjustments were made thereafter.  
28  
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31  
32 429 The household interviewers will upload only completed anonymised questionnaires to the  
33  
34 430 online survey records at the end of each day's survey and the transmitted questionnaires will  
35  
36 431 be reviewed for missing, incoherent, and illogical data. Any identified error will immediately  
37  
38 432 be communicated to the respective interviewers for correction by cross-checking with the  
39  
40 433 respective respondents. The investigators will supervise the household survey interviewers and  
41  
42 434 will revisit at least 20 eligible households per cluster with a specialised form of the survey  
43  
44 435 questionnaire to double check on responses and coverage.  
45  
46  
47  
48

49 436 Multiple submissions of the self-administered electronic questionnaire from a health worker  
50  
51 437 on the same device and browser will be prevented by deploying the questionnaire through the  
52  
53 438 online-only (once per respondent) option in KoBoToolbox. However, in any case where a  
54  
55 439 health worker who have completed the questionnaire agrees to giving the android phone to any  
56  
57 440 co-worker – who do not have android phone or online address but is willing to participate in  
58  
59  
60



1  
2  
3 441 the survey – to respond to the questionnaire, a web link for online-only (single submission)  
4  
5 442 will be sent to such health worker. The data utility in Stata will be used to check for duplicated  
6  
7 443 submissions (observations) and if found, only one will be kept, the duplicates will be deleted  
8  
9 444 from the dataset. Participation of study participants in the FGDs before the questionnaire  
10  
11 445 surveys will be prevented. During the translation and transcribing of the community members  
12  
13 446 FGDs, exact and meaning-based translation will be used. The FGD transcripts will be  
14  
15 447 compared with the original recording to check for ‘accuracy’ before conducting analyses.  
16  
17  
18  
19

### 20 448 **Sample size**

21  
22  
23 449 Sample size is estimated using Stata/SE version 15.1 (Stata Corp, College Station, TX, USA).  
24  
25 450 For the community members survey, assuming a conservative estimate of 50% for the primary  
26  
27 451 outcome (the proportion of community members who have not received COVID-19  
28  
29 452 vaccination who intend (or plan) to receive COVID-19 vaccination that is available for them  
30  
31 453 to receive) among the community members who have not strong COVID-19 experience and  
32  
33 454 perception and 56% among those who have strong COVID-19 experience and perception, 80%  
34  
35 455 power at 2.5% probability of type one error (to correct for multiple comparisons),<sup>76</sup> 2630 is the  
36  
37 456 minimum total sample size required to detect the 6%-point difference in this primary outcome  
38  
39 457 between both comparison groups. Allowance for 70% response rate will increase the sample  
40  
41 458 size to 3758. To account for cluster sampling, 3758 is multiplied by a conservative estimate of  
42  
43 459 design effect of 4 to give a final minimum total sample size of 15032. As the clusters that will  
44  
45 460 be selected to participate in the study are those with minimum population size of 1000 per  
46  
47 461 cluster, and with 540 (54%) of the population expectedly falling within the age group of 15  
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49 462 years and above,<sup>77</sup> the study requires 28 clusters (15032/540) for the community members  
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51 463 survey.  
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3 464 Using similar parameters, the health workers survey requires a minimum total sample size of  
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5 465 940 to detect a 10%-point difference in this primary outcome between both comparison groups  
6  
7 466 (50% versus 60%). Because of the nature of the survey, such as the use of social media  
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9 467 platforms for distribution of the (self-administered) questionnaire, the length of the  
10  
11 468 questionnaire, and the sampling technique (convenience and snowball), allowance for 50%  
12  
13 469 acceptance rate to account for both non-response and incomplete response will increase the  
14  
15 470 minimum total sample size for the health worker survey to 1880. Also, due to the nature of the  
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17 471 survey, the 1880 is perhaps more of the number of health workers that will be targeted for  
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19 472 distribution of the questionnaire rather than for selection to participate in the survey.  
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### 25 473 **Sampling technique (Recruitment)**

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27  
28 474 Community members will be selected by stratified cluster sampling technique. The sampling  
29  
30 475 frame will be the list of clusters obtained from the Ebonyi state ministry of health. The eligible  
31  
32 476 clusters will be stratified into two: rural and urban/semi-urban. A random sample of 21 clusters  
33  
34 477 will be selected from the rural stratum and a random sample of 7 clusters will be selected from  
35  
36 478 the urban/semi-urban stratum using the “sample” command in Stata, after random-number seed  
37  
38 479 is set with the “set seed” command. This will give a 3:1 rural to urban ratio. If verbal  
39  
40 480 consent/permission is not given by any of the selected cluster(s) head(s) before commencement  
41  
42 481 of household survey, replacement cluster(s) will be selected from the remaining list of eligible  
43  
44 482 clusters using the same technique. The study profile is shown in figure 2. In each of the selected  
45  
46 483 clusters, all the households will be enumerated and all individuals aged 15 year and above in  
47  
48 484 each household will be selected for the community members survey. About six to seven eligible  
49  
50 485 male and female community members, both those who have received and those who have not  
51  
52 486 receive COVID-19 vaccination, in 10 clusters will be selected purposively for FGDs.  
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3 487 Health workers will be selected by convenience and snowballing techniques. To increase  
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5 488 acceptance rate, the research team will first make a physical and or phone contact with as many  
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7 489 health workers as possible to invite them to participate in the survey and seek their consent and  
8  
9 permission for the web link for the self-administered electronic questionnaire to be sent to them  
10  
11 490 via online platforms. For those who give consent and permission, the address or phone number  
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13 491 of their preferred online platform will be recorded and the web link for the questionnaire will  
14  
15 492 be sent to their private online pages. They will be implored to forward the web link to other  
16  
17 493 health workers that they know within the study area after they have completed the  
18  
19 494 questionnaires. The research team will send the web link for the questionnaire to the online  
20  
21 495 contacts (such as WhatsApp phone numbers) of as many eligible health workers as possible,  
22  
23 496 including both private and group pages. About six to seven eligible health workers, both those  
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25 497 who have received and those who have not receive COVID-19 vaccination, will be selected  
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27 498 purposively for FGDs.  
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#### 34 500 **Data analyses**

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37 501 Data will be analysed using Stata/SE version 15.1 (Stata Corp, College Station, TX, USA). All  
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39 502 analyses will be on intention-to-treat bases. Analyses of the community members data will be  
40  
41 503 based on population-averaged models that account for clustering. Point estimates of the  
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43 504 outcome measures will be computed for each comparison group as defined in the study  
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45 505 hypotheses. Each hypothesis with dichotomous or categorical independent factor will be tested  
46  
47 506 by computing prevalence difference (with 95% CI and p-values) in binary outcome measure  
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49 507 using binomial identity, and mean difference (with 95% CI and p-values) in continuous  
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51 508 outcome measure using gaussian identity, generalized estimating equations (GEE) with an  
52  
53 509 exchangeable correlation matrix and robust standard errors. Each hypothesis with continuous  
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55 510 independent factor will be tested by computing coefficient (with 95% CI and p-values) in  
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3 511 binary and continuous outcome measures, respectively using the binomial identity and gaussian  
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5 512 identity GEE models.  
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9 513 For each independent factor (in a hypothesis) being tested, adjusted analysis will be done by  
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11 514 in-putting into the GEE model the other independent factors as appropriate. For clarity, the  
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13 515 potential independent factors to control for are presented in table 3. Both unadjusted and  
14  
15 516 adjusted results will be reported. If the binomial identity GEE model fails to run or convergence  
16  
17 517 is not achieved, gaussian identity GEE model, or generalized least square (GLS) random-  
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19 518 effects linear regression model (with robust standard errors), or maximum likelihood (ML)  
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21 519 random-effects linear regression model will be used instead.<sup>78</sup>  
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25 520 The same analytic technique will be used for the analyses of the health workers data except  
26  
27 521 that generalized linear model (GLM) with robust standard errors will be used in place of GEE  
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29 522 model because of the absence of cluster design in the health worker survey.  
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33 523 Summary statistics will be used to assess COVID-19 vaccination acceptance (the intention to  
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35 524 receive, timeliness of the intention to receive, uptake, and hesitancy); COVID-19 experiences  
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37 525 and perceptions; COVID-19 vaccination expectations and perceptions; COVID-19 vaccination  
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39 526 process experiences and perceptions; knowledge, attitude, and practices about COVID-19; and  
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41 527 sources of information about COVID-19 among community members and health workers.  
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45 528 The qualitative data (focus group discussion transcripts) will be analysed thematically based  
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47 529 on pre-determined themes in the study's conceptual framework.  
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### 51 **Ethics and dissemination** 52 53

54 531 Ethical approval for this study was obtained from the Ebonyi State Health Research and Ethics  
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56 532 Committee (EBSHREC/15/01/2022-02/01/2023).  
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Table 3: Independent factors to in-put into multivariate models in adjusted analyses		
	Independent factors under test	Independent factors to control for (as appropriate)
	Primary hypotheses	
1.	Extent of COVID-19 experience and perception	COVID-19 vaccination expectation and perception level; COVID-19 vaccination process experience and perception level; Basic knowledge of COVID-19; Attitude towards COVID-19 and COVID-19 vaccination; Practices about COVID-19; Source of information about COVID-19 (Main source and Most trusted source of information about COVID-19); Sociodemographic characteristics (Gender, Age, Marital status, Educational level, Occupation*, Residence*, Monthly income/income score*); Professional or work-related attributes <sup>^</sup> (Work category, Years of working experience, Level of work (primary place of work))
2.	COVID-19 experiences and perceptions score	COVID-19 vaccination expectations and perceptions score; COVID-19 vaccination process experiences and perceptions score; Basic knowledge of COVID-19; Attitude towards COVID-19 and COVID-19 vaccination; Practices about COVID-19; Source of information about COVID-19; Sociodemographic characteristics; Professional or work-related attributes <sup>^</sup>
3.	COVID-19 vaccination expectation and perception level	Extent of COVID-19 experience and perception; COVID-19 vaccination process experience and perception level; Basic knowledge of COVID-19; Attitude towards COVID-19 and COVID-19 vaccination; Practices about COVID-19; Source of information about COVID-19; Sociodemographic characteristics; Professional or work-related attributes <sup>^</sup>
4.	COVID-19 vaccination expectations and perceptions score	COVID-19 experiences and perceptions score; COVID-19 vaccination process experiences and perceptions score; Basic knowledge of COVID-19; Attitude towards COVID-19 and COVID-19 vaccination; Practices about COVID-19; Source of information about COVID-19; Sociodemographic characteristics; Professional or work-related attributes <sup>^</sup>
5.	Acceptance factor level (COVID-19 risk-COVID-19 vaccination benefit perception or disease risk-remedy benefit perception level)	Availability/access factor level (COVID-19 vaccination process experience and perception level); Basic knowledge of COVID-19; Attitude towards COVID-19 and COVID-19 vaccination; Practices about COVID-19; Source of information about COVID-19; Sociodemographic characteristics; Professional or work-related attributes <sup>^</sup>
6.	COVID-19 vaccination process experience and perception level	Extent of COVID-19 experience and perception; COVID-19 vaccination expectation and perception level; Basic knowledge of COVID-19; Attitude towards COVID-19 and COVID-19 vaccination; Practices about COVID-19; Source of information about COVID-19; Sociodemographic characteristics; Professional or work-related attributes <sup>^</sup>
7.	COVID-19 vaccination process experiences and perceptions score	COVID-19 experiences and perceptions score; COVID-19 vaccination expectations and perceptions score; Basic knowledge of COVID-19; Attitude towards COVID-19 and COVID-19 vaccination; Practices about COVID-19; Source of information about COVID-19; Sociodemographic characteristics; Professional or work-related attributes <sup>^</sup>
8.	Acceptance-availability/access factor level	Basic knowledge of COVID-19; Attitude towards COVID-19 and COVID-19 vaccination; Practices about COVID-19; Source of information about COVID-19; Sociodemographic characteristics; Professional or work-related attributes <sup>^</sup>
9.	Acceptance factor score and availability/access factor score	Basic knowledge of COVID-19; Attitude towards COVID-19 and COVID-19 vaccination; Practices about COVID-19; Source of information about COVID-19; Sociodemographic characteristics; Professional or work-related attributes <sup>^</sup>
	Secondary hypotheses	
1.	Knowledge of COVID-19	Attitude towards COVID-19; Practices about COVID-19; Source of information about COVID-19; Sociodemographic characteristics; Professional or work-related attributes <sup>^</sup> ; Extent of COVID-19 experience and perception; COVID-19 vaccination expectation and perception level; COVID-19 vaccination process experience and perception level
2.	Attitude towards COVID-19	Knowledge of COVID-19; Practices about COVID-19; Source of information about COVID-19; Sociodemographic characteristics; Professional or work-related attributes <sup>^</sup> ; Extent of COVID-19 experience and perception; COVID-19 vaccination expectation and perception level; COVID-19 vaccination process experience and perception level
3.	Practices about COVID-19	Knowledge of COVID-19; Attitude towards COVID-19; Source of information about COVID-19; Sociodemographic characteristics; Professional or work-related attributes <sup>^</sup> ; Extent of COVID-19 experience and perception; COVID-19 vaccination expectation and perception level; COVID-19 vaccination process experience and perception level
4.	Main source of information about COVID-19	Most trusted source of information about COVID-19; Sociodemographic characteristics; Professional or work-related attributes <sup>^</sup> ; Extent of COVID-19 experience and perception; COVID-19 vaccination expectation and perception level; COVID-19 vaccination process experience and perception level
5.	Most trusted source of information about COVID-19	Main source of information about COVID-19; Sociodemographic characteristics; Professional or work-related attributes <sup>^</sup> ; Extent of COVID-19 experience and perception; COVID-19 vaccination expectation and perception level; COVID-19 vaccination process experience and perception level
6.	A sociodemographic characteristic	Other sociodemographic characteristics; Source of information about COVID-19; Professional or work-related attributes <sup>^</sup> ; Extent of COVID-19 experience and perception; COVID-19 vaccination expectation and perception level; COVID-19 vaccination process experience and perception level
7.	A professional or work-related attribute <sup>^</sup>	Other professional or work-related attributes <sup>^</sup> ; Source of information about COVID-19; Sociodemographic characteristics; Extent of COVID-19 experience and perception; COVID-19 vaccination expectation and perception level; COVID-19 vaccination process experience and perception level

\*Among only community members. <sup>^</sup>Among only health workers.

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3 534 The investigators will obtain verbal consent/permission from the heads of the selected clusters  
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5 535 and the interviewers will obtain verbal consent and assent from the heads of households and  
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8 536 household members aged 15 years and above during the household survey.  
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11 537 The health workers will be informed that only those that give consent should take the online  
12  
13 538 survey. The moderators of the focus group discussions (FGDs) will obtain verbal consent from  
14  
15 539 the respondents before each FGD.  
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18 540 The purpose the study, the kind of participation, likely duration of participation, voluntary  
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20 541 nature of participation, absence of potential harm, potential benefit, and confidential nature of  
21  
22 542 the study will be communicated to participants as required. The online record of the  
23  
24 543 anonymised quantitative data will be passworded and the audio recordings and the electronic  
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26 544 verbatim transcript of the FGDs will be stored in a passworded computer to prevent  
27  
28 545 unauthorised access.  
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33 546 Study findings will be reported at local, national, and international levels in high impact peer-  
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35 547 reviewed journals and conferences as appropriate  
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### 38 548 **Patients and public involvement**

39  
40  
41 549 Patients or the public were not involved in the design and reporting or dissemination plans  
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43 550 and will not be involved in the conduct of our research.  
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48

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50  
51 553 manuscript. OI, RLE, CIA, OUO, VUU, ASA, COI, OON, OOU, IMO contributed to the development of the study design,  
52  
53 554 data collection tools, and original protocol. All authors read, edited, and approved the final manuscript.  
54

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56  
57 556 sectors.  
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60 557 **Competing interests** No competing interest is declared.

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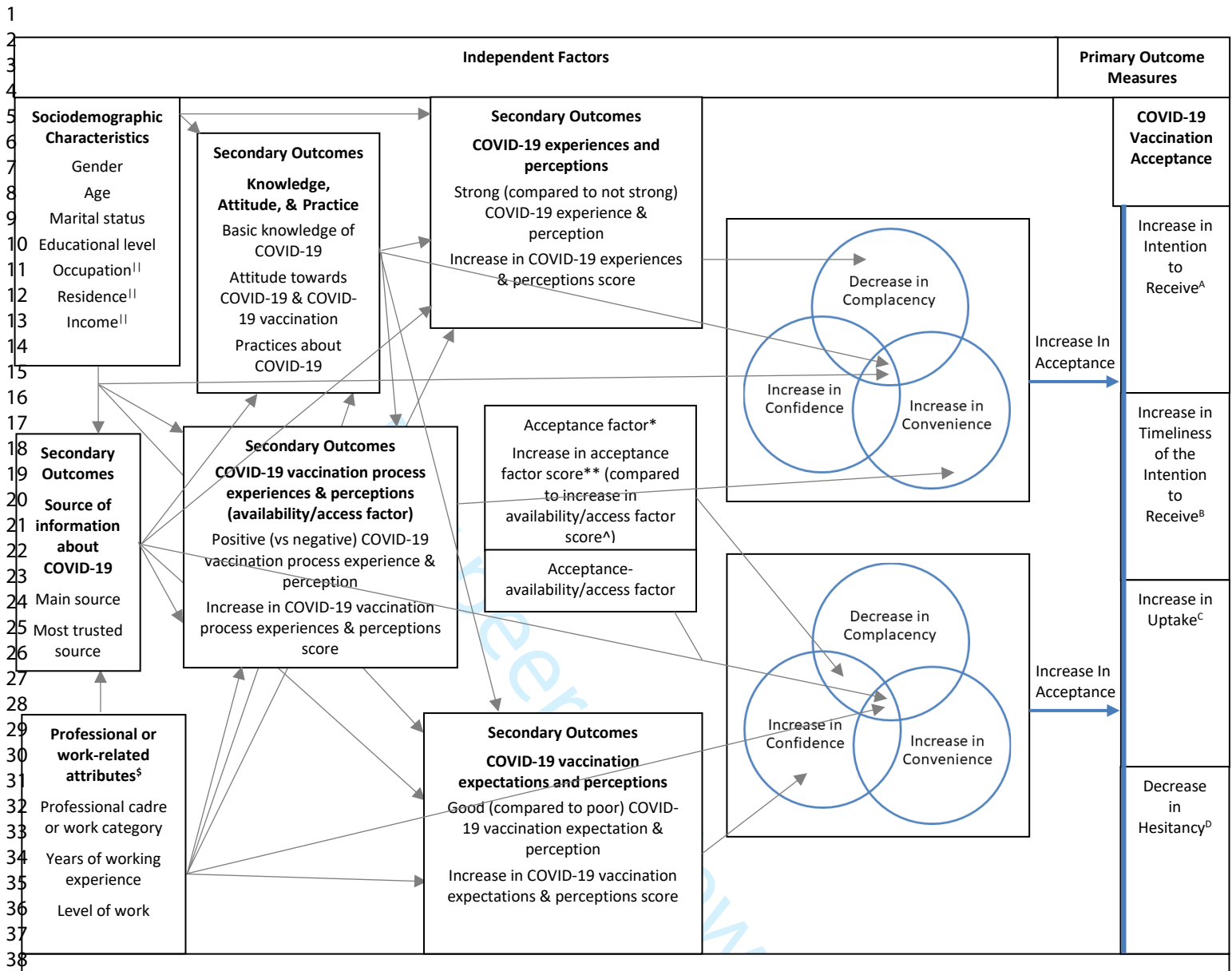
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775 **Figure legend**

776 Figure 1: Study conceptual framework

777 Figure 2: Summary of study profile

For peer review only



**Figure 1: Study conceptual framework**

\*COVID-19 risk-COVID-19 vaccination benefit perception or disease risk-remedy benefit perception (DR-RB or DRRB perception). \*\*Increase in COVID-19 risk-COVID-19 vaccination benefit perceptions score or DR-RB perception score. <sup>^</sup>Increase in COVID-19 vaccination process experience & perception score. <sup>A</sup>Measured as the proportion of participants who intend to receive covid-19 vaccination that is available for them to receive at their catchment health facility. <sup>B</sup>Measured as the length of time the participants, who intend to receive covid-19 vaccination that is available for them to receive at their catchment health facility, intend to take before they go and receive the COVID-19 vaccination (increasing timeliness means reducing the length of time). <sup>C</sup>Measured as the proportion of participants who have received covid-19 vaccination (including those who have completed the doses and those who have not). <sup>D</sup>Measured as the proportion of participants who have not received covid-19 vaccination due to non-acceptance factor (perceptions that the vaccination is not important, vaccine is not safe, vaccine is not effective etc) rather than real or perceived non-availability (non-access) factor (ignorance of vaccination availability, long distance to vaccination site, vaccine stock-out etc) or both. <sup>||</sup>Among only community members. <sup>§</sup>Among only health workers

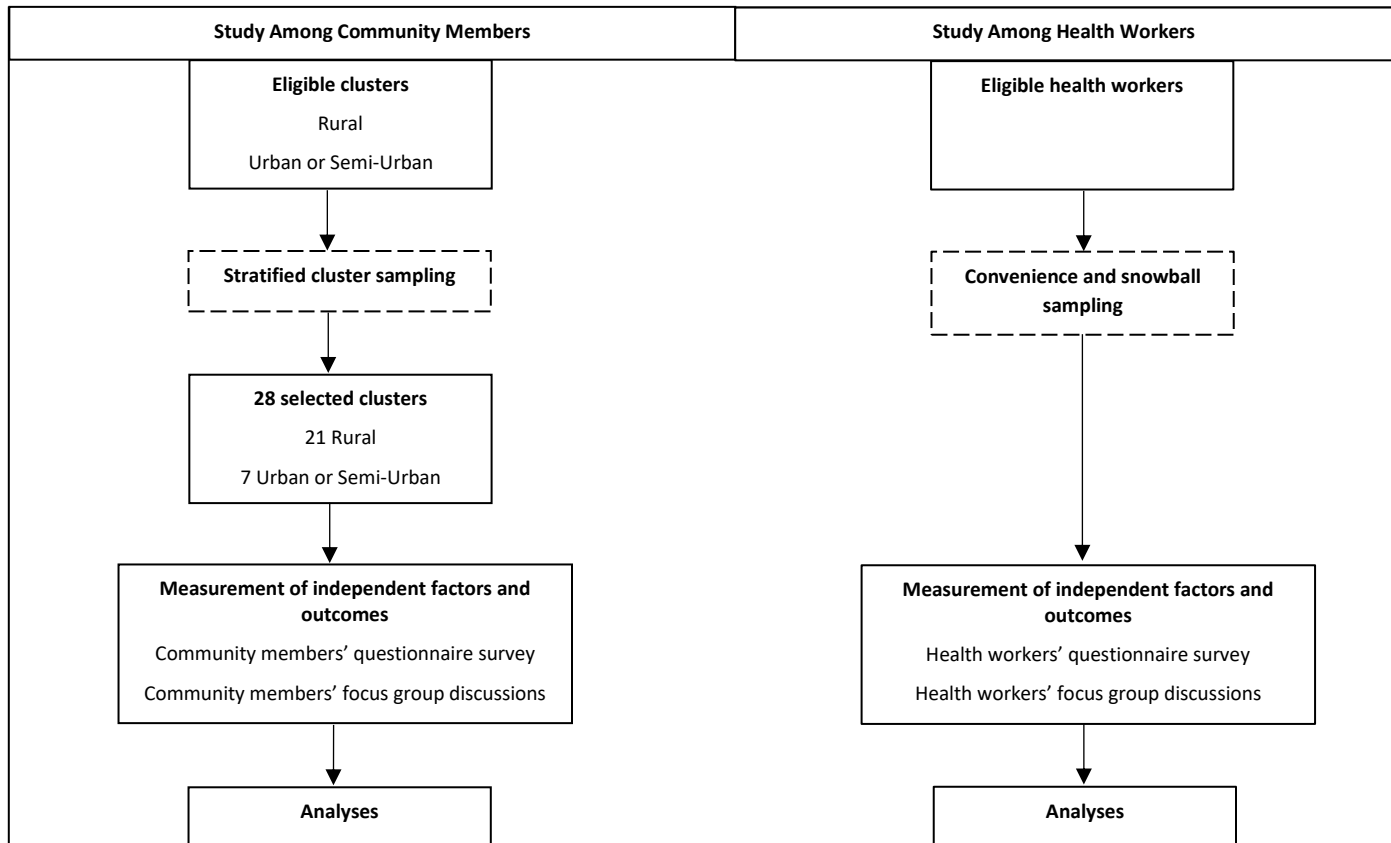


Figure 2: Summary of study profile

# BMJ Open

## COVID-19 vaccination acceptance among community members and health workers in Ebonyi state, Nigeria: study protocol for a concurrent-independent mixed method analyses of intention to receive, timeliness of the intention to receive, uptake, and hesitancy to COVID-19 vaccination and the determinants

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<b>Primary Subject Heading</b>:	Public health
Secondary Subject Heading:	Global health, Health policy, Infectious diseases, Qualitative research
Keywords:	Public health < INFECTIOUS DISEASES, PUBLIC HEALTH, PREVENTIVE MEDICINE, QUALITATIVE RESEARCH



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Manuscripts

1 **Title:** COVID-19 vaccination acceptance among  
2 community members and health workers in Ebonyi  
3 state, Nigeria: study protocol for a concurrent-  
4 independent mixed method analyses of intention to  
5 receive, timeliness of the intention to receive, uptake,  
6 and hesitancy to COVID-19 vaccination and the  
7 determinants

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## 25 **Abstract**

26 **Introduction** The coronavirus disease 2019 (COVID-19) pandemic has gravely affected the  
27 lives and economies of the global population including Nigeria. The attainment of herd  
28 immunity through mass COVID-19 vaccination is the foremost control strategy, however, the  
29 deployments of COVID-19 vaccinations are facing challenges of non-acceptance. Despite the  
30 efforts of the Nigerian government and COVAX facility in making COVID-19 vaccination  
31 more available/accessible, the vaccination rate remains unexpectedly very low in  
32 Nigeria/Ebonyi state. It is thus important to investigate the acceptability of COVID-19  
33 vaccination to elucidate the explanations for the very low coverage rate. This study aims to  
34 evaluate/explore COVID-19 vaccination acceptance and the determinants among community  
35 members and health workers in Ebonyi state, Nigeria.

36 **Methods and analyses** The study is an analytical cross-sectional survey with a concurrent-  
37 independent mixed method design. Quantitative data will be collected from all  
38 consenting/assenting community members aged 15 years and above in 28 randomly selected  
39 geographical clusters, through structured interviewer-administered questionnaire household  
40 survey, using KoBoCollect installed in android devices. Quantitative data will be collected  
41 from all consenting health workers, selected via convenience and snowball techniques, through  
42 structured self-administered questionnaire survey distributed via WhatsApp and interviewer-  
43 administered survey using KoBoCollect installed in android devices. Qualitative data will be  
44 collected from purposively selected community members and health workers through focus  
45 group discussions. Quantitative analyses will involve descriptive statistics, generalized  
46 estimating equations (for community members data), and generalized linear model (for health  
47 workers data). Qualitative analyses will employ the thematic approach.

48 **Ethics and dissemination** Ethical approval for this study was obtained from the Ebonyi State  
49 Health Research and Ethics Committee (EBSHREC/15/01/2022-02/01/2023) and Research  
50 and Ethics Committee of Alex Ekwueme Federal University Teaching Hospital Abakaliki  
51 (14/12/2021-17/02/2022) and verbal consent will be obtained from participants. Study findings  
52 will be reported at local, national, and international levels as appropriate.

53 **Trial registration number** ISRCTN16735844

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## 55 **Strengths and limitations of this study**

- 56 ➤ Our study will be the first geographical-community based study, using mixed method  
57 approach, to investigate COVID-19 vaccination acceptance (the intention to receive,  
58 timeliness of the intention to receive, uptake, and hesitancy) in the context where there is  
59 very low vaccination rate despite relative vaccine availability and public access to  
60 vaccination.
- 61 ➤ The study will be implemented after prospective registration with ISRCTN and based on  
62 available/accessible or disseminated protocol.
- 63 ➤ The study is prone to reporting bias due to the questionnaire-based data collection  
64 method. The convenience and snowballing sampling will make the health worker survey  
65 prone to selection bias.

## 76 **Introduction**

77 Coronavirus disease 2019 (COVID-19), a severe acute respiratory syndrome disease caused by  
78 severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), emerged by the end of 2019  
79 and became a pandemic. By 10th August, 2022, the COVID-19 pandemic had affected more  
80 than 581 million persons and had resulted in the death of over 6.4 million persons globally with  
81 more than 9.2 million cases and over 174000 deaths in Africa.<sup>1</sup> By 10th August, 2022, the total  
82 number of recorded confirmed cases of COVID-19 and COVID-19 related deaths were  
83 respectively 262402 and 3147 in Nigeria and 2064 and 32 in Ebonyi state.<sup>2</sup> The pandemic has  
84 overstretched the capacity of many countries' health care delivery and disrupted the global  
85 economy due to lockdown measures.<sup>3-7</sup>

86 Amongst the available control measures, perhaps the most cost-effective and sustainable  
87 control strategy is mass COVID-19 vaccination (with safe and effective vaccines). COVID-19  
88 vaccination reduces the incidence, severity, and death from COVID-19,<sup>8-11</sup> and is perhaps the  
89 foremost means of achieving herd immunity especially when all population groups including  
90 adults and children are vaccinated<sup>9-14</sup> because both adults and children are susceptible to  
91 COVID-19 infection.<sup>15-17</sup> However, the deployments of COVID-19 vaccinations are facing  
92 some challenges such as non-acceptance and misinformation propagated by anti-vaccine  
93 campaigners. Refusal and/or delay in accepting vaccinations (vaccine hesitancy) had become  
94 a major public health challenge over the past decade<sup>18,19</sup> and was noted as one of the top ten  
95 threats to global health in 2019.<sup>20</sup> Moreover, the unprecedented disruptive impact of the  
96 pandemic with the associated conspiracy theories being propagated in conventional and social  
97 media and the unprecedented rapid development and introduction of COVID-19 vaccines have  
98 generated an atmosphere of uncertainty and confusion which have further limited the  
99 acceptance of COVID-19 vaccination.<sup>21-23</sup>

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3 100 COVID-19 vaccination started in March, 2021 in Nigeria under the COVAX initiative.<sup>24,25</sup>  
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5 101 Although the Nigerian government, with the support of the COVAX facility, is scaling up the  
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7 102 availability/access to COVID-19 vaccination, the coverage rate is still very low in Nigeria,  
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9 103 including Ebonyi state and Nigeria was not among the only five countries in Africa expected  
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11 104 to meet the target of about 40% COVID-19 vaccination coverage by end of 2021.<sup>26</sup> As of 26th  
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13 105 January, 2022 (before this study was implemented), only about 4.6% of eligible Nigerians had  
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15 106 received the second dose of COVID-19 vaccination,<sup>27</sup> about 10.5% had received the first  
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17 107 dose,<sup>28</sup> and Ebonyi state had about the least coverage rate in Nigeria.<sup>29</sup> As of 11th August,  
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19 108 2022, about 25.2% of eligible Nigerians had received the second dose (fully vaccinated)<sup>30</sup> and  
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21 109 about 10.6% had received the first dose (partially vaccinated)<sup>31</sup> and as of 12th August, 2022,  
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23 110 Ebonyi state had the second least coverage rate in Nigeria.<sup>32</sup> Moreover, these coverage rates  
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25 111 were among the current eligible population of 18 years and above and, the rates among the  
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27 112 population at risk, which is what is considered with regards to herd immunity, would be a  
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29 113 fraction of the above.

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36 114 Although the incidence of COVID-19 in Nigeria has been relatively lower compared to many  
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38 115 other countries, high acceptance of COVID-19 vaccination among Nigerians is important in  
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40 116 order to prevent any possible upsurge of the disease especially due to new strains of the virus.  
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42 117 Resurgence of COVID-19 infections and COVID-19 related deaths are common especially  
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44 118 among populations with low COVID-19 vaccination coverage.<sup>9-11</sup>

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48 119 Although the issue of stock-out of COVID-19 vaccines and vaccination syringes cannot be  
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50 120 ignored in Nigeria and other African countries,<sup>26</sup> the slow pace of coverage may be partly due  
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52 121 to non-acceptance/hesitancy among the populace and health workers as we have observed  
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54 122 anecdotally in Ebonyi state. However, to our knowledge, the extent of COVID-19 vaccination  
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56 123 acceptance and the determinants among community members and health workers, as well as  
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58 124 the degree to which the very low COVID-19 vaccination coverage is explained by non-

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3 125 acceptance as against non-availability/non-access, have not been rigorously investigated  
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5 126 especially in Nigeria and particularly in Ebonyi state. Such investigation has become more  
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7 127 imperative since the introduction and scale up of COVID-19 vaccination across Nigeria. The  
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9 128 understanding of context-specific determinants of vaccination acceptance is a necessary  
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11 129 strategy in addressing the problem of non-acceptance of new vaccines such as the current  
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13 130 COVID-19 vaccines.<sup>33</sup>  
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18 131 COVID-19 vaccination intentions among populations were assessed at the early phase of the  
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20 132 pandemic by studies across the world<sup>12-14,34-63</sup> and in Nigeria (mostly based on social media  
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22 133 platforms and among health workers)<sup>64-70</sup> during the development/clinical trial stage of  
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24 134 COVID-19 vaccines. Few studies were done at the early stage of the introduction and  
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26 135 deployment of COVID-19 vaccination.<sup>71,72</sup> However, these studies were done when COVID-  
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28 136 19 vaccination had not been introduced for public use or was just being introduced. Thus, the  
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30 137 perceptions of vaccination-related attributes such as importance, safety or side-effects, and  
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32 138 effectiveness were perhaps largely distal. Moreover, the findings of those studies might  
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34 139 markedly vary from that of studies conducted in situations where COVID-19 vaccination is  
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36 140 readily/relatively available/accessible and there are close/real experiences/perceptions of  
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38 141 vaccination activities and vaccination-related adverse events. Also, since the implementation  
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40 142 of COVID-19 vaccination in Nigeria, the amplification of reports of serious side-effects and  
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42 143 deaths following vaccination is common in the social and conventional media and on the  
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44 144 grapevine.  
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51 145 Moreover, decline in the intention to receive COVID-19 vaccination after the vaccine became  
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53 146 available have been reported across countries.<sup>73</sup> Anecdotal evidence shows that the initial  
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55 147 waves of fear of COVID-19 among the people, including health workers, has markedly waned  
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57 148 overtime especially in Ebonyi state and Nigeria as a whole where the pandemic has been much  
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59 149 less severe compared to some other climes. As a result, it is not surprising that COVID-19  
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150 vaccination uptake is reportedly very low and more importantly, the drive to scale up the  
151 availability and uptake of COVID-19 vaccination may be up against an unexpected bottle-neck  
152 if there is no intention or delayed intention to receive the vaccination among the people.

153 This study aims to evaluate and explore COVID-19 vaccination acceptance (the intention to  
154 receive, timeliness of the intention to receive, uptake, and hesitancy) and the determinants  
155 among community members and health workers in Ebonyi state, Nigeria, in order to generate  
156 evidence to inform policy interventions and strategies on optimal COVID-19 vaccination  
157 acceptance and coverage.

### 158 **Study objectives**

159 The primary objectives are to evaluate and explore the following among community members  
160 and health workers in Ebonyi state, Nigeria:

- 161 1. The intention to receive COVID-19 vaccination and the determinants
- 162 2. Timeliness of the intention to receive COVID-19 vaccination and the determinants
- 163 3. The uptake of COVID-19 vaccination and the determinants
- 164 4. The hesitancy to COVID-19 vaccination and the determinants
- 165 5. The predictive power of acceptance factor compared with availability/access factor  
166 regarding the intention to receive, timeliness of the intention to receive, and uptake of  
167 COVID-19 vaccination

168 The secondary objectives are to evaluate and explore the following among community  
169 members and health workers in Ebonyi state, Nigeria:

- 170 1. The COVID-19 experiences and perceptions and their determinants



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3 171 2. The COVID-19 vaccination expectations and perceptions and their determinants  
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6 172 3. The COVID-19 vaccination process experiences and perceptions (availability/access  
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12 174 4. The knowledge, attitude, and practices about COVID-19 and their determinants  
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15 175 5. The sources of information about COVID-19 and their determinants  
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18 176 6. The perceptions about COVID-19, COVID-19 vaccine/vaccination, and COVID-19  
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20 177 vaccination process

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23 178 **Study hypotheses**

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26 179 The primary hypotheses include:

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29  
30 180 1. Strong COVID-19 experience and perception increases COVID-19 vaccination acceptance  
31  
32 181 (increases the intention to receive, timeliness of the intention to receive, and uptake and  
33  
34 182 reduces hesitancy) compared with not strong COVID-19 experience and perception  
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36  
37 183 2. Increase in COVID-19 experiences and perceptions score increases COVID-19 vaccination  
38  
39 184 acceptance  
40  
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42  
43 185 3. Good COVID-19 vaccination expectation and perception increases COVID-19 vaccination  
44  
45 186 acceptance compared with poor COVID-19 vaccination expectation and perception  
46  
47  
48 187 4. Increase in COVID-19 vaccination expectations and perceptions score increases COVID-  
49  
50 188 19 vaccination acceptance  
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53  
54 189 5. Acceptance factor (COVID-19 risk-COVID-19 vaccination benefit perception or disease  
55  
56 190 risk-remedy benefit perception (DR-RB or DRRB perception)) is significantly associated  
57  
58 191 with COVID-19 vaccination acceptance  
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3 192 6. Positive COVID-19 vaccination process experience and perception (positive  
4  
5  
6 193 availability/access factor) increases the intention to receive, timeliness of the intention to  
7  
8 194 receive, and uptake of COVID-19 vaccination compared with negative COVID-19  
9  
10 195 vaccination process experience and perception (negative availability/access factor)  
11  
12  
13 196 7. Increase in COVID-19 vaccination process experiences and perceptions score increases the  
14  
15 197 intention to receive, timeliness of the intention to receive, and uptake of COVID-19  
16  
17 198 vaccination  
18  
19  
20  
21 199 8. Acceptance-availability/access factor is significantly associated with the intention to  
22  
23 200 receive, timeliness of the intention to receive, and uptake of COVID-19 vaccination  
24  
25  
26 201 9. Increase in acceptance factor score increases the intention to receive, timeliness of the  
27  
28 202 intention to receive, and uptake of COVID-19 vaccination compared with increase in  
29  
30 203 availability/access factor score  
31  
32  
33  
34 204 10. The positive categories of COVID-19 experiences and perceptions, COVID-19  
35  
36 205 vaccination expectations and perceptions, and COVID-19 vaccination process experiences  
37  
38 206 and perceptions respectively increase COVID-19 vaccination acceptance compared with the  
39  
40 207 negative categories (as depicted in table 1)  
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44 208 The secondary hypotheses include:  
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47 209 11. Knowledge, attitude, and practices about COVID-19 are significantly associated with:  
48  
49 210 COVID-19 vaccination acceptance; COVID-19 experiences and perceptions; COVID-19  
50  
51 211 vaccination expectations and perceptions; and COVID-19 vaccination process experiences  
52  
53 212 and perceptions  
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56  
57 213 12. Sources of information about COVID-19 are significantly associated with: COVID-19  
58  
59 214 vaccination acceptance; COVID-19 experiences and perceptions; COVID-19 vaccination

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3 215 expectations and perceptions; COVID-19 vaccination process experiences and perceptions;  
4  
5 216 and knowledge, attitude, and practices about COVID-19  
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9 217 13. Sociodemographic characteristics are significantly associated with: COVID-19  
10  
11 218 vaccination acceptance; COVID-19 experiences and perceptions; COVID-19 vaccination  
12  
13 219 expectations and perceptions; COVID-19 vaccination process experiences and perceptions;  
14  
15 220 knowledge, attitude, and practices about COVID-19; and sources of information about  
16  
17 221 COVID-19  
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20  
21 222 14. Professional or work-related attributes of health workers are significantly associated with:  
22  
23 223 COVID-19 vaccination acceptance, COVID-19 experiences and perceptions; COVID-19  
24  
25 224 vaccination expectations and perceptions; COVID-19 vaccination process experiences and  
26  
27 225 perceptions; knowledge, attitude, and practices about COVID-19; and sources of information  
28  
29 226 about COVID-19  
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32  
33 227 The hypothesized relationships between the independent factors and the outcome measures are  
34  
35 228 shown in the study's conceptual framework in figure 1. The conceptual framework was  
36  
37 229 designed based on the study hypotheses which were informed by published data on COVID-  
38  
39 230 19 and COVID-19 vaccination and the "3Cs" Vaccine Hesitancy Model by The SAGE  
40  
41 231 Working Group on Vaccine Hesitancy.<sup>18</sup>  
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44

45 232 In the conceptual framework (figure 1), strong COVID-19 experience and perception  
46  
47 233 (compared with not strong experience and perception), increase in COVID-19 experiences and  
48  
49 234 perceptions score, and the positive categories of COVID-19 experiences and perceptions  
50  
51 235 (compared with the negative categories) are expected to be associated with decrease in  
52  
53 236 complacency about COVID-19 vaccination which will result in increase in the intention to  
54  
55 237 receive, timeliness of the intention to receive, and uptake and decrease in hesitancy to COVID-  
56  
57 238 19 vaccination (increase in COVID-19 vaccination acceptance). Likewise, good COVID-19  
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3 239 vaccination expectation and perception (compared with poor expectation and perception),  
4  
5 240 increase in COVID-19 vaccination expectations and perceptions score, and the positive  
6  
7 241 categories of COVID-19 vaccination expectations and perceptions (compared with the negative  
8  
9 242 categories) are expected to be associated with increase in confidence in COVID-19 vaccination  
10  
11 243 which will lead to increase in COVID-19 vaccination acceptance.  
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15 244 Positive COVID-19 vaccination process experience and perception (compared with negative  
16  
17 245 experience and perception), increase in COVID-19 vaccination process experiences and  
18  
19 246 perceptions score, and the positive categories of COVID-19 vaccination process experiences  
20  
21 247 and perceptions (compared with the negative categories) are expected to be associated with  
22  
23 248 increase in convenience in COVID-19 vaccination and then increase in the intention to receive,  
24  
25 249 timeliness of the intention to receive, and uptake of COVID-19 vaccination. Acceptance factor  
26  
27 250 is expected to be associated with increase in COVID-19 vaccination acceptance compared with  
28  
29 251 availability/access factor.  
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34 252 As depicted in the conceptual framework (figure 1), knowledge, attitude, and practice about  
35  
36 253 COVID-19; sources of information about COVID-19; sociodemographic characteristics; and  
37  
38 254 professional or work-related attributes are expected to be associated with decrease in  
39  
40 255 complacency, increase in confidence, and increase in convenience in COVID-19 vaccination  
41  
42 256 and then increase in COVID-19 vaccination acceptance. These background characteristics are  
43  
44 257 also expected to be associated with COVID-19 experiences and perceptions, COVID-19  
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46 258 vaccination expectations and perceptions, and COVID-19 vaccination process experiences and  
47  
48 259 perceptions (figure 1).  
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## 53 260 **Methods and analyses**

### 54 261 **Design**

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3 262 The study is an analytical cross-sectional survey with a concurrent-independent mixed data  
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5 263 collection and data analysis and interpretation method. In this design, the quantitative and  
6  
7 264 qualitative aspects of the study will be implemented simultaneously and independently of each  
8  
9 265 other.<sup>74</sup> The study protocol development was guided by the Standard Protocol Items:  
10  
11 266 Recommendations for Interventional Trials (SPIRIT) 2013 checklist and the Strengthening the  
12  
13 267 Reporting of Observational Studies in Epidemiology (STROBE) 2007 checklist for cross-  
14  
15 268 sectional studies.

### 20 269 **Study area**

23 270 The study is planned to be implemented between March and April, 2022, in Ebonyi state which  
24  
25 271 is located in south-eastern geopolitical zone of Nigeria (supplementary file 1) with land area of  
26  
27 272 5,953 sq. km. The population of the state was projected to be 3,313,229 in 2021 based on the  
28  
29 273 2006 national census figure and a growth rate of 2.8% and christianity is the most practiced  
30  
31 274 religion. Ebonyi state has 13 Local Government Areas (LGAs) including the state capital  
32  
33 275 (Abakaliki LGA) and 171 political wards.<sup>75</sup> Each LGA is made up of political wards and  
34  
35 276 autonomous communities. Each autonomous community is made up of larger villages called  
36  
37 277 autonomous villages which consist of smaller villages or settlements. Each village/settlement  
38  
39 278 has a head or traditional leader. Most parts of Ebonyi state are rural and there are only six towns  
40  
41 279 (urban or semi-urban areas), five of which are LGAs capitals with the adjoining areas.<sup>76</sup>

44 280 The federal ministry of health (FMOH) and its agencies provide the overarching guidance and  
45  
46 281 policy framework for public and private health service delivery in all states in Nigeria including  
47  
48 282 Ebonyi state. The FMOH provides health services in the state through tertiary health facilities  
49  
50 283 while the state ministry of health (SMOH) provides health service through secondary health  
51  
52 284 facilities (general hospitals). The SMOH and the state primary health care development agency  
53  
54 285 (SPHCDA) provide health care in the local governments through primary health care (PHC)

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3 286 facilities. There is at least one PHC centre in each political ward. The national primary health  
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5 287 care development agency (NPHCDA) provides policy guidance and coordination for  
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7  
8 288 immunisation/vaccination services in all states in Nigeria including Ebonyi state. The  
9  
10 289 NPHCDA provides vaccines and related products while the SMOH and SPHCDA coordinates  
11  
12 290 the implementation of immunisation/vaccination service delivery in the state (and LGAs)  
13  
14  
15 291 through the tertiary, secondary, and primary health care (PHC) facilities.  
16

## 17 18 292 **Participants**

19  
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21 293 The participants include clusters, the community members within clusters, and health workers  
22  
23 294 in Ebonyi state. A cluster in this study is a geographical community (village(s)/settlement(s))  
24  
25 295 which is the immediate catchment area of a PHC centre. Eligible clusters for inclusion in the  
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27  
28 296 study are those with at least 200 households or a population of 1000 people, whose PHC centres  
29  
30 297 are providing basic maternal and child health care services including routine childhood  
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32 298 immunisation, that can be easily accessed with a car, and where the cluster heads give verbal  
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35 299 consent/permission. In each of the selected clusters, community members aged 15 years and  
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37 300 above who give verbal consent/assent will be eligible to participate in a population-based  
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39 301 household survey. Health workers (both clinical and non-clinical staff) in public and private  
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41 302 health care sectors, including the patent medicine vendors (PMVs), who work or live in Ebonyi  
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43  
44 303 state and give verbal consent will be eligible to participate in a health worker survey.  
45  
46 304 Community members aged 15 years and above who have resided in the community for at least  
47  
48 305 one year and who give verbal consent/assent will be eligible to participate in community-based  
49  
50  
51 306 focus group discussions (FGDs) while health workers (both clinical and non-clinical staff) who  
52  
53 307 work or live in Ebonyi state, have at least one year of working experience, and give verbal  
54  
55 308 consent will be eligible to participate in health worker-based FGDs.  
56

## 57 58 309 **Independent factors and outcome measures**

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### 310 **Independent factors, categories, scoring, and grading**

311 The independent factors among community members and health workers (see table 1) are  
312 almost the same with few differences which include: occupation, monthly income, and  
313 residence among the community members; and professional or work category/cadre, years of  
314 working experience, and level of work among the health workers.

315 The independent factors are listed under seven headings labelled A–I: COVID-19 experiences  
316 and perceptions; COVID-19 vaccination expectations and perceptions; COVID-19 vaccination  
317 process experiences and perceptions (availability/access factor); Acceptance factor (COVID-  
318 19 risk-COVID-19 vaccination benefit perception); Acceptance-availability/access factor;  
319 Knowledge, attitude, and practice about COVID-19; Source of information about COVID-19;  
320 Sociodemographic characteristics; and Professional or work-related attributes. These three  
321 factors – COVID-19 experiences and perceptions; COVID-19 vaccination expectations and  
322 perceptions; and COVID-19 vaccination process experiences and perceptions – will be  
323 respectively measured using eight, five, and five questionnaire items each having five  
324 categories grouped into positive and negative and scored from 0–4 as depicted in table 1.

325 The scoring will create three new continuous variables including COVID-19 experiences and  
326 perceptions score (ranging from 0–32 for each participant); COVID-19 vaccination  
327 expectations and perceptions score (ranging from 0–20); and COVID-19 vaccination process  
328 experiences and perceptions score (ranging from 0–20). These continuous variables will then  
329 be graded on a two-level scale such that scores  $\geq 50\%$  of the total versus  $< 50\%$  will  
330 respectively be considered to be: strong versus not strong COVID-19 experience and  
331 perception; good versus poor COVID-19 vaccination expectation and perception; and positive  
332 versus negative COVID-19 vaccination process experience and perception.

333 Acceptance factor will be created as the combination of COVID-19 experiences and

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**Table 1: Independent factors and their categories and category scores and grading among community members and health workers**

Independent factors	Categories (Scores)					
	Positive category			Negative category		
COVID-19 experiences and perceptions						
1. How fearful are you about getting COVID-19?	Very fearful (4)	A little fearful (3)	Not sure (2)	Not fearful (1)	Not fearful at all (0)	
2. How possible is it for you to get COVID-19?	Highly possible (4)	A bit possible (3)	Not sure (2)	Not possible (1)	Not possible at all (0)	
3. How possible is it for you to get severe COVID-19?	Highly possible (4)	A bit possible (3)	Not sure (2)	Not possible (1)	Not possible at all (0)	
4. Have you ever had COVID-19?	Yes, surely (4)	Yes, think so (3)	Not sure (2)	No, think so (1)	No, surely (0)	
5. Have you ever had severe COVID-19?	Yes, very serious (4)	Yes, a bit serious (3)	Not sure (2)	No, not serious (1)	No, not serious at all (0)	
6. Do you know any person who have had COVID-19?	A very close person (4)	A close person (3)	A distant person (2)	A very distant person (1)	No person (0)	
7. Do you know any person who have had severe COVID-19?	A very close person (4)	A close person (3)	A distant person (2)	A very distant person (1)	No person (0)	
8. Do you know any person who have died from COVID-19?	A very close person (4)	A close person (3)	A distant person (2)	A very distant person (1)	No person (0)	
Total	(32 <sup>HI</sup> )	–	–	–	(0 <sup>L</sup> )	
COVID-19 experiences and perceptions score						
9. Extent of COVID-19 experience and perception (COVID-19 risk perception) <sup>A</sup>	Strong experience and perception (high risk perception)	–	–	–	Not strong experience and perception (low risk perception)	
10. COVID-19 vaccination expectations and perceptions						
11. How important is it for you to receive COVID-19 vaccination?	Very important (4)	Important (3)	Not sure (2)	Not important (1)	Not important at all (0)	
12. How fearful are you about having severe side-effect from COVID-19 vaccination?	Not fearful at all (4)	Not fearful (3)	Not sure (2)	A little fearful (1)	Very fearful (0)	
13. What protection against COVID-19 will you get from receiving COVID-19 vaccination?	Full protection (4)	Partial protection (3)	Not sure (2)	No protection (1)	No protection at all (0)	
14. How do you trust the health workers who give COVID-19 vaccination?	Trust them very much (4)	Trust them (3)	Not sure (2)	Do not trust them (1)	Do not trust them at all (0)	
15. How do you trust the government who made COVID-19 vaccination available?	Trust them very much (4)	Trust them (3)	Not sure (2)	Do not trust them (1)	Do not trust them at all (0)	
Total	(20 <sup>HH</sup> )	–	–	–	(0 <sup>L</sup> )	
COVID-19 vaccination expectations and perceptions score						
16. COVID-19 vaccination expectation and perception level (COVID-19 vaccination benefit perception) <sup>B</sup>	Good expectation and perception (high benefit perception)	–	–	–	Poor expectation and perception (low benefit perception)	
17. COVID-19 vaccination process experiences and perceptions (availability/access factor)						
18. Ever heard about COVID-19 vaccination?	Many times (4)	Once/few times (3)	Not sure (2)	No time (1)	No time at all (0)	
19. Know a COVID-19 vaccination place?	A very close place (4)	A close place (3)	A far place (2)	A very far place (1)	No place (0)	
20. Frequency of COVID-19 vaccination at the vaccination place?	Daily, down to twice a week (4)	Once a weekly (3)	Once in two-four weeks (2)	No fixed time (1)	Do not know (0)	
21. Queue at the vaccination place?	No queue (4)	Short queue (3)	Do not know (2)	Long queue (1)	Very long queue (0)	
22. How caring are the health workers at the vaccination place?	Very caring (4)	Caring (3)	Not sure (2)	Not caring (1)	Not caring at all (0)	
Total	(20 <sup>HHH</sup> )				(0 <sup>LL</sup> )	
23. COVID-19 vaccination process experiences & perceptions score (availability/access factor score)						
24. COVID-19 vaccination process experience and perception level (availability/access factor level) <sup>C</sup>	Positive experience & perception (availability & access factor)	–	–	–	Negative experience & perception (availability & access factor)	
Acceptance factor level	Defined as COVID-19 risk-COVID-19 vaccination benefit perception or disease risk-remedy benefit perception level. Categories: High disease risk-high remedy benefit perception or high-high DR-RB perception, high-low DR-RB perception, low-high DR-RB perception, and low-low DR-RB perception					
Acceptance factor score	Defined as COVID-19 risk perception score plus COVID-19 vaccination benefit perceptions score or DR-RB perception score					
Acceptance-availability/access factor level	High-high-positive, High-high-negative, High-low-positive, High-low-negative, low-high-positive, low-high-negative, low-low-positive, low-low-negative					

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Table 1: Continued

Independent factors	Categories (Scores)				
	Positive category		Negative category		
Knowledge, Attitude, and Practice					
28. Knowledge score					
29. Level of knowledge of COVID-19 <sup>D</sup>	Good knowledge	–	–	–	Poor knowledge
30. Attitude score					
31. Level of attitude towards COVID-19 & COVID-19 vaccination <sup>E</sup>	Good attitude	–	–	–	Poor attitude
32. Practice score					
33. Level of practices about COVID-19 <sup>F</sup>	Good practice	–	–	–	Poor practice
34. Source of information about COVID-19	Interpersonal (Family members/Relatives/Friends, Other health workers, Place of work, Place of worship/Religious forums); Traditional media (Television, Radio, Prints (Newspaper/Magazine)); Internet, social media, & SMS ( WhatsApp, Facebook, Internet sites, Bulk SMS/Text messages)				
35. Main source of information	Interpersonal; Traditional media; Internet, social media, & SMS				
36. Most trusted source of information	Interpersonal; Traditional media; Internet, social media, & SMS				
37. Sociodemographic characteristics					
38. Gender	Male, Female				
39. Age					
40. Marital status	Married, Divorced, Separated, Widowed, Never married (single)				
41. Educational level	No formal education, Some primary, Completed primary, Some secondary, Completed secondary, Tertiary (diploma, first degree, masters/PHD/other equivalent)				
42. Occupation*	Farmer, Trader, Other-self-employment, Private paid work, Government paid work, Housewife, Student, Apprentice, Youth service (Corper), None				
43. Residence*	Rural, Semi-urban/Urban				
44. Usual monthly income (NGN) & income score	Income categories: "no income" up to "more than 300,000" with interval of 20,000, giving 18 categories. "no income" is scored "one" & the score increases by "one" for each higher category up to the highest score of 17				
45. Professional or work-related attributes <sup>A</sup>					
46. Professional cadre or work category	non-Clinical staff, Clinical staff (PMV, health attendant, JCHEW, CHEW, CHO, nurse/midwife, medical laboratory scientist, medical laboratory technologist, pharmacist, pharmacy technician, house officer, medical officer, medical doctor in specialist training, specialist medical doctor)				
47. Years of working experience					
48. Primary place of work	Public and private				
49. Level of primary place of work	Primary health care level (facility), Secondary health care level (facility), and Tertiary health care level (facility)				

33 <sup>H</sup>Highest attainable COVID-19 experiences and perceptions score for each participant (<sup>L</sup>Lowest attainable score). <sup>A</sup>COVID-19 experiences and perceptions score of  $\geq 50\%$   
34 of the highest attainable score of 32 is strong experience and perception,  $<50\%$  is not strong experience and perception. <sup>HH</sup>Highest attainable COVID-19 vaccination  
35 expectations and perceptions score for each participant (<sup>LL</sup>Lowest attainable score). <sup>B</sup>COVID-19 vaccination expectations and perceptions score of  $\geq 50\%$  of the highest  
36 attainable score of 20 is good expectation and perception,  $<50\%$  is poor expectation and perception. <sup>HHH</sup>Highest attainable COVID-19 vaccination process experiences  
37 and perceptions score (<sup>LLL</sup>Lowest attainable score). <sup>C</sup>COVID-19 vaccination process experiences and perceptions score of  $\geq 50\%$  of the highest attainable score of 20 is  
38 positive experience and perception,  $<50\%$  is negative experience and perception. <sup>D</sup>Knowledge score of  $\geq 75\%$  of the highest attainable score of 44 is good knowledge,  
39  $<75\%$  is poor knowledge (lowest attainable score is 0) (44 knowledge items scored "1" for each correct response and "0" for each incorrect response). <sup>E</sup>Attitude score of  
40  $\geq 75\%$  of the highest attainable score of 80 is good attitude,  $<75\%$  is poor attitude (lowest attainable score is 16) (each of 16 attitude items respectively scored from "1"  
41 to "5" or "5" to "1" as appropriate for "strongly disagree", "disagree", "not sure", "agree", & "strongly agree"). <sup>F</sup>Practice score of  $\geq 75\%$  of the highest attainable score  
42 of 24 is good practice,  $<75\%$  is poor practice (lowest attainable score is 0) (24 practice items scored "1" for each correct response and "0" for each incorrect response).  
43 \*Among only community members. <sup>A</sup>Among only health workers. PMV=Patent Medicine Vendor. JCHEW=Junior Community Health Extension Worker.  
44 CHEW=Community Health Extension Worker. CHO=Community Health Officer.

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335 perceptions plus COVID-19 vaccination expectations and perceptions and defined as COVID-

336 19 risk-COVID-19 vaccination benefit perception (disease risk-remedy benefit perception

337 (DR-RB/DRRB perception)). Acceptance factor will be in contrast to availability/access factor

338 (COVID-19 vaccination process experience and perception). Acceptance-availability/access

339 factor will be created as the combination of acceptance and availability/access factors.

340 Acceptance factor score (ranging from 0–52 for each participant as the sum of disease-risk

341 perception score (0–32) and remedy-benefit perception score (0–20)) and availability/access

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3 342 factor score (ranging from 0–20) will be converted to percentages of the maximum attainable  
4  
5 343 score for each participant so that the power of acceptance factor and availability/access factor  
6  
7 344 in predicting COVID-19 vaccination acceptance can be compared by comparing how unit  
8  
9 345 increase in the percentage scores (percentage point increase) affect COVID-19 vaccination  
10  
11 346 acceptance. The predictive power of disease-risk perception and remedy-benefit perception  
12  
13 347 will also be compared using similar technique.  
14  
15  
16  
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18 348 Basic knowledge, attitude, and practices about COVID-19 will be assessed, scored, and  
19  
20 349 categorised as stated in the legend of table 1.  
21  
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### 23 350 **Outcome measures**

24  
25  
26 351 The outcome measures are as defined in table 2. The primary outcomes among community  
27  
28 352 members and health workers include the intention to receive, timeliness of the intention to  
29  
30 353 receive, uptake, and hesitancy to COVID-19 vaccination. The secondary outcomes include  
31  
32 354 COVID-19 experiences and perceptions, COVID-19 vaccination expectations and perceptions,  
33  
34 355 COVID-19 vaccination process experiences and perceptions, knowledge of COVID-19,  
35  
36 356 attitude towards COVID-19 and COVID-19 vaccination, practices about COVID-19, main  
37  
38 357 source and most trusted source of information about COVID-19.  
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### 43 358 **Measurement of independent factors and study outcomes**

44  
45  
46 359 Quantitative data will be measured through population-based household survey using  
47  
48 360 structured community members questionnaire (supplementary file 2) and health worker survey  
49  
50 361 using structured health worker questionnaire (supplementary file 3). The community members  
51  
52 362 questionnaire and the health workers questionnaire are virtually the same except for the absence  
53  
54 363 of identification section and the professional/work-related attributes in the sociodemographic  
55  
56 364 section of the health worker questionnaire.  
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Table 2: Outcome measures and their definitions		
SN	Primary Outcomes	Definitions
	<u>Among community members</u>	
1.	The intention to receive COVID-19 vaccination	The proportion of community members aged 15 years and above, who have not received COVID-19 vaccination, who intend (or plan) to receive COVID-19 vaccination that is available for them to receive. The component outcomes are those who will surely go and receive and those who think they will go and receive the vaccination. This outcome is in contrast to those who do not intend (or plan) to receive COVID-19 vaccination that is available for them to receive – consisting of those who are not sure, those who think they will not go and receive, and those who will surely not go and receive the vaccination.
2.	Timeliness of the intention to receive COVID-19 vaccination	The time (in days or weeks) that community members aged 15 years and above, who intend (or plan) to receive COVID-19 vaccination, intend (or plan) to take before they go and receive the vaccination. The component outcomes are the intended time to vaccination among those who will surely go and receive and those who think they will go and receive the vaccination.
3.	The uptake of COVID-19 vaccination	The proportion of community members aged 18 years and above who have received COVID-19 vaccination
4.	The hesitancy to COVID-19 vaccination	The proportion of community members aged 18 years and above who have not received COVID-19 vaccination due to reasons that include only non-acceptance factor rather than only real/perceived non-availability/non-access factor or both non-acceptance and real/perceived non-availability/non-access factors. Non-acceptance factor is defined as consisting of one or more of: perceptions that the vaccination is not important, vaccine is not safe, vaccine is not effective, vaccine is new and/or waiting for others to take it first, and hearing of many bad stories about the vaccine. Real/perceived non-availability/non-access factor is defined as consisting of one or more of: ignorance of vaccination availability, ignorance of place and/or time of vaccination, long distance to vaccination site, being too busy, being ill and did not go for vaccination, being ill and went for vaccination but was not given, long waiting time, vaccine stock-out, absence of vaccinator, closure of health facility. The non-acceptance and real/perceived non-availability/non-access factors will be measured as the reasons given by respondents regarding why they have not received COVID-19 vaccination
5.	The intention for the children to receive COVID-19 vaccination	The proportion of community members aged 15 years and above who intend (or plan) for their children to receive COVID-19 vaccination if it is available for them to receive. The component outcomes are those who will surely take their children to receive and those who think they will take their children to receive the vaccination. This outcome is in contrast to those who do not intend (or plan) for their children to receive COVID-19 vaccination if it is available for them to receive – consisting of those who are not sure, those who think they will not take their children to receive, and those who will surely not take their children to receive the vaccination
6.	Timeliness of the intention for the children to receive COVID-19 vaccination	The time (in days or weeks) that community members aged 15 years and above, who intend (or plan) for their children to receive COVID-19 vaccination, intend (or plan) to take before they take their children to receive the vaccination. The component outcomes are the intended time to vaccination for their children among those who will surely take their children to receive and those who think they will take their children to receive the vaccination
	<u>Among health workers</u>	
7.	The intention to receive COVID-19 vaccination	As for community members above
8.	Timeliness of the intention to receive COVID-19 vaccination	As for community members above
9.	The uptake of COVID-19 vaccination	As for community members above
10.	The hesitancy to COVID-19 vaccination	As for community members above
SN	Secondary Outcomes	Definitions
	<u>Among community members</u>	
1.	COVID-19 experiences and perceptions	COVID-19 experiences and perceptions score among community members aged 15 years and above
2.		The proportion of community members aged 15 years and above who have strong COVID-19 experience and perception (in contrast to those who have less strong experience and perception)
3.		The proportion of community members aged 15 years and above who have the positive categories of COVID-19 experiences and perceptions (in contrast to those who have the negative categories)
4.	COVID-19 vaccination expectations and perceptions	COVID-19 vaccination expectations and perceptions score among community members aged 15 years and above
5.		The proportion of community members aged 15 years and above who have good COVID-19 vaccination expectation and perception (in contrast to those who have poor expectation and perception)
6.		The proportion of community members aged 15 years and above who have the positive categories of COVID-19 vaccination expectations and perceptions (in contrast to those who have the negative categories)
7.	COVID-19 vaccination process experiences and perceptions	COVID-19 vaccination process experiences and perceptions score among community members aged 15 years and above
8.		The proportion of community members aged 15 years and above who have positive COVID-19 vaccination process experience and perception (in contrast to those who have negative experience and perception)
9.		The proportion of community members aged 15 years and above who have the positive categories of COVID-19 vaccination process experiences and perceptions (in contrast to those who have the negative categories)

Table 2: Continued		
SN	Secondary Outcomes	Definitions
10.	The knowledge of COVID-19	Knowledge score among community members aged 15 years and above
11.		The proportion of community members aged 15 years and above who have good knowledge of COVID-19 (in contrast to those who have poor knowledge)
12.	The attitude towards COVID-19 and COVID-19 vaccination	Attitude score among community members aged 15 years and above
13.		The proportion of community members aged 15 years and above who have good attitude towards COVID-19 and COVID-19 vaccination (in contrast to those who have poor attitude)
14.	The practices about COVID-19	Practice score among community members aged 15 years and above
15.		The proportion of community members aged 15 years and above who have good practice about COVID-19 (in contrast to those who have poor practice)
16.	The main source of information about COVID-19*	The proportion of community members aged 15 years and above whose main source of information about COVID-19 is interpersonal; traditional media; or Internet, social media, & SMS.
17.	The most trusted source of information about COVID-19*	The proportion of community members aged 15 years and above whose most trusted source of information about COVID-19 is interpersonal; traditional media; or Internet, social media, & SMS
	<u>Among health workers</u>	
18.	COVID-19 experiences and perceptions	As for community members above
19.	COVID-19 vaccination expectations and perceptions	As for community members above
20.	COVID-19 vaccination process experiences and perceptions	As for community members above
21.	The knowledge of COVID-19	As for community members above
22.	The attitude towards COVID-19 and COVID-19 vaccination	As for community members above
23.	The practices about COVID-19	As for community members above
24.	The main source of information about COVID-19	As for community members above
25.	The most trusted source of information about COVID-19	As for community members above

\*Interpersonal source includes Family members/Relatives/Friends, Other health workers, Place of work, Place of worship/Religious forums; Traditional media source includes Television, Radio, Prints (Newspaper/Magazine); Internet, social media, & SMS source includes WhatsApp, Facebook, Internet sites, Bulk SMS/Text messages.

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366 The questionnaire was designed with the guide of data published by other studies,<sup>12,34,42,47</sup> the  
 367 Report of the SAGE Working Group on Vaccine Hesitancy,<sup>18</sup> the WHO vaccination coverage  
 368 questionnaire,<sup>77</sup> and basic facts about COVID-19 on WHO website.<sup>78</sup> The electronic versions  
 369 of both questionnaires were programmed using the KoBoToolbox software and were pre-tested  
 370 in non-participating clusters.

371 The community members questionnaire will be interviewer administered. The interviewers will  
 372 administer the electronic questionnaire with KoBoCollect installed in their android phones or  
 373 tablet devices. The interviewers will receive two days training on how to administer the  
 374 electronic questionnaire. The training will include a detailed review and explanation of the

1  
2  
3 375 questionnaire items, how to obtain consent from respondents, interview techniques, the  
4  
5 376 translation of key words in the questionnaire to local language, household revisiting techniques,  
6  
7  
8 377 and how to collect data and upload completed forms with KoBoCollect.  
9

10  
11 378 During the household survey, all the households will be enumerated and household members  
12  
13 379 aged 15 years and above in households where verbal consent is given by the heads of  
14  
15 380 households will be enlisted and assigned unique numbers on a separate paper form before  
16  
17 381 administering the anonymised electronic questionnaire. To enhance coverage and response,  
18  
19 382 local residents who have good knowledge of the cluster environment will preferably be the  
20  
21 383 interviewers so that they can visit households when household members are expected to be  
22  
23 384 around and revisit up to three times as necessary. The community members questionnaire has  
24  
25 385 seven sections: Identification (including cluster number, household number, participant  
26  
27 386 number); Sociodemographic characteristics; COVID-19 vaccination acceptance; COVID-19  
28  
29 387 experiences and perceptions; Basic knowledge of COVID-19; Attitude towards COVID-19 and  
30  
31 388 COVID-19 vaccination; and Practices about COVID-19 (supplementary file 2).  
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37 389 The health worker questionnaire will be self-administered and the web link for the electronic  
38  
39 390 questionnaire will be distributed via social media platform such as WhatsApp. However,  
40  
41 391 interviewers will administer the health workers questionnaire via KoBoCollect installed in  
42  
43 392 android devices to health workers who do not have online contact and those living in remote  
44  
45 393 areas with poor internet access. The health workers questionnaire has six sections:  
46  
47 394 Sociodemographic characteristics; COVID-19 vaccination acceptance; COVID-19  
48  
49 395 experiences and perceptions; Basic knowledge of COVID-19; Attitude towards COVID-19 and  
50  
51 396 COVID-19 vaccination; and Practices about COVID-19 (supplementary file 3).  
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56 397 Qualitative data will be measured through focus group discussions (FGDs) with community  
57  
58 398 members and health workers. A total of 20 FGDs with community members will be carried out  
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3 399 across 10 clusters with two FGDs (one male-FGD and one female-FGD) per cluster. A total of  
4  
5 400 14 FGDs with health workers will be conducted, five with non-clinical staff and nine with  
6  
7 401 clinical staff (five at PHC facilities and four at secondary/tertiary health facilities). The  
8  
9 402 investigators will conduct the FGDs using FGD guide (supplementary file 4) prepared in  
10  
11 403 English and pre-tested in non-participating clusters and among some health workers who will  
12  
13 404 later be exempted from the study. The FGD guides (supplementary file 4) contain step-by-step  
14  
15 405 instructions and both open-ended and more targeted questions designed to explore the  
16  
17 406 participants' perceptions about COVID-19, COVID-19 vaccine/vaccination, COVID-19  
18  
19 407 vaccination process, and the determinants of COVID-19 vaccination acceptance.

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24 408 Before commencement of each FGD, the investigators will collect background data of  
25  
26 409 participants including age, sex, marital status, level of education, occupation or cadre, and years  
27  
28 410 of working experience as appropriate. The community members FGDs will be conducted in  
29  
30 411 local language and the health workers FGDs in English. Each FGD will consist of 7–8  
31  
32 412 participants (comprising a moderator, a note taker, and the respondents) and will last for about  
33  
34 413 45 minutes. The FGDs will be audio-recorded, the health workers FGDs will be transcribed  
35  
36 414 and community members FGDs will be translated and transcribed verbatim into English.

#### 41 415 **Data management and quality control**

42  
43  
44 416 The skip logic and validation criteria in KoBoToolbox software was utilized when  
45  
46 417 programming the electronic questionnaire to enhance the quality of data collection. To  
47  
48 418 minimise the potential bias in assessing the association between COVID-19 and COVID-19  
49  
50 419 vaccination related experiences and perceptions and uptake of COVID-19 vaccination, the  
51  
52 420 questionnaire items on these factors are subdivided into two subgroups: “have not received  
53  
54 421 COVID-19 vaccination” and “have received COVID-19 vaccination” and the items in each  
55  
56 422 subgroup are framed differently, respectively in present tense versus in past tense. For example,  
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3 423 those whose response to a preceding question indicate that they have not received COVID-19  
4  
5 424 vaccination will subsequently respond to the questions: “How fearful are you that you may  
6  
7 425 have very serious side-effect if you receive COVID-19 vaccination?” “How fearful are you  
8  
9 426 about getting COVID-19?” etc. In contrast, those who have received COVID-19 vaccination  
10  
11 427 will subsequently respond to the questions: “Regarding your experiences and perceptions  
12  
13 428 before the day you received the first dose of COVID-19 vaccination: How fearful were you  
14  
15 429 that you might have very serious side-effect if you received COVID-19 vaccination?” “How  
16  
17 430 fearful were you about getting COVID-19?”  
18  
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22 431 To enhance the validity of the questionnaires, after the first drafts, there were several rounds  
23  
24 432 of systematic review-discussion-correction-redrafting by the research team. During this  
25  
26 433 iterative process, attention was paid to relevance of the questionnaire items to the study  
27  
28 434 objectives and the logical flow and order, wording, framing, clarity and appropriateness of the  
29  
30 435 questions. The validation process continued until the final version of the questionnaires which  
31  
32 436 were then pre-tested. During the pre-test, respondents’ understanding and interpretation of the  
33  
34 437 items and the options, their response time to individual items and time taken to complete a  
35  
36 438 questionnaire were assessed and the completed questionnaires were reviewed for any problems.  
37  
38  
39 439 Minor adjustments were made thereafter.  
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44 440 The household interviewers will upload only completed anonymised questionnaires to the  
45  
46 441 online survey records at the end of each day’s survey and the transmitted questionnaires will  
47  
48 442 be reviewed for missing, incoherent, and illogical data. Any identified error will immediately  
49  
50 443 be communicated to the respective interviewers for correction by cross-checking with the  
51  
52 444 respective respondents. The investigators will supervise the household survey interviewers and  
53  
54 445 will revisit at least 20 eligible households per cluster with a specialised form of the survey  
55  
56 446 questionnaire to double check on responses and coverage.  
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3 447 Multiple submissions of the self-administered electronic questionnaire from a health worker  
4  
5 448 on the same device and browser will be prevented by deploying the questionnaire through the  
6  
7 449 online-only (once per respondent) option in KoBoToolbox. However, in any case where a  
8  
9 450 health worker who has completed the questionnaire agrees to give the android phone to any co-  
10  
11 451 worker – who do not have android phone or online address but is willing to participate in the  
12  
13 452 survey – to respond to the questionnaire, a web link for online-only (single submission) will be  
14  
15 453 sent to such health worker. The data utility in Stata will be used to check for duplicated  
16  
17 454 submissions (observations) and if found, only one will be kept, the duplicates will be deleted  
18  
19 455 from the dataset. Participation of study participants in the FGDs before the questionnaire  
20  
21 456 surveys will be prevented. During the translation and transcribing of the community members  
22  
23 457 FGDs, exact and meaning-based translation will be used. The FGD transcripts will be  
24  
25 458 compared with the original recording to check for ‘accuracy’ before conducting analyses.  
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### 31 **Sample size**

32  
33  
34 460 Sample size is estimated using Stata/SE version 15.1 (Stata Corp, College Station, TX, USA).  
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36  
37 461 For the community members survey, assuming a conservative estimate of 50% for the primary  
38  
39 462 outcome (the proportion of community members who have not received COVID-19  
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41 463 vaccination who intend (or plan) to receive COVID-19 vaccination that is available for them  
42  
43 464 to receive) among the community members who have not strong COVID-19 experience and  
44  
45 465 perception and 56% among those who have strong COVID-19 experience and perception, 80%  
46  
47 466 power at 2.5% probability of type one error (to correct for multiple comparisons),<sup>79</sup> 2630 is the  
48  
49 467 minimum total sample size required to detect the 6%-point difference in this primary outcome  
50  
51 468 between both comparison groups. Allowance for 70% response rate will increase the sample  
52  
53 469 size to 3758. To account for cluster sampling, 3758 is multiplied by a conservative estimate of  
54  
55 470 design effect of 4 to give a final minimum total sample size of 15032. As the clusters that will  
56  
57 471 be selected to participate in the study are those with minimum population size of 1000 per  
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3 472 cluster, and with 540 (54%) of the population expectedly falling within the age group of 15  
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5 473 years and above,<sup>80</sup> the study requires 28 clusters (15032/540) for the community members  
6  
7  
8 474 survey.

9  
10  
11 475 Using similar parameters, the health workers survey requires a minimum total sample size of  
12  
13 476 940 to detect a 10%-point difference in this primary outcome between both comparison groups  
14  
15 477 (50% versus 60%). Because of the nature of the survey, such as the use of social media  
16  
17 478 platforms for distribution of the (self-administered) questionnaire, the length of the  
18  
19 479 questionnaire, and the sampling technique (convenience and snowball), allowance for 50%  
20  
21 480 acceptance rate to account for both non-response and incomplete response will increase the  
22  
23 481 minimum total sample size for the health worker survey to 1880. Also, due to the nature of the  
24  
25 482 survey, the 1880 is perhaps more of the number of health workers that will be targeted for  
26  
27 483 distribution of the questionnaire rather than for selection to participate in the survey.

#### 31 32 484 **Sampling technique (Recruitment)**

33  
34  
35 485 Community members will be selected by stratified cluster sampling technique. The sampling  
36  
37 486 frame will be the list of clusters obtained from the Ebonyi state ministry of health. The eligible  
38  
39 487 clusters will be stratified into two: rural and urban/semi-urban. A random sample of 21 clusters  
40  
41 488 will be selected from the rural stratum and a random sample of 7 clusters will be selected from  
42  
43 489 the urban/semi-urban stratum using the “sample” command in Stata. This will give a 3:1 rural  
44  
45 490 to urban ratio. If verbal consent/permission is not given by any of the selected cluster(s) head(s)  
46  
47 491 before commencement of household survey, replacement cluster(s) will be selected from the  
48  
49 492 remaining list of eligible clusters using the same technique. The study profile is shown in figure  
50  
51 493 2. In each of the selected clusters, all the households will be enumerated and all individuals  
52  
53 494 aged 15 year and above in each household will be selected for the community members survey.  
54  
55 495 About five to six eligible male and female community members, both those who have received  
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3 496 and those who have not received COVID-19 vaccination, in 10 clusters will be selected  
4  
5 497 purposively for FGDs.  
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8 498 Health workers will be selected by convenience and snowballing techniques. To increase  
9  
10 499 acceptance rate, the research team will first make a physical and or phone contact with as many  
11  
12 500 health workers as possible to invite them to participate in the survey and seek their consent and  
13  
14 501 permission for the web link for the self-administered electronic questionnaire to be sent to them  
15  
16 502 via online platforms. For those who give consent and permission, the address or phone number  
17  
18 503 of their preferred online platform will be recorded and the web link for the questionnaire will  
19  
20 504 be sent to their private online pages. They will be implored to forward the web link to other  
21  
22 505 health workers that they know within the study area after they have completed the  
23  
24 506 questionnaires. The research team will send the web link for the questionnaire to the online  
25  
26 507 contacts (such as WhatsApp phone numbers) of as many eligible health workers as possible,  
27  
28 508 including both private and group pages. Interviewers will also use convenience sampling in  
29  
30 509 administering the health workers questionnaire (via KoBoCollect installed in android devices)  
31  
32 510 to those who do not have online contact and those living in remote areas with poor internet  
33  
34 511 connectivity. About five to six eligible health workers, both those who have received and those  
35  
36 512 who have not receive COVID-19 vaccination, will be selected purposively for FGDs.  
37  
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#### 44 513 **Data analyses**

45  
46  
47 514 Data will be analysed using Stata/SE version 15.1 (Stata Corp, College Station, TX, USA). All  
48  
49 515 analyses will be on intention-to-treat bases. Analyses of the community members data will be  
50  
51 516 based on population-averaged models that account for clustering. Point estimates of the  
52  
53 517 outcome measures will be computed for each comparison group as defined in the study  
54  
55 518 hypotheses. Each hypothesis with dichotomous or categorical independent factor will be tested  
56  
57 519 by computing prevalence difference (with 97.5% CI and p-values) in binary outcome measure  
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3 520 using binomial identity, and mean difference (with 97.5% CI and p-values) in continuous  
4  
5 521 outcome measure using gaussian identity, generalized estimating equations (GEE) with an  
6  
7  
8 522 exchangeable correlation matrix and robust standard errors. Each hypothesis with continuous  
9  
10 523 independent factor will be tested by computing coefficient (with 97.5% CI and p-values) in  
11  
12 524 binary and continuous outcome measures, respectively using the binomial identity and gaussian  
13  
14  
15 525 identity GEE models.

16  
17  
18 526 For each independent factor (in a hypothesis) being tested, adjusted analysis will be done by  
19  
20 527 in-putting into the GEE model the other independent factors as appropriate. For clarity, the  
21  
22 528 potential independent factors to control for are presented in table 3. Both unadjusted and  
23  
24 529 adjusted results will be reported. If the binomial identity GEE model fails to run or convergence  
25  
26 530 is not achieved, gaussian identity GEE model, or generalized least square (GLS) random-  
27  
28 531 effects linear regression model (with robust standard errors), or maximum likelihood (ML)  
29  
30 532 random-effects linear regression model will be used instead.<sup>81</sup>

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34  
35 533 The same analytic technique will be used for the analyses of the health workers data except  
36  
37 534 that generalized linear model (GLM) with robust standard errors will be used in place of GEE  
38  
39 535 model because of the absence of cluster design in the health worker survey.

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41  
42 536 Summary statistics will be used to assess COVID-19 vaccination acceptance (the intention to  
43  
44 537 receive, timeliness of the intention to receive, uptake, and hesitancy); COVID-19 experiences  
45  
46 538 and perceptions; COVID-19 vaccination expectations and perceptions; COVID-19 vaccination  
47  
48 539 process experiences and perceptions; knowledge, attitude, and practices about COVID-19; and  
49  
50 540 sources of information about COVID-19 among community members and health workers.

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55 541 The qualitative data (focus group discussion transcripts) will be analysed thematically based  
56  
57 542 on pre-determined themes in the study's conceptual framework. The qualitative data will be  
58  
59 543 analysed, interpreted, and presented independently of the quantitative data.

**Table 3: Independent factors to in-put into multivariate models in adjusted analyses**

	Independent factors under test	Independent factors to control for (as appropriate)
	Primary hypotheses	
1.	Extent of COVID-19 experience and perception	COVID-19 vaccination expectation and perception level; COVID-19 vaccination process experience and perception level; Basic knowledge of COVID-19; Attitude towards COVID-19 and COVID-19 vaccination; Practices about COVID-19; Source of information about COVID-19 (Main source and Most trusted source of information about COVID-19); Sociodemographic characteristics (Gender, Age, Marital status, Educational level, Occupation*, Residence*, Monthly income/income score*); Professional or work-related attributes <sup>^</sup> (Work category (clinical and non-clinical), Years of working experience, Primary place of work (public and private), Level of primary place of work (primary, secondary, and tertiary))
2.	COVID-19 experiences and perceptions score	COVID-19 vaccination expectations and perceptions score; COVID-19 vaccination process experiences and perceptions score; Basic knowledge of COVID-19, Attitude towards COVID-19 and COVID-19 vaccination; Practices about COVID-19; Source of information about COVID-19; Sociodemographic characteristics; Work-related attributes <sup>^</sup>
3.	COVID-19 vaccination expectation and perception level	Extent of COVID-19 experience and perception; COVID-19 vaccination process experience and perception level; Basic knowledge of COVID-19; Attitude towards COVID-19 and COVID-19 vaccination; Practices about COVID-19; Source of information about COVID-19; Sociodemographic characteristics; Work-related attributes <sup>^</sup>
4.	COVID-19 vaccination expectations and perceptions score	COVID-19 experiences and perceptions score; COVID-19 vaccination process experiences and perceptions score; Basic knowledge of COVID-19; Attitude towards COVID-19 and COVID-19 vaccination; Practices about COVID-19; Source of information about COVID-19; Sociodemographic characteristics; Work-related attributes <sup>^</sup>
5.	Acceptance factor level (COVID-19 risk-COVID-19 vaccination benefit perception or disease risk-remedy benefit perception level)	Availability/access factor level (COVID-19 vaccination process experience and perception level); Basic knowledge of COVID-19; Attitude towards COVID-19 and COVID-19 vaccination; Practices about COVID-19; Source of information about COVID-19; Sociodemographic characteristics; Work-related attributes <sup>^</sup>
6.	COVID-19 vaccination process experience and perception level	Extent of COVID-19 experience and perception; COVID-19 vaccination expectation and perception level; Basic knowledge of COVID-19; Attitude towards COVID-19 and COVID-19 vaccination; Practices about COVID-19; Source of information about COVID-19; Sociodemographic characteristics; Work-related attributes <sup>^</sup>
7.	COVID-19 vaccination process experiences and perceptions score	COVID-19 experiences and perceptions score; COVID-19 vaccination expectations and perceptions score; Basic knowledge of COVID-19; Attitude towards COVID-19 and COVID-19 vaccination; Practices about COVID-19; Source of information about COVID-19; Sociodemographic characteristics; Work-related attributes <sup>^</sup>
8.	Acceptance-availability/access factor level	Basic knowledge of COVID-19; Attitude towards COVID-19 and COVID-19 vaccination; Practices about COVID-19; Source of information about COVID-19; Sociodemographic characteristics; Work-related attributes <sup>^</sup>
9.	Acceptance factor score and availability/access factor score	Basic knowledge of COVID-19; Attitude towards COVID-19 and COVID-19 vaccination; Practices about COVID-19; Source of information about COVID-19; Sociodemographic characteristics; Work-related attributes <sup>^</sup>
10.	COVID-19 experiences & perceptions <sup>a</sup> , COVID-19 vaccination expectations & perceptions <sup>b</sup> , COVID-19 vaccination process experiences & perceptions <sup>c</sup>	COVID-19 experiences & perceptions <sup>a</sup> , COVID-19 vaccination expectations & perceptions <sup>b</sup> , COVID-19 vaccination process experiences & perceptions <sup>c</sup> (as appropriate); Basic knowledge of COVID-19, Attitude towards COVID-19 and COVID-19 vaccination; Practices about COVID-19; Source of information about COVID-19; Sociodemographic characteristics; Work-related attributes <sup>^</sup>
	Secondary hypotheses	
1.	Knowledge of COVID-19	Attitude towards COVID-19; Practices about COVID-19; Source of information about COVID-19; Sociodemographic characteristics; Work-related attributes <sup>^</sup> ; Extent of COVID-19 experience and perception; COVID-19 vaccination expectation and perception level; COVID-19 vaccination process experience and perception level
2.	Attitude towards COVID-19	Knowledge of COVID-19; Practices about COVID-19; Source of information about COVID-19; Sociodemographic characteristics; Work-related attributes <sup>^</sup> ; Extent of COVID-19 experience and perception; COVID-19 vaccination expectation and perception level; COVID-19 vaccination process experience and perception level
3.	Practices about COVID-19	Knowledge of COVID-19; Attitude towards COVID-19; Source of information about COVID-19; Sociodemographic characteristics; Work-related attributes <sup>^</sup> ; Extent of COVID-19 experience and perception; COVID-19 vaccination expectation and perception level; COVID-19 vaccination process experience and perception level
4.	Main source of information about COVID-19	Most trusted source of information about COVID-19; Sociodemographic characteristics; Work-related attributes <sup>^</sup> ; Extent of COVID-19 experience and perception; COVID-19 vaccination expectation and perception level; COVID-19 vaccination process experience and perception level
5.	Most trusted source of information about COVID-19	Main source of information about COVID-19; Sociodemographic characteristics; Work-related attributes <sup>^</sup> ; Extent of COVID-19 experience and perception; COVID-19 vaccination expectation and perception level; COVID-19 vaccination process experience and perception level
6.	A sociodemographic characteristic	Other sociodemographic characteristics; Source of information about COVID-19; Work-related attributes <sup>^</sup> ; Extent of COVID-19 experience and perception; COVID-19 vaccination expectation and perception level; COVID-19 vaccination process experience and perception level
7.	A professional or work-related attribute <sup>^</sup>	Other professional or work-related attributes <sup>^</sup> ; Source of information about COVID-19; Sociodemographic characteristics; Extent of COVID-19 experience and perception; COVID-19 vaccination expectation and perception level; COVID-19 vaccination process experience and perception level

\*Among only community members. <sup>^</sup>Among only health workers. <sup>a</sup>Fear of getting COVID-19, possible to get (severe) COVID-19, ever had COVID-19, and knowledge of any person who have had COVID-19. <sup>b</sup>Importance of COVID-19 vaccination, fear of having severe side-effect from COVID-19 vaccination, protection from receiving COVID-19 vaccination, trust for the health workers who give COVID-19 vaccination, trust for the government who made COVID-19 vaccination available <sup>c</sup>Ever heard COVID-19 vaccination was available for receipt and knowledge of a COVID-19 vaccination place.

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545 **Ethics and dissemination**

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3 546 Ethical approval for this study was obtained from the Ebonyi State Health Research and Ethics  
4  
5 547 Committee (EBSHREC/15/01/2022-02/01/2023) and Research and Ethics Committee of Alex  
6  
7 548 Ekwueme Federal University Teaching Hospital Abakaliki (14/12/2021-17/02/2022). The  
8  
9 549 investigators will obtain verbal consent/permission from the heads of the selected clusters.  
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11 550 During the household survey the interviewers will obtain verbal consent from the household  
12  
13 551 members aged 18 years and above and assent from household members aged less than 18 years  
14  
15 552 (after obtaining consent from the heads of households). The health workers will be informed  
16  
17 553 that only those that give consent should take the online survey. The moderators of the focus  
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19 554 group discussions (FGDs) will obtain verbal consent from the respondents before each FGD.  
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22  
23  
24 555 The purpose of the study, the kind of participation, likely duration of participation, voluntary  
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26 556 nature of participation, absence of potential harm, potential benefit, and confidential nature of  
27  
28 557 the study will be communicated to participants as required. The online record of the  
29  
30 558 anonymised quantitative data will be passworded and the audio recordings and the electronic  
31  
32 559 verbatim transcript of the FGDs will be stored in a passworded computer to prevent  
33  
34 560 unauthorised access.  
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39 561 Study findings will be reported at local, national, and international levels in high impact peer-  
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41 562 reviewed journals and conferences as appropriate.  
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### 563 **Patients and public involvement**

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48 564 Patients or the public were not involved in the design and reporting or dissemination plans  
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50 565 and will not be involved in the conduct of our research.  
51  
52

53 566 **Acknowledgements** Not applicable  
54

55  
56 567 **Contributors** UIO conceived and designed the study, designed the data collection tools and programmed the software, and  
57  
58 568 wrote the original protocol and the manuscript. OI, RLE, CIA, OOU, VUU, ASA, COI, OON, OOU, IMO, GEN, UIAN  
59  
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2  
3 569 contributed to the development of the study design, data collection tools, and original protocol. All authors read, edited, and  
4  
5 570 approved the final manuscript.

6  
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8  
9 572 sectors.

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11 573 **Competing interests** No competing interest is declared.

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## 32 799 **Figure legend**

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35 800 Figure 1: Study conceptual framework

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38 801 Figure 2: Summary of study profile

## 39 40 41 802 **Supplemental file**

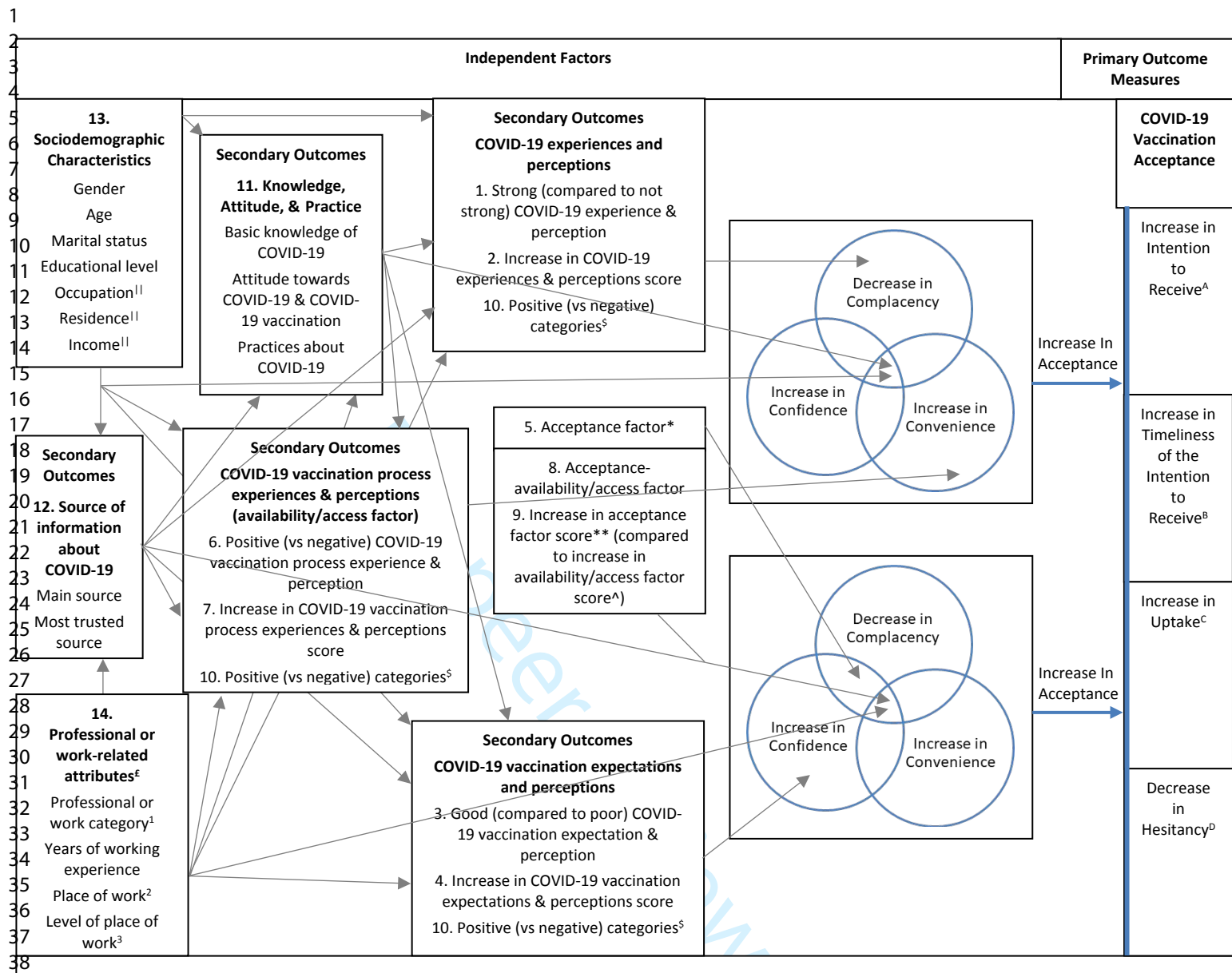
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45 803 Supplementary file 1: Map showing the study area (Ebonyi state) in the south-east  
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47 804 geopolitical zone of Nigeria

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50 805 Supplementary file 2: COVID-19 Vaccination Questionnaire\_Community Members

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53 806 Supplementary file 3: COVID-19 Vaccination Questionnaire\_Health Workers

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56 807 Supplementary file 4: FGD Guide\_Community Members & Health Workers

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**Figure 1: Study conceptual framework**

As depicted in table 1. \*COVID-19 risk-COVID-19 vaccination benefit perception or disease risk-remedy benefit perception (DR-RB or DRRB perception)). \*\*Increase in COVID-19 risk-COVID-19 vaccination benefit perceptions score or DR-RB perception score. <sup>A</sup>Increase in COVID-19 vaccination process experience & perception score. <sup>A</sup>Measured as the proportion of participants who intend to receive covid-19 vaccination that is available for them to receive at their catchment health facility. <sup>B</sup>Measured as the length of time the participants, who intend to receive covid-19 vaccination that is available for them to receive at their catchment health facility, intend to take before they go and receive the COVID-19 vaccination (increasing timeliness means reducing the length of time). <sup>C</sup>Measured as the proportion of participants who have received covid-19 vaccination including those who have completed the doses and those who have not). <sup>D</sup>Measured as the proportion of participants who have not received covid-19 vaccination due only to non-acceptance factor (perceptions that the vaccination is not important, vaccine is not safe, vaccine is not effective etc) rather than real or perceived non-availability (non-access) factor (ignorance of vaccination availability, long distance to vaccination site, vaccine stock-out etc) or both. <sup>||</sup>Among only community members. <sup>f</sup>Among only health workers. <sup>1</sup>Clinical and non-clinical. <sup>2</sup>Public and private. <sup>3</sup>Primary, secondary, and tertiary.

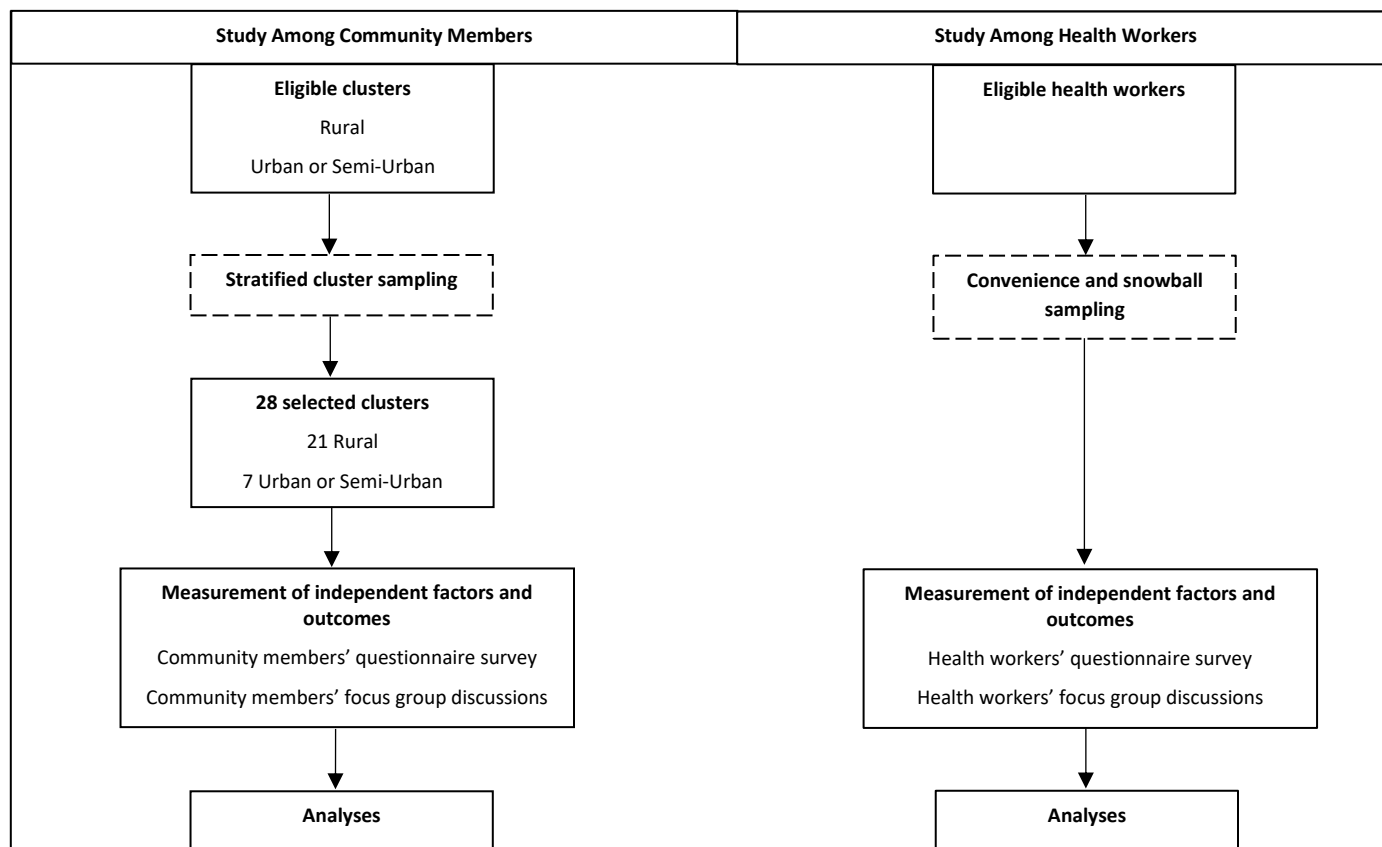


Figure 2: Summary of study profile

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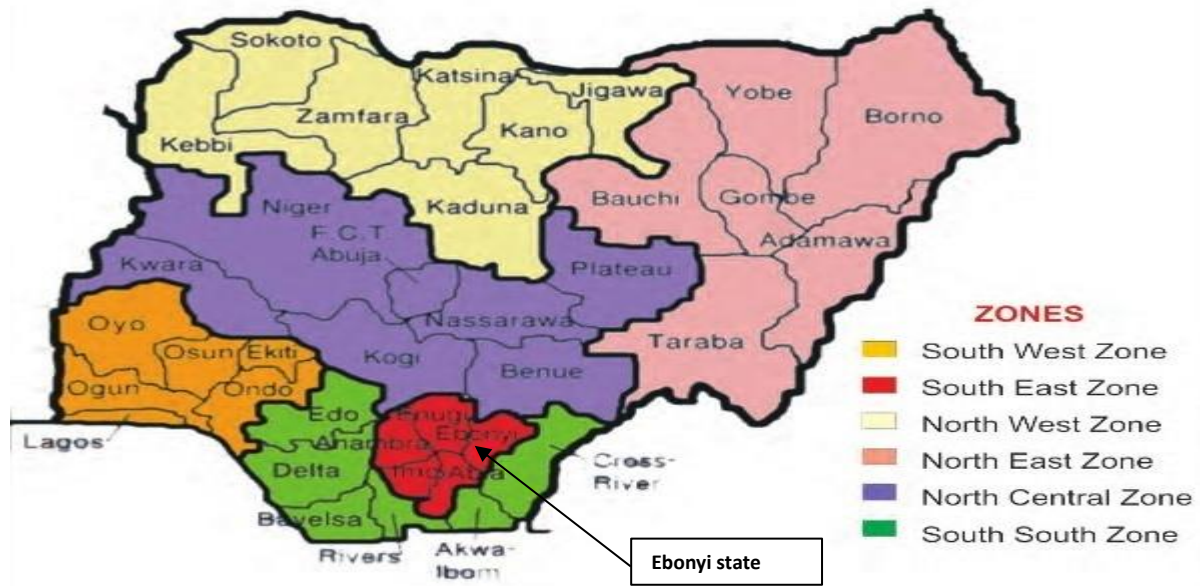


Figure: Map showing the study area (Ebonyi state) in the south-east geopolitical zone of Nigeria (Source: National malaria strategic plan 2014–2020)

## COVID-19 AND COVID-19 VACCINATION QUESTIONNAIRE FOR COMMUNITY MEMBERS

**NOTE:** Only Household Members Aged 15 years and Above Who Give Verbal Consent (or Assent) are Eligible to Participate in this Survey.

**Identification – Section 1**

1. Cluster ID Number: \_\_\_\_\_
2. Household ID Number (last 3 digits of household number): \_\_\_\_\_
3. Participant (Respondent) ID Number: \_\_\_\_\_
4. GPS
5. Date of interview (Year/Month/Day)

**Sociodemographic Characteristics – Section 2**

6. What is your Gender?
  1. Male
  2. Female
7. Age in years: How old were you during your last birthday? Number: \_\_\_\_\_
8. What is your Marital Status? **Probe:**
  1. Married
  2. Separated/Divorced
  3. Widowed
  4. Never married (Single)
9. What is your Educational Level? **Probe:**
  1. No formal education
  2. Some primary
  3. Completed primary
  4. Some secondary
  5. Completed secondary
  6. NCE/Diploma (ND, OND) (Tertiary)
  7. HND/First Degree (Tertiary)
  8. Masters/PHD/Other Equivalent (Tertiary)



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3 10. What is your Main Occupation? **NOTE: Record the most suitable option:**  
4

- 5 1. Farmer  
6 2. Trader  
7  
8 3. Other-self-employment  
9  
10 4. Private paid work  
11 5. Government paid work  
12  
13 6. Housewife  
14  
15 7. Student  
16  
17 8. Apprentice  
18  
19 9. Youth service (Corper)  
20  
21 10. None

22 11. What is your Usual Monthly Income in NGN from all sources including remittances and “pocket  
23 money” if any? **Probe:**

- |    |                       |                        |                          |
|----|-----------------------|------------------------|--------------------------|
| 24 | 25 1. No income       | 26 7. 101,000–120,000  | 27 13. 221,000–240,000   |
| 28 | 29 2. 20,000 and less | 30 8. 121,000–140,000  | 31 14. 241,000–260,000   |
| 32 | 33 3. 21,000–40,000   | 34 9. 141,000–160,000  | 35 15. 261,000–280,000   |
| 36 | 37 4. 41,000–60,000   | 38 10. 161,000–180,000 | 39 16. 281,000–300,000   |
| 40 | 41 5. 61,000–80,000   | 42 11. 181,000–200,000 | 43 17. More than 300,000 |
| 44 | 45 6. 81,000–100,000  | 46 12. 201,000–220,000 |                          |

47 **COVID-19 Vaccination Acceptance – Section 3**

48 12. Have you received COVID-19 vaccination?

- 49 1. Yes  
50 2. No

51 **NOTE: No. 13–27 is for those who have received COVID-19 vaccination:**

52 13. Which of the COVID-19 vaccination doses have you received? **Probe:**

- 53 1. First dose only  
54 2. Second dose only  
55 3. Second dose plus Booster

56 14. If no. 13 above is 1: Why have you not received the second dose of COVID-19 vaccination? **NOTE:**

57 **Multiple responses: Probe for respondent to select all that apply:**

- 58 1. No vaccine when you went (stock-out)  
59 2. No vaccinator when you went (health facility not Closed)  
60

3. Health facility was closed when you went
4. Place of vaccination was too far
5. You were too busy
6. You were ill and did not go for the remaining dose
7. You were ill, went but was not given the remaining dose
8. You had serious side effects from the first dose
9. The time for the second dose has not reached
10. Other (specify below)

15. If no. 14 above includes 10: Other reason, please specify. Phrase: \_\_\_\_\_

16. If no. 13 above is 2: Why have you not received a booster dose of COVID-19 vaccination? **NOTE:**

**Multiple responses: Probe for respondent to select all that apply:**

1. You are not aware of booster dose
2. You do not need booster dose (it is not important)
3. No vaccine when you went (stock-out)
4. No vaccinator when you went (health facility not Closed)
5. Health facility was closed when you went
6. Place of vaccination was too far
7. You were too busy
8. You were ill and did not go for the booster dose
9. You were ill, went but was not given the booster dose
10. You had serious side effects from the second dose
11. The time for a booster dose has not reached
12. Other (specify below)

17. If no. 16 above includes 12: Other reason, please specify. Phrase: \_\_\_\_\_

18. Regarding your experiences and perceptions before the day you received the first dose of COVID-19 vaccination: How often did you hear that COVID-19 vaccination was available for you to go and receive? **Probe:**

1. You heard about it many times before the day you received it
2. You heard about it few times (or once) before the day you received it
3. Not sure about it
4. You did not hear about it before the day you received it
5. You did not hear about it at all before the day you received it

19. Regarding your experiences and perceptions before the day you received the first dose of COVID-19 vaccination: Did you know any place or health facility where they gave COVID-19 vaccination? **Probe:**

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1. Yes, a place that was very close
  2. Yes, a place that was close
  3. Yes, a place that was far
  4. Yes, a place that was very far
  5. No, you did not know any place before the day you received COVID-19 vaccination

20. If no. 19 above is 1 or 2 or 3 or 4: Regarding your experiences and perceptions before the day you received the first dose of COVID-19 vaccination: How frequently were they giving COVID-19 vaccination at that place you mentioned above? **Probe:**

1. Daily or two/three times a week
2. Once a week
3. Once every two weeks/every month
4. No fixed time (not regular)
5. You did not know how frequently they were giving COVID-19 vaccination before the day you received it

21. If no. 19 above is 1 or 2 or 3 or 4: Regarding your experiences and perceptions before the day you received the first dose of COVID-19 vaccination: How was the queue (waiting time) at the place of vaccination that you mentioned above?

1. There was usually no queue (very short waiting time)
2. There was usually short queue (short waiting time)
3. You did not know what the queue (waiting time) was
4. There was usually long queue (long waiting time)
5. There was usually very long queue (very long waiting time)

22. If no. 19 above is 1 or 2 or 3 or 4: Regarding your expectations and perceptions before the day you received the first dose of COVID-19 vaccination: How caring (or kind/friendly) were the health workers at the place of vaccination that you mentioned above? **Probe:**

1. They were very caring
2. They were caring
3. Not sure whether they were caring or not
4. They were not caring
5. They were not caring at all

23. Regarding your expectations and perceptions before the day you received the first dose of COVID-19 vaccination: How important did you think it was for you to receive COVID-19 vaccination? **Probe:**

1. It was very important
2. It was important

3. Not sure whether it was important or not
4. It was not important
5. It was not important at all

24. **Regarding your expectations and perceptions before the day you received the first dose of COVID-19**

**vaccination:** How fearful were you that you might have severe or very serious side-effect if you received COVID-19 vaccination? **Probe:**

1. You were not fearful at all
2. You were not fearful
3. Not sure about it
4. You were a little fearful
5. You were very fearful

25. **Regarding your expectations and perceptions before the day you received the first dose of COVID-19**

**vaccination:** What protection did you think COVID-19 vaccination would give you if you received it?

**Probe:**

1. Full or complete protection from COVID-19
2. Partial or incomplete protection from COVID-19
3. You were not sure about it
4. No protection from COVID-19
5. No protection at all from COVID-19

26. **Regarding your expectations and perceptions before the day you received the first dose of COVID-19**

**vaccination:** How did you trust the health workers who gave COVID-19 vaccination?

1. You trusted them very much
2. You trusted them
3. Not sure about it
4. You did not trust them
5. You did not trust them at all

27. **Regarding your expectations and perceptions before the day you received the first dose of COVID-19**

**vaccination:** How did you trust the federal and state governments who made the COVID-19 vaccination available for people to receive? **Probe:**

1. You trusted them very much
2. You trusted them
3. Not sure about it
4. You did not trust them
5. You did not trust them at all

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3 **NOTE: No. 28–43 is for those who have not received COVID-19 vaccination:**

4 28. Have you ever heard that COVID-19 vaccination is available for you to go and receive? **Probe:**

- 5  
6 1. Yes, you heard about it many times  
7  
8 2. Yes, you heard about it few times (or once)  
9  
10 3. Not sure  
11  
12 4. No, you have not heard about it  
13  
14 5. No, you have not heard about it at all

15 29. Do you know any place or health facility where they give COVID-19 vaccination? **Probe:**

- 16  
17 1. Yes, a place that is very close  
18  
19 2. Yes, a place that is close  
20  
21 3. Yes, a place that is far  
22  
23 4. Yes, a place that is very far  
24  
25 5. No, you do not know any place

26 30. If no. 29 above is 1 or 2 or 3 or 4: How frequently do they give COVID-19 vaccination at that place  
27 you mentioned above? **Probe:**

- 28  
29 1. Daily or two/three times a week  
30  
31 2. Once a week  
32  
33 3. Once every two weeks/every month  
34  
35 4. No fixed time (not regular)  
36  
37 5. Do not know

38 31. If no. 29 above is 1 or 2 or 3 or 4: How is the queue (waiting time) at the place of vaccination that  
39 you mentioned above? **Probe:**

- 40  
41 1. There is usually no queue (very short waiting time)  
42  
43 2. There is usually short queue (short waiting time)  
44  
45 3. Do not know  
46  
47 4. There is usually long queue (long waiting time)  
48  
49 5. There is usually very long queue (very long waiting time)

50 32. If no. 29 above is 1 or 2 or 3 or 4: How caring (or kind/friendly) are the health workers at the place  
51 of vaccination that you mentioned above? **Probe:**

- 52  
53 1. They are very caring  
54  
55 2. They are caring  
56  
57 3. You are not sure about it  
58  
59 4. They are not caring  
60  
5. They are not caring at all

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3 33. If no. 12 above is 2 & no. 7 above is  $\geq 18$ : Why have you not received COVID-19 vaccination? **NOTE:**

4  
5 **Multiple responses: Probe for respondent to select all that apply:**

- 6 1. You do not need the vaccine (it is not important)
- 7
- 8 2. You think the vaccine is not safe (you think it is harmful)
- 9
- 10 3. You think the vaccine is not effective
- 11
- 12 4. You have been hearing bad stories about the vaccine
- 13
- 14 5. The vaccine is new and/or you want others to take it first
- 15
- 16 6. You do not know the place and/or time of vaccination
- 17
- 18 7. Place of vaccination is too far
- 19
- 20 8. You have been too busy
- 21
- 22 9. You have been ill and did not go for vaccination
- 23
- 24 10. You have been ill, went but was not given vaccination
- 25
- 26 11. Long waiting time (long queue)
- 27
- 28 12. No vaccine (stock-out) when you went
- 29
- 30 13. No vaccinator (health facility not closed) when you went
- 31
- 32 14. Health facility was closed when you went
- 33
- 34 15. You are not aware of it
- 35
- 36 16. Other (specify below)

37 34. If no. 33 above includes 16: Other reason, please specify. Phrase: \_\_\_\_\_

38 35. How important is it for you to receive COVID-19 vaccination? **Probe:**

- 39 1. Very important for me to receive it
- 40
- 41 2. Important for me to receive it
- 42
- 43 3. Not sure about it
- 44
- 45 4. Not important for me to receive it
- 46
- 47 5. Not important at all for me to receive it

48 36. How fearful are you that you may have severe or very serious side-effect if you receive COVID-19 vaccination? **Probe:**

- 49 1. Not fearful at all
- 50
- 51 2. Not fearful
- 52
- 53 3. Not sure about it
- 54
- 55 4. A little fearful
- 56
- 57 5. Very fearful

58 37. What protection will COVID-19 vaccination give you if you receive it? **Probe:**

- 59 1. Full or complete protection from COVID-19
- 60

1  
2  
3 2. Partial or incomplete protection from COVID-19

4  
5 3. Not sure about it

6  
7 4. No protection from COVID-19

8  
9 5. No protection at all from COVID-19

10 38. How do you trust the health workers who give COVID-19 vaccination? **Probe:**

11  
12 1. You trust them very much

13  
14 2. You trust them

15  
16 3. Not sure about it

17  
18 4. You do not trust them

19  
20 5. You do not trust them at all

21 39. How do you trust the federal and state governments who made the COVID-19 vaccination  
22 available for people to receive? **Probe:**

23  
24 1. You trust them very much

25  
26 2. You trust them

27  
28 3. Not sure about it

29  
30 4. You do not trust them

31  
32 5. You do not trust them at all

33 40. Do you intend (or plan) to receive COVID-19 vaccination that is available for you to receive?

34 **Probe:**

35  
36 1. Yes, you will surely go and receive the vaccination

37  
38 2. Yes, you think you will go and receive the vaccination

39  
40 3. Not sure about it

41  
42 4. No, you think you will not go and receive the vaccination

43  
44 5. No, you will surely not go and receive the vaccination

45 **NOTE: If 3 or 4 or 5: Skip to no. 35**

46 41. If no. 40 above is 1 or 2: How long will it take before you go and receive the COVID-19 vaccination?

47 Number (in days): \_\_\_\_\_ **NOTE: Record Response in DAYS (Convert Weeks, Months, and Years to**  
48 **DAYS). NOTE: Record "2000" for "do not know"**

49  
50  
51 42. If no. 40 above is 3 or 4 or 5: What is/are the reasons why you do not intend (or plan) to receive  
52 COVID-19 vaccination or are not sure about it? **NOTE: Multiple responses: Probe for respondent to select**  
53 **all that apply:**

54  
55  
56 1. You do not need the vaccine (it is not important)

57  
58 2. You think the vaccine is not safe (I think it is harmful)

59  
60 3. You think the vaccine is not effective

4. You have been hearing bad stories about the vaccine
5. The vaccine is new and/or I want others to take it first
6. You do not know the place and/or time of vaccination
7. Place of vaccination is too far
8. Other reason (specify below)

43. If no. 42 above includes 8: Other reason, please specify. Phrase: \_\_\_\_\_

**NOTE: No. 44–51 is for all**

44. Do you have a child or children? 1=Yes 2=No. If 2: Skip to 52

45. How important is it for your child or children to receive COVID-19 vaccination if it is available for them to receive? **Probe:**

1. Very important for them to receive it
2. Important for them to receive it
3. Not sure about it
4. Not important for them to receive it
5. Not important at all for them to receive it

46. How fearful are you that your child/children may have severe or very serious side-effect if they receive COVID-19 vaccination that is available for them to receive? **Probe:**

1. Not fearful at all
2. Not fearful
3. Not sure about it
4. A little fearful
5. Very fearful

47. What protection will COVID-19 vaccination give your child or children if they receive the one that is available for them to receive? **Probe:**

1. It will give them full or complete protection from COVID-19
2. It will give them partial or incomplete protection from COVID-19
3. Not sure about it
4. It will give them no protection from COVID-19
5. It will give them no protection at all from COVID-19

48. Do you intend (or plan) for your child or children to receive COVID-19 vaccination if it is available for them to receive at [NAME OF CATCHMENT HEALTH FACILITY]?

1. Yes, you will surely take your child or children to receive the vaccination



2. Yes, you think you will take your child or children to receive the vaccination
3. Not sure about it
4. No, you think you will not take your child or children to receive the vaccination
5. No, you will surely not take your child or children to receive the vaccination

**NOTE: If 3 or 4 or 5: Skip to 50**

49. If no. 48 above is 1 or 2: How long will it take before you take your child or children to receive the COVID-19 vaccination if it is available for them to receive at [NAME OF CATCHMENT HEALTH FACILITY]? Number (in days): \_\_\_\_\_ **NOTE: Record Response in DAYS (Convert Weeks, Months, and Years to DAYS)**

50. If no. 48 above is 3 or 4 or 5: What is/are the reasons why you do not intend (or plan) for your child or children to receive the COVID-19 vaccination if it is available for them to receive at [NAME OF CATCHMENT HEALTH FACILITY] or are not sure about it? **NOTE: Multiple responses: Probe for respondent to select all that apply:**

1. The child/children do not need the vaccine (it is not important)
2. You think the vaccine is not safe (I think it is harmful)
3. You think the vaccine is not effective
4. You have been hearing bad stories about the vaccine
5. The vaccine is new and/or You want others to take it first
6. Other reason (specify below)

51. If no. 49 above includes 6: Other reason, please specify. Phrase: \_\_\_\_\_

#### COVID-19 Experiences and Perceptions – Section 4

**NOTE: No. 52–63 is for those who have received COVID-19 vaccination:**

52. Regarding your experiences and perceptions before the day you received the first dose of COVID-19 vaccination: How fearful were you about getting COVID-19? **Probe:**

1. You were very fearful
2. You were a little fearful
3. Not sure about it
4. You were not fearful
5. You were not fearful at all

53. Regarding your experiences and perceptions before the day you received the first dose of COVID-19 vaccination: Was it possible for someone like you to get COVID-19? **Probe:**

1. It was highly possible

2. It was a bit possible
3. Not sure about it
4. It was not possible
5. It was not possible at all

54. Regarding your experiences and perceptions before the day you received the first dose of COVID-19

vaccination: Was it possible for someone like you to get severe or very serious COVID-19? **Probe:**

1. It was highly possible
2. It was a bit possible
3. Not sure about it
4. It was not possible
5. It was not possible at all

55. Regarding your experiences and perceptions before the day you received the first dose of COVID-19

vaccination: Did you ever have COVID-19 before you received the vaccination? **Probe:**

1. Yes, you were sure
2. Yes, you thought so
3. Not sure about it
4. No, you thought so
5. No, you were sure

56. If no. 55 above is 1 or 2: Regarding your experiences and perceptions before the day you received the

first dose of COVID-19 vaccination: Did you ever have severe or very serious COVID-19 before you received the vaccination? **Probe:**

1. Yes, it was very serious
2. Yes, it was a bit serious
3. Not sure about it
4. No, it was not serious
5. No, it was not serious at all

57. Regarding your experiences and perceptions before the day you received the first dose of COVID-19

vaccination: Did you know any person who had COVID-19 before you received the vaccination?

**Probe:**

1. Yes, you knew a very close person
2. Yes, you knew a close person
3. Yes, you only knew a distant person
4. Yes, you only knew a very distant person
5. No, you did not know any person

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58. If no. 57 above is 1 or 2 or 3 or 4: Regarding your experiences and perceptions before the day you received the first dose of COVID-19 vaccination: Did you know any person who had severe or very serious COVID-19 before you received the vaccination? **Probe:**

1. Yes, you knew a very close person
2. Yes, you knew a close person
3. Yes, you only knew a distant person
4. Yes, you only knew a very distant person
5. No, you did not know any person

59. If no. 57 above is 1 or 2 or 3 or 4: Regarding your experiences and perceptions before the day you received the COVID-19 vaccination: Did you know any person who died from COVID-19 before you received the vaccination? **Probe:**

1. Yes, you knew a very close person
2. Yes, you knew a close person
3. Yes, you only knew a distant person
4. Yes, you only knew a very distant person
5. No, you did not know any person

60. Regarding your experiences and perceptions before the day you received the first dose of COVID-19 vaccination: What were your sources of information about COVID-19? **NOTE: Multiple responses: Probe for respondent to select all that apply:**

1. Family members/Relatives/Friends
  2. Health care providers/Health workers
  3. Television
  4. Radio
  5. Prints (Newspaper/Magazine)
  6. WhatsApp
  7. Facebook
  8. Internet sites
  9. Bulk SMS/Text messages (e.g from Nigerian CDC, NPHCDA, Bank etc)
  10. Workplace (Place of work)
  11. Place of worship/Religious forums
  12. Other (specify below)
- } Interpersonal
- } Traditional media
- } Internet and social media
- } Internet, social media, & SMS
- } Interpersonal

61. If no. 60 above includes 12: Please specify the other source. Word or Phrase: \_\_\_\_\_

62. If more than one sources given in no. 60 above: Which of the sources was your main source? **NOTE: Probe: Select the one mentioned: 1–12 above**

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3 63. If more than one sources given in no. 60 above: Which of the sources did you trust most? **NOTE:**

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5 **Probe:** Select the one mentioned: 1–12 above

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7  
8 **NOTE: No. 64–75 is for those who have not received COVID-19 vaccination:**

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10 64. How fearful are you about getting COVID-19? **Probe:**

- 11 1. Very fearful
- 12 2. A little fearful
- 13 3. Not sure about it
- 14 4. Not fearful
- 15 5. Not fearful at all

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20 65. Is it possible for someone like you to get COVID-19? **Probe:**

- 21 1. Highly possible
- 22 2. A bit possible
- 23 3. Not sure about it
- 24 4. Not possible
- 25 5. Not possible at all

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28  
29  
30 66. Is it possible for someone like you to get severe or very serious COVID-19? **Probe:**

- 31 1. Highly possible
- 32 2. A bit possible
- 33 3. Not sure about it
- 34 4. Not possible
- 35 5. Not possible at all

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39  
40 67. Have you ever had COVID-19? **Probe:**

- 41 1. Yes, you are sure
- 42 2. Yes, you think so
- 43 3. Not sure about it
- 44 4. No, you think so
- 45 5. No, you are sure

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50 68. If no 67 above is 1 or 2: Have you ever had severe or very serious COVID-19? **Probe:**

- 51 1. Yes, it was very serious
- 52 2. Yes, it was a bit serious
- 53 3. Not sure about it
- 54 4. No, it was not serious
- 55 5. No, it was not serious at all

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3 69. Do you know any person who have had COVID-19? **Probe:**

- 4  
5 1. Yes, you know a very close person  
6 2. Yes, you know a close person  
7 3. Yes, you only know a distant person  
8 4. Yes, you only know a very distant person  
9 5. No, you do not know any person

10  
11  
12  
13 70. If no. 69 above is 1 or 2 or 3 or 4: Do you know any person who have had severe or very serious  
14 COVID-19? **Probe:**

- 15  
16 1. Yes, you know a very close person  
17 2. Yes, you know a close person  
18 3. Yes, you only know a distant person  
19 4. Yes, you only know a very distant person  
20 5. No, you do not know any person

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22  
23  
24  
25 71. If no. 69 above is 1 or 2 or 3 or 4: Do you know any person who have died from COVID-19? **Probe:**

- 26  
27 1. Yes, you know a very close person  
28 2. Yes, you know a close person  
29 3. Yes, you only know a distant person  
30 4. Yes, you only know a very distant person  
31 5. No, you do not know any person

32  
33  
34  
35 72. What are your sources of information about COVID-19? **NOTE: Multiple responses: Probe for**  
36 **respondent to select all that apply:**

- 37  
38 1. Family members/Relatives/Friends  
39 2. Health care providers/Health workers } Interpersonal  
40 3. Television  
41 4. Radio } Traditional media  
42 5. Prints (Newspaper/Magazine)  
43 6. WhatsApp  
44 7. Facebook } Internet and social media  
45 8. Internet sites } Internet, social media, & SMS  
46 9. Bulk SMS/Text messages (e.g from Nigerian CDC, NPHCDA, Bank etc)  
47 10. Workplace (Place of work)  
48 11. Place of worship/Religious forums } Interpersonal  
49 12. Other (specify below)

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56  
57  
58  
59 73. If no. 72 above includes 12: Please specify the other source. Word or Phrase: \_\_\_\_\_  
60

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3 74. If more than one sources given in no. 72 above: Which of the sources is your main source? **NOTE:**

4  
5 **Probe: Select the one mentioned: 1–12 above**

6  
7 75. If more than one sources given in no. 72 above: Which of the sources do you trust most? **NOTE:**

8  
9 **Probe: Select the one mentioned: 1–12 above**

10  
11  
12  
13 **Basic Knowledge of COVID-19 – Section 5**

14  
15 76. What is COVID-19? **Probe:**

- 16  
17 1. A new disease (caused by a new micro-organism)
- 18 2. An old disease (caused by an old micro-organism)
- 19  
20 99. Do not know

21  
22 77. How do people get COVID-19? **Probe:**

- 23  
24 1. By staying close to infected persons when they cough or sneezes
- 25 2. From bat
- 26 3. From rat
- 27 4. From spiritual attack
- 28 5. Other (specify below)
- 29  
30 99. Do not know

31  
32 78. If no. 77 above is 5: Please specify how people get COVID-19. Word or Phrase: \_\_\_\_\_

33  
34 79. When somebody gets COVID-19, how long does it usually take before the person starts to show  
35 symptoms? **Probe:**

- 36  
37 1. 2–14 days (within 2 weeks)
- 38 2. 2–4 weeks
- 39 3. >4 weeks
- 40  
41 99. Do not know

42  
43 80. What are the symptoms of COVID-19 (symptoms that someone with COVID-19 can have)? **NOTE:**

44  
45 **Multiple responses: Probe for respondent to select all that apply:**

- 46  
47 1. Fever
- 48 2. Cough
- 49 3. Tiredness
- 50 4. Body aches and pains
- 51 5. Sore throat
- 52 6. Difficulty breathing or shortness of breath
- 53 7. Chest pain
- 54  
55  
56  
57  
58  
59  
60

- 1
- 2
- 3 8. Headache
- 4
- 5 9. Loss of taste or smell
- 6
- 7 10. Diarrhoea
- 8
- 9 11. Nausea or vomiting
- 10
- 11 12. other (specify below)
- 12
- 13 99. Do not know

14 **81. If no. 80 above includes 12:** Please specify the other symptom. Word or Phrase:\_\_\_\_\_

15 **82. Can people also have COVID-19 without showing any symptoms?**

- 16 1. Yes
- 17
- 18 2. No
- 19
- 20 99. Do Not Know
- 21
- 22

23 **83. Who are more at risk of having severe COVID-19? NOTE: Multiple responses: Probe for respondent**

24 **to select all that apply:**

- 25 1. Children
- 26
- 27 2. Younger adults
- 28
- 29 3. Elderly people
- 30
- 31 4. Slim people
- 32
- 33 5. Obese people
- 34
- 35 6. People with chronic illness
- 36
- 37 7. People who smoke
- 38
- 39 8. Pregnant women
- 40
- 41 99. Do not know

42 **84. Is there a laboratory test to diagnose COVID-19?**

- 43 1. Yes
- 44
- 45 2. No
- 46
- 47 99. Do not know. **If 2 OR 99: Skip to 87**

48 **85. If no. 84 above is 1:** Where is laboratory test to diagnose COVID-19 done in Ebonyi state? **NOTE:**

49 **Multiple responses: Probe for respondent to select all that apply:**

- 50
- 51 1. AEFUTHA
- 52
- 53 2. General hospitals
- 54
- 55 3. PHC centres
- 56
- 57 4. Missionary hospitals
- 58
- 59 5. Private hospitals
- 60
- 60 6. Private laboratory

1  
2  
3 7. Other (specify below)

4  
5 99. Do not know

6  
7 86. If no. 85 above includes 7: Please specify the other place lab test for COVID-19 is done in Ebonyi  
8 state. Word or Phrase: \_\_\_\_\_

9  
10 87. Are there treatments for COVID-19?

11 1. Yes

12 2. No

13 99. Do Not Know

14  
15 88. Are there vaccines for COVID-19?

16 1. Yes

17 2. No

18 99. Do Not Know

19  
20 89. If no. 88 above is 1: Do you know any place where one can go and receive COVID-19 vaccination in  
21 Ebonyi state?

22 1. Yes

23 2. No

24  
25 90. What are the ways to avoid/prevent getting COVID-19? **NOTE: Multiple responses: Probe for**  
26 **respondent to select all that apply:**

27 1. Avoiding crowd (large group of people)

28 2. Maintaining at least 1–2 metre distance away from people coughing or sneezing

29 3. Wearing of face mask in public places (especially indoor public places)

30 4. Frequent hands washing with soap and water

31 5. Frequent hand cleaning with alcoholic sanitisers

32 6. Avoiding touching of face (eyes, nose, & mouth) when one is in public places

33 7. COVID-19 vaccination

34 8. Taking chloroquine

35 9. Use of herbs or roots (“Agbo”)

36 10. Use of ginger or garlic

37 11. Taking hot drinks or “ogogoro”

38 12. Other (specify below)

39 99. Do Not Know

40  
41 91. If no. 90 above includes 12: Please specify other way to avoid getting COVID-19. Word or Phrase: \_\_\_\_\_



## Attitude Towards COVID-19 and COVID-19 Vaccination – Section 6

**NOTE: Tell the respondents you will make statements and for each statement, they should: Strongly Disagree, Disagree, Say if they are Not Sure/Do Not Know, Agree, or Strongly Agree.**

92. COVID-19 is real. **Probe:**

1. Strongly Disagree
2. Disagree
3. Not Sure
4. Agree
5. Strongly Agree

93. COVID-19 a serious illness that can kill.

94. Everybody is susceptible to COVID-19 infection (it is possible for anybody to get COVID-19).

95. The risk of getting COVID-19 can be reduced by avoiding crowd (large group of people).

96. The risk of getting COVID-19 can be reduced by maintaining at least 1–2 metre distance away from people coughing or sneezing

97. The risk of getting COVID-19 can be reduced if everybody covers the mouth and nose (with handkerchief or bent elbow) when coughing or sneezing

98. The risk of getting COVID-19 can be reduced by wearing face mask when going out to public places (especially indoor public places).

99. The risk of getting COVID-19 can be reduced by washing hands with soap and water frequently (e.g before touching the face, before eating).

100. The risk of getting COVID-19 can be reduced by cleaning hands with alcoholic sanitisers frequently.

101. Chloroquine is an effective treatment (prevention) for COVID-19.

102. Herbs and roots (“Agbo”) are effective treatments (prevention) for COVID-19.

103. Ginger and garlic are effective treatments (prevention) for COVID-19.

104. Hot drinks or “ogogoro” are effective treatments (prevention) for COVID-19

105. COVID-19 vaccines are safe for people to receive

106. The risk of COVID-19 can be reduced by receiving COVID-19 vaccination

107. Everybody should receive COVID-19 vaccination that is recommended by the government

**Practices about COVID-19 – Section 7**

108. Since the COVID-19 pandemic started spreading in Ebonyi state (since 2020 till now), which of the following have you Ever Practiced because you wanted to Avoid or Prevent transmission of

COVID-19? **NOTE: Multiple responses: Probe for respondent to select all that apply:**

1. Avoiding crowd (large group of people)
2. Maintaining at least 1–2 metre distance away from people coughing or sneezing
3. Wearing of a face mask when going out to public places (especially indoor public places)
4. Frequent hand washing with soap and water
5. Frequent hand cleaning with alcoholic sanitisers
6. Avoiding touching your face (eyes, nose, mouth) when you are in public places
7. Covering your mouth and nose (with handkerchief or your bent elbow) when coughing or sneezing
8. Use of bleach/Jik or spirit/alcohol to clean surfaces that people touch frequently such as door handles, table tops etc
9. None of the above was ever practiced

109. Among those that you have ever practiced, which ones have you Been Practicing in the Last Two Weeks because you want to Avoid or Prevent transmission of COVID-19? **NOTE: Multiple**

**responses: Probe for respondent to select all that apply:**

1. Avoiding crowd (large group of people)
2. Maintaining at least 1–2 metre distance away from people coughing or sneezing
3. Wearing of a face mask when going out to public places (especially indoor public places)
4. Frequent hand washing with soap and water
5. Frequent hand cleaning with alcoholic sanitisers
6. Avoiding touching your face (eyes, nose, mouth) when you are in public places
7. Covering your mouth and nose (with handkerchief or your bent elbow) when coughing or sneezing
8. Use of bleach/Jik or spirit/alcohol to clean surfaces that people touch frequently such as door handles, table tops etc
9. None of the above was practiced in the last two weeks

110. Since the COVID-19 pandemic started spreading in Ebonyi state (since 2020 till now), which of the following have you Ever Practiced because you wanted to Treat or Prevent COVID-19? **NOTE:**

**Multiple responses: Probe for respondent to select all that apply:**

1. Taking chloroquine
2. Using herbs or roots (“Agbo”)

3. Using ginger or garlic
4. Using hot drinks or “ogogoro”
5. None of the above was ever practiced

111. Among those that you have ever practiced, which ones have you Been Practicing in the Last Two Weeks because you want to Treat or Prevent COVID-19? **NOTE: Multiple responses: Probe for respondent to select all that apply:**

1. Taking chloroquine
2. Using herbs or roots (“Agbo”)
3. Using ginger or garlic
4. Using hot drinks or “ogogoro”
5. None of the above was practiced in the last two weeks

## COVID-19 AND COVID-19 VACCINATION QUESTIONNAIRE FOR HEALTH WORKERS

**NOTE: All health workers (both clinical and non-clinical) working or living in Eboni state who give consent are eligible to participate in this survey.**

**Sociodemographic Characteristics**

1. What is your Gender?

1. Male
2. Female

2. Age in years: How old were you during your last birthday? Number: \_\_\_\_\_

3. What is your Marital Status?

1. Married
2. Separated/Divorced
3. Widowed
4. Never married (Single)

4. What is your Educational Level?

1. No formal education
2. Some primary
3. Completed primary
4. Some secondary
5. Completed secondary
6. NCE/Diploma (ND, OND) (Tertiary)
7. HND/First Degree (Tertiary)
8. Masters/PHD/Other Equivalent (Tertiary)

5. What is your Category or Cadre?

1. non-Clinical staff
2. PMV
3. Health attendant
4. JCHEW
5. CHEW
6. CHO
7. Nurse/Midwife
8. Medical laboratory technologist

- 1
- 2
- 3 9. Medical laboratory scientist
- 4 10. Pharmacy technician
- 5 11. Pharmacist
- 6 12. House officer
- 7 13. Medical officer
- 8 14. Medical doctor in specialist training (Resident doctor)
- 9 15. Specialist medical doctor (Fellow)
- 10 16. Other (specify below)

16  
17 6. If no. 5 above is 16: Please specify your Category or Cadre. Word or Phrase: \_\_\_\_\_

18  
19 7. How many years of working experience do you have? NOTE: Use "0" for less than one year. Number: \_\_\_\_\_

20  
21 8. Where is your current primary place of work?

- 22 1. PMV
- 23 2. PHC centre
- 24 3. Private laboratory
- 25 4. Private pharmacy
- 26 5. Private hospital/clinic
- 27 6. Missionary hospital
- 28 7. General hospital
- 29 8. NOFIC
- 30 9. AEFUTHA
- 31 10. Other (specify below)

32  
33  
34  
35  
36  
37  
38  
39 9. If no. 8 above is 10: Please specify your current primary place of work. Word or Phrase: \_\_\_\_\_

#### 40 41 42 43 **COVID-19 Vaccination Acceptance**

44  
45 10. Have you received COVID-19 vaccination?

- 46 1. Yes
- 47 2. No

48  
49  
50 **NOTE: No. 11–25 is for those who have received COVID-19 vaccination:**

51 11. Which of the COVID-19 vaccination doses have you received?

- 52 1. First dose only
- 53 2. Second dose only
- 54 3. Second dose plus Booster

55  
56  
57  
58  
59 12. If no. 11 above is 1: Why have you not received the second dose of COVID-19 vaccination?

1  
2  
3 **NOTE: select all that apply:**

- 4  
5 1. No vaccine when you went (stock-out)  
6 2. No vaccinator when you went (health facility not Closed)  
7  
8 3. Health facility was closed when you went  
9  
10 4. Place of vaccination was too far  
11 5. You were too busy  
12  
13 6. You were ill and did not go for the remaining dose  
14 7. You were ill, went but was not given the remaining dose  
15  
16 8. You had serious side effects from the first dose  
17  
18 9. The time for the second dose has not reached  
19  
20 10. Other (specify below)

21  
22 13. If no. 12 above includes 10: Other reason, please specify. Phrase: \_\_\_\_\_

23  
24 14. If no. 11 above is 2: Why have you not received a booster dose of COVID-19 vaccination?

25 **NOTE: select all that apply:**

- 26  
27 1. You are not aware of booster dose  
28 2. You do not need booster dose (it is not important)  
29 3. No vaccine when you went (stock-out)  
30 4. No vaccinator when you went (health facility not Closed)  
31 5. Health facility was closed when you went  
32 6. Place of vaccination was too far  
33 7. You were too busy  
34 8. You were ill and did not go for the booster dose  
35 9. You were ill, went but was not given the booster dose  
36 10. You had serious side effects from the second dose  
37 11. The time for a booster dose has not reached  
38 12. Other (specify below)

39  
40  
41  
42  
43  
44  
45  
46  
47 15. If no. 14 above includes 12: Other reason, please specify. Phrase: \_\_\_\_\_

48  
49  
50  
51 **NOTE: No. 16–25 is about your experiences and perceptions before the day you received the first dose of**  
52 **COVID-19 vaccination:**

53  
54 16. How often did you hear that COVID-19 vaccination was available for you to go and receive?

- 55 1. You heard about it many times before the day you received it  
56 2. You heard about it few times (or once) before the day you received it  
57 3. Not sure  
58  
59  
60

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  - 59
  - 60
4. You did not hear about it before the day you received it
  5. You did not hear about it at all before the day you received it

17. Did you know any place or health facility where they gave COVID-19 vaccination?

1. Yes, a place that was very close
2. Yes, a place that was close
3. Yes, a place that was far
4. Yes, a place that was too far
5. No, you did not know any place before the day you received COVID-19 vaccination

18. If no. 17 above is 1 or 2 or 3 or 4: How frequently were they giving COVID-19 vaccination at that place you mentioned above?

1. Daily or two/three times a week
2. Once a week
3. Once every two weeks/every month
4. No fixed time (not regular)
5. You did not know how frequently they were giving COVID-19 vaccination before the day you received it

19. If no. 17 above is 1 or 2 or 3 or 4: How was the queue (waiting time) at the place of vaccination that you mentioned above?

1. There was usually no queue (very short waiting time)
2. There was usually short queue (short waiting time)
3. You did not know what the queue (waiting time) was
4. There was usually long queue (long waiting time)
5. There was usually very long queue (very long waiting time)

20. If no. 17 above is 1 or 2 or 3 or 4: How caring (or kind/friendly) were the health workers at the place of vaccination that you mentioned above?

1. They were very caring
2. They were caring
3. Not sure whether they were caring or not
4. They were not caring
5. They were not caring at all

21. How important did you think it was for you to receive COVID-19 vaccination?

1. It was very important
2. It was important

3. Not sure whether it was important or not
4. It was not important
5. It was not important at all

22. How fearful were you that you might have severe or very serious side-effect if you received COVID-19 vaccination?

1. You were not fearful at all
2. You were not fearful
3. Not sure about it
4. You were a little fearful
5. You were very fearful

23. What protection did you think COVID-19 vaccination would give you if you received it?

1. Full or complete protection from COVID-19
2. Partial or incomplete protection from COVID-19
3. You were not sure about it
4. No protection from COVID-19
5. No protection at all from COVID-19

24. How did you trust the health workers who gave COVID-19 vaccination?

1. You trusted them very much
2. You trusted them
3. Not sure about it
4. You did not trust them
5. You did not trust them at all

25. How did you trust the federal and state governments who made the COVID-19 vaccination available for people to receive?

1. You trusted them very much
2. You trusted them
3. Not sure about it
4. You did not trust them
5. You did not trust them at all

**NOTE: No. 26–41 is for those who have not received COVID-19 vaccination:**

26. Have you ever heard that COVID-19 vaccination is available for you to go and receive?

1. Yes, you heard about it many times
2. Yes, you heard about it few times (or once)



3. Not sure
4. No, you have not heard about it
5. No, you have not heard about it at all

27. Do you know any place or health facility where they give COVID-19 vaccination?

1. Yes, a place that is very close
2. Yes, a place that is close
3. Yes, a place that is far
4. Yes, a place that is very far
5. No, you do not know any place

28. If no. 27 above is 1 or 2 or 3 or 4: How frequently do they give COVID-19 vaccination at that place you mentioned above?

1. Daily or two/three times a week
2. Once a week
3. Once every two weeks/every month
4. No fixed time (not regular)
5. Do not know

29. If no. 27 above is 1 or 2 or 3 or 4: How is the queue (waiting time) at the place of vaccination that you mentioned above?

1. There is usually no queue (very short waiting time)
2. There is usually short queue (short waiting time)
3. Do not know
4. There is usually long queue (long waiting time)
5. There is usually very long queue (very long waiting time)

30. If no. 27 above is 1 or 2 or 3 or 4: How caring (or kind/friendly) are the health workers at the place of vaccination that you mentioned above?

1. They are very caring
2. They are caring
3. You are not sure about it
4. They are not caring
5. They are not caring at all

31. If no. 10 above is 2 & no. 2 above is  $\geq 18$ : Why have you not received COVID-19 vaccination? **NOTE:**

**Select all that apply:**

1. You do not need the vaccine (it is not important)
2. You think the vaccine is not safe (you think it is harmful)

3. You think the vaccine is not effective
4. You have been hearing bad stories about the vaccine
5. The vaccine is new and/or you want others to take it first
6. You do not know the place and/or time of vaccination
7. Place of vaccination is too far
8. You have been too busy
9. You have been ill and did not go for vaccination
10. You have been ill, went but was not given vaccination
11. Long waiting time (long queue)
12. No vaccine (stock-out) when you went
13. No vaccinator (health facility not Closed) when you went
14. Health facility was closed when you went
15. You are not aware of it
16. Other (specify below)

32. If no. 31 above includes 16: Other reason, please specify. Phrase: \_\_\_\_\_

33. How important is it for you to receive COVID-19 vaccination?

1. Very important for me to receive it
2. Important for me to receive it
3. Not sure about it
4. Not important for me to receive it
5. Not important at all for me to receive it

34. How fearful are you that you may have severe or very serious side-effect if you receive COVID-19 vaccination?

1. Not fearful at all
2. Not fearful
3. Not sure about it
4. A little fearful
5. Very fearful

35. What protection will COVID-19 vaccination give you if you receive it?

1. Full or complete protection from COVID-19
2. Partial or incomplete protection from COVID-19
3. Not sure about it
4. No protection from COVID-19
5. No protection at all from COVID-19

1  
2  
3 36. How do you trust the health workers who give COVID-19 vaccination?  
4

- 5 1. You trust them very much  
6 2. You trust them  
7 3. Not sure about it  
8 4. You do not trust them  
9 5. You do not trust them at all  
10  
11  
12

13 37. How do you trust the federal and state governments who made the COVID-19 vaccination  
14 available for people to receive?  
15

- 16 1. You trust them very much  
17 2. You trust them  
18 3. Not sure about it  
19 4. You do not trust them  
20 5. You do not trust them at all  
21  
22  
23  
24

25 38. Do you intend (or plan) to receive COVID-19 vaccination that is available for you to receive?  
26

- 27 1. Yes, you will surely go and receive the vaccination  
28 2. Yes, you think you will go and receive the vaccination  
29 3. Not sure about it  
30 4. No, you think you will not go and receive the vaccination  
31 5. No, you will surely not go and receive the vaccination  
32  
33  
34

35 **NOTE: If 3 or 4 or 5: Skip to no. 40**  
36

37 39. If no. 38 above is 1 or 2: How many DAYS or WEEKS or MONTHS or YEARS will it take before you go  
38 and receive the COVID-19 vaccination? Number plus Word: \_\_\_\_\_  
39  
40

41 40. If no. 38 above is 3 or 4 or 5: What is/are the reasons why you do not intend (or plan) to receive  
42 COVID-19 vaccination? **NOTE: Select all that apply:**  
43

- 44 1. You do not need the vaccine (it is not important)  
45 2. You think the vaccine is not safe (I think it is harmful)  
46 3. You think the vaccine is not effective  
47 4. You have been hearing bad stories about the vaccine  
48 5. The vaccine is new and/or I want others to take it first  
49 6. You do not know the place and/or time of vaccination  
50 7. Place of vaccination is too far  
51 8. Other reason (specify below)  
52  
53  
54  
55  
56  
57

58 41. If no. 40 above includes 8: Other reason, please specify. Phrase: \_\_\_\_\_  
59  
60

## COVID-19 Experiences and Perceptions

NOTE: No. 42–53 is for those who have received COVID-19 vaccination:

NOTE: No. 42–53 is about your experiences and perceptions before the day you received the first dose of COVID-19 vaccination:

42. How fearful were you about getting COVID-19?

1. You were very fearful
2. You were a little fearful
3. Not sure about it
4. You were not fearful
5. You were not fearful at all

43. Was it possible for someone like you to get COVID-19?

1. It was highly possible
2. It was a bit possible
3. Not sure about it
4. It was not possible
5. It was not possible at all

44. Was it possible for someone like you to get severe or very serious COVID-19?

1. It was highly possible
2. It was a bit possible
3. Not sure about it
4. It was not possible
5. It was not possible at all

45. Did you ever have COVID-19 before you received the vaccination?

1. Yes, you were sure
2. Yes, you thought so
3. Not sure about it
4. No, you thought so
5. No, you were sure

46. If no. 45 above is 1 or 2: Did you ever have severe or very serious COVID-19 before you received the vaccination?

1. Yes, it was very serious
2. Yes, it was a bit serious
3. Not sure about it
4. No, it was not serious

1  
2  
3 5. No, it was not serious at all  
4

5 47. Did you know any person who had COVID-19 before you received the vaccination?  
6

- 7 1. Yes, you knew a very close person  
8  
9 2. Yes, you knew a close person  
10  
11 3. Yes, you only knew a distant person  
12  
13 4. Yes, you only knew a very distant person  
14  
15 5. No, you did not know any person

16 48. **If no. 47 above is 1 or 2 or 3 or 4:** Did you know any person who had severe or very serious COVID-  
17  
18 19 before you received the vaccination?

- 19 1. Yes, you knew a very close person  
20  
21 2. Yes, you knew a close person  
22  
23 3. Yes, you only knew a distant person  
24  
25 4. Yes, you only knew a very distant person  
26  
27 5. No, you did not know any person

28 49. **If no. 47 above is 1 or 2 or 3 or 4:** Did you know any person who died from COVID-19 before you  
29  
30 received the vaccination?

- 31 1. Yes, you knew a very close person  
32  
33 2. Yes, you knew a close person  
34  
35 3. Yes, you only knew a distant person  
36  
37 4. Yes, you only knew a very distant person  
38  
39 5. No, you did not know any person

40 50. What were your sources of information about COVID-19? **NOTE: Select all that apply:**

- 41 1. Family members/Relatives/Friends  
42 2. Other health workers } Interpersonal  
43  
44 3. Television  
45 4. Radio } Traditional media  
46 47 5. Prints (Newspaper/Magazine)  
48  
49 6. WhatsApp  
50 51 7. Facebook } Internet and social media } Internet, social media, & SMS  
52 53 8. Internet sites  
54 55 9. Bulk SMS/Text messages (e.g from Nigerian CDC, NPHCDA, Bank etc)  
56 57 10. Workplace (Place of work)  
58 59 11. Place of worship/Religious forums } Interpersonal  
60 12. Other (specify below)

1  
2  
3 51. If no. 50 above includes 12: Please specify the other source. Word or Phrase: \_\_\_\_\_  
4

5 52. If more than one sources given in no. 50 above: Which of the sources was your main source?  
6

7 53. If more than one sources given in no. 50 above: Which of the sources did you trust most?  
8  
9

10  
11 **NOTE: No. 54–65 is for those who have not received COVID-19 vaccination:**  
12

13 54. How fearful are you about getting COVID-19?

- 14 1. Very fearful
- 15 2. A little fearful
- 16 3. Not sure about it
- 17 4. Not fearful
- 18 5. Not fearful at all

19  
20  
21  
22 55. Is it possible for someone like you to get COVID-19?

- 23 1. Highly possible
- 24 2. A bit possible
- 25 3. Not sure about it
- 26 4. Not possible
- 27 5. Not possible at all

28  
29  
30  
31  
32 56. Is it possible for someone like you to get severe or very serious COVID-19?

- 33 1. Highly possible
- 34 2. A bit possible
- 35 3. Not sure about it
- 36 4. Not possible
- 37 5. Not possible at all

38  
39  
40  
41  
42 57. Have you ever had COVID-19?

- 43 1. Yes, you are sure
- 44 2. Yes, you think so
- 45 3. Not sure about it
- 46 4. No, you think so
- 47 5. No, you are sure

48  
49  
50  
51  
52 58. If no. 57 above is 1 or 2: Have you ever had severe or very serious COVID-19?

- 53 1. Yes, it was very serious
- 54 2. Yes, it was a bit serious
- 55 3. Not sure about it

4. No, it was not serious
5. No, it was not serious at all

59. Do you know any person who have had COVID-19?

1. Yes, you know a very close person
2. Yes, you know a close person
3. Yes, you only know a distant person
4. Yes, you only know a very distant person
5. No, you do not know any person

60. If no. 59 above is 1 or 2 or 3 or 4: Do you know any person who have had severe or very serious COVID-19?

1. Yes, you know a very close person
2. Yes, you know a close person
3. Yes, you only know a distant person
4. Yes, you only know a very distant person
5. No, you do not know any person

61. If no 59 above is 1 or 2 or 3 or 4: Do you know any persons who have died from COVID-19?

1. Yes, you know a very close person
2. Yes, you know a close person
3. Yes, you only know a distant person
4. Yes, you only know a very distant person
5. No, you do not know any person

62. What are your sources of information about COVID-19? **NOTE: Select all that apply:**

1. Family members/Relatives/Friends
  2. Other health workers
  3. Television
  4. Radio
  5. Prints (Newspaper/Magazine)
  6. WhatsApp
  7. Facebook
  8. Internet sites
  9. Bulk SMS/Text messages (e.g from Nigerian CDC, NPHCDA, Bank etc)
  10. Workplace (Place of work)
  11. Place of worship/Religious forums
  12. Other (specify below)
- } Interpersonal
- } Traditional media
- } Internet and social media
- } Internet, social media, & SMS
- } Interpersonal

1  
2  
3 63. If no. 62 above includes 12: Please specify the other source. Word or Phrase: \_\_\_\_\_  
4

5 64. If more than one sources given in no. 62 above: Which of the sources is your main source?  
6

7 65. If more than one sources given in no. 62 above: Which of the sources do you trust most?  
8  
9

### 10 11 12 **Basic Knowledge of COVID-19**

13  
14 66. What is COVID-19?

- 15 1. A new type of coronavirus disease  
16  
17 2. An old type of coronavirus disease  
18  
19 99. Do not know  
20

21 67. How do people get COVID-19?

- 22  
23 1. By staying close to infected persons when they cough or sneezes  
24  
25 2. From bat  
26  
27 3. From rat  
28  
29 4. From spiritual attack  
30  
31 5. Other (specify below)  
32 99. Do not know

33 68. If no. 67 above is 5: Please specify how people get COVID-19. Word or Phrase: \_\_\_\_\_  
34

35 69. When somebody gets COVID-19, how long does it usually take before the person starts to show  
36 symptoms?  
37

- 38 1. 2–14 days (within 2 weeks)  
39  
40 2. 2–4 weeks  
41  
42 3. >4 weeks  
43  
44 99. Do not know  
45

46 70. What are the symptoms of COVID-19? **NOTE: Select all that apply:**

- 47 1. Fever  
48  
49 2. Cough  
50  
51 3. Tiredness  
52  
53 4. Body aches and pains  
54  
55 5. Sore throat  
56  
57 6. Difficulty breathing or shortness of breath  
58  
59 7. Chest pain  
60  
8. Headache



1  
2  
3 9. Loss of taste or smell

4  
5 10. Diarrhoea

6  
7 11. Nausea or vomiting

8  
9 12. other (specify below)

10  
11 99. Do not know

12 71. If no. 70 above includes 12: Please specify the other symptom. Word or Phrase:\_\_\_\_\_

13  
14 72. Can people also have COVID-19 without showing any symptoms?

15  
16 1. Yes

17  
18 2. No

19  
20 99. Do Not Know

21 73. Who are more at risk of having severe COVID-19? **NOTE: Select all that apply:**

22  
23 1. Children

24  
25 2. Younger adults

26  
27 3. Elderly people

28  
29 4. Slim people

30  
31 5. Obese people

32  
33 6. People with chronic illness

34  
35 7. People who smoke

36  
37 8. Pregnant women

38  
39 99. Do not know

40 74. Is there a laboratory test to diagnose COVID-19?

41  
42 1. Yes

43  
44 2. No

45  
46 99. Do not know. If 2 OR 99: Skip to 77

47 75. Where is laboratory test to diagnose COVID-19 done in Ebonyi state? **NOTE: Select all that apply:**

48  
49 1. AEFUTHA

50  
51 2. General hospitals

52  
53 3. PHC centres

54  
55 4. Missionary hospitals

56  
57 5. Private hospitals

58  
59 6. Private laboratory

60 7. Other (specify below)

99. Do not know

1  
2  
3 76. If no. 75 above includes 7: Please specify the other place lab test for COVID-19 is done in Ebonyi  
4 state. Word or Phrase: \_\_\_\_\_  
5  
6

7 77. Are there treatments for COVID-19?

- 8 1. Yes  
9  
10 2. No  
11  
12 99. Do Not Know  
13

14 78. Are there vaccines for COVID-19?

- 15 1. Yes  
16  
17 2. No  
18  
19 99. Do Not Know  
20

21 79. If no. 78 above is 1: Do you know any place where one can go and receive COVID-19 vaccination in  
22 Ebonyi state?  
23

- 24 1. Yes  
25  
26 2. No  
27

28 80. What are the ways to avoid/prevent getting COVID-19? **NOTE: Select all that apply:**

- 29  
30 1. Avoiding crowd (large group of people)  
31  
32 2. Maintaining at least 1–2 metre distance away from people coughing or sneezing  
33  
34 3. Wearing of face mask in public places (especially indoor public places)  
35  
36 4. Frequent hands washing with soap and water  
37  
38 5. Frequent hand cleaning with alcoholic sanitisers  
39  
40 6. Avoiding touching of face (eyes, nose, & mouth) when one is in public places  
41  
42 7. COVID-19 vaccination  
43  
44 8. Taking chloroquine  
45  
46 9. Use of herbs or roots (“Agbo”)  
47  
48 10. Use of ginger or garlic  
49  
50 11. Taking hot drinks or “ogogoro”  
51  
52 12. Other (specify below)  
53  
54 99. Do Not Know  
55  
56  
57  
58  
59  
60

81. If no. 80 above includes 12: Please specify other way. Word or Phrase: \_\_\_\_\_

### Attitude Towards COVID-19 and COVID-19 Vaccination

**NOTE: For each of the statements below, take one option whether you: Strongly Disagree, Disagree, Not Sure/Do Not Know, Agree, or Strongly Agree.**

82. COVID-19 is real.

1. Strongly Disagree
2. Disagree
3. Not Sure
4. Agree
5. Strongly Agree

83. COVID-19 a serious illness that can kill.

84. Everybody is susceptible to COVID-19 infection (Anybody can get COVID-19).

85. The risk of getting COVID-19 can be reduced by avoiding crowd (large group of people).

86. The risk of getting COVID-19 can be reduced by maintaining at least 1–2 metre distance away from people coughing or sneezing

87. The risk of getting COVID-19 can be reduced if everybody covers the mouth and nose (with handkerchief or bent elbow) when coughing or sneezing

88. The risk of getting COVID-19 can be reduced by wearing face mask when going out to public places (especially indoor public places).

89. The risk of getting COVID-19 can be reduced by washing hands with soap and water frequently (e.g before touching the face, before eating).

90. The risk of getting COVID-19 can be reduced by cleaning hands with alcoholic sanitisers frequently.

91. Chloroquine is an effective treatment (prevention) for COVID-19.

92. Herbs and roots (“Agbo”) are effective treatments (prevention) for COVID-19.

93. Ginger and garlic are effective treatments (prevention) for COVID-19.

94. Hot drinks or “ogogoro” are effective treatments (prevention) for COVID-19

95. COVID-19 vaccines are safe for people to receive

96. The risk of COVID-19 can be reduced by receiving COVID-19 vaccination

97. Everybody should receive COVID-19 vaccination that is recommended by the government

**Practices about COVID-19**

98. Since the COVID-19 pandemic started spreading in Ebonyi state (since 2020 till now), which of the following have you Ever Practiced because you wanted to Avoid or Prevent transmission of

COVID-19? **NOTE: Select all that apply:**

1. Avoiding crowd (large group of people)
2. Maintaining at least 1–2 metre distance away from people coughing or sneezing
3. Wearing of a face mask when going out to public places (especially indoor public places)
4. Frequent hand washing with soap and water
5. Frequent hand cleaning with alcoholic sanitisers
6. Avoiding touching your face (eyes, nose, mouth) when you are in public places
7. Covering your mouth and nose (with handkerchief or your bent elbow) when coughing or sneezing
8. Use of bleach/Jik or spirit/alcohol to clean surfaces that people touch frequently such as door handles, table tops etc
9. None of the above was ever practiced

99. Among those that you have ever practiced, which ones have you Been Practicing in the Last Two Weeks because you want to Avoid or Prevent transmission of COVID-19? **NOTE: Select all that apply:**

1. Avoiding crowd (large group of people)
2. Maintaining at least 1–2 metre distance away from people coughing or sneezing
3. Wearing of a face mask when going out to public places (especially indoor public places)
4. Frequent hand washing with soap and water
5. Frequent hand cleaning with alcoholic sanitisers
6. Avoiding touching your face (eyes, nose, mouth) when you are in public places
7. Covering your mouth and nose (with handkerchief or your bent elbow) when coughing or sneezing
8. Use of bleach/Jik or spirit/alcohol to clean surfaces that people touch frequently such as door handles, table tops etc
9. None of the above was practiced in the last two weeks

100. Since the COVID-19 pandemic started spreading in Ebonyi state (since 2020 till now), which of the following have you Ever Practiced because you wanted to Treat or Prevent COVID-19? **NOTE:**

**Select all that apply:**

1. Taking chloroquine
2. Using herbs or roots (“Agbo”)
3. Using ginger or garlic
4. Using hot drinks or “ogogoro”
5. None of the above was ever practiced

1  
2  
3 101. Among those that you have ever practiced, which ones have you Been Practicing in the Last  
4 Two Weeks because you want to Treat or Prevent COVID-19? **NOTE: Select all that apply:**  
5

- 6 1. Taking chloroquine
- 7
- 8 2. Using herbs or roots (“Agbo”)
- 9
- 10 3. Using ginger or garlic
- 11
- 12 4. Using hot drinks or “ogogoro”
- 13
- 14 5. None of the above was practiced in the last two weeks
- 15
- 16
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- 60

For peer review only

## FGD Guide for FGD with Community Members

1  
2  
3  
4 Q1. What is COVID-19?

5 **Prompts:**

- 6 1. Is COVID-19 real or not?  
7  
8 2. Is COVID-19 a new disease or an old disease?  
9  
10 3. Is COVID-19 a serious disease that can kill?

11 **Probe:** their views on cause, transmission, symptoms, diagnosis, treatment, and prevention of  
12 COVID-19

13 **Prompt:** Are there vaccines for COVID-19?  
14

15  
16  
17 Q2. What are your views about COVID-19 vaccine/vaccination and the vaccination process?

18 **Probe:** safety, effectiveness, universal COVID-19 vaccination, and vaccination process

19  
20  
21 Q3. Some people have received COVID-19 vaccination but others have not received. What are the  
22 things that make people to receive or not to received COVID-19 vaccination?

23 **Prompt:** Why have some people not received COVID-19 vaccination?

24  
25 Why have some people not received COVID-19 vaccination that *is available close to them*?

26  
27  
28  
29 Q4. Among the people that currently have not received COVID-19 vaccination, some intend or plan  
30 to receive it but others do not intend or plan to receive it.

31  
32 What are the things that make people to plan to receive or to plan not to received COVID-19  
33 vaccination?

34  
35 **Prompt:** Why do some people say they will not receive COVID-19 vaccination?  
36

37  
38  
39 Q5. Among the people that say they will receive COVID-19 vaccination, some say they will go and  
40 receive it after some days, some say after some weeks, some say after some months, others say  
41 after some years.

42  
43 What are the things that determines how long it takes before people go and receive COVID-19  
44 vaccination?  
45

46  
47 **Prompt:** What will make some people go and receive the COVID-19 vaccination earlier and  
48 others to go later?  
49

50  
51  
52 Q6. What do you think should be done so that people who have not received COVID-19 vaccination  
53 will go and receive or start planning to receive it?

54  
55 **Prompt:** How can people be made to accept COVID-19 vaccination? Probe: Role of government,  
56 health workers etc.  
57

58  
59 *Thank you very much for your time and views.*  
60

## FGD Guide for FGD with Health Workers

1  
2  
3  
4 Q1. What is COVID-19?

5 **Prompts:**

- 6 1. Is COVID-19 real or not?  
7  
8 2. Is COVID-19 a new disease or an old disease?  
9  
10 3. Is COVID-19 a serious disease that can kill?

11 **Probe:** their views on cause, transmission, symptoms, diagnosis, treatment, and prevention of  
12 COVID-19

13 **Prompt:** Are there vaccines for COVID-19?  
14

15  
16  
17 Q2. What are your views about COVID-19 vaccine/vaccination and the vaccination process?

18 **Probe:** safety, effectiveness, universal COVID-19 vaccination, and vaccination process

19  
20  
21 Q3. Some health workers have received COVID-19 vaccination but others have not received. What  
22 are the things that make health workers to receive or not to received COVID-19 vaccination?

23 **Prompt:** Why have some health workers not received COVID-19 vaccination?

24 Why have some health workers not received COVID-19 vaccination that is *available close*  
25 *to them?*  
26  
27  
28

29  
30 Q4. Among the health workers that currently have not received COVID-19 vaccination, some intend  
31 or plan to receive it but others do not intend or plan to receive it.

32  
33 What are the things that make health workers to plan to receive or to plan not to received  
34 COVID-19 vaccination?  
35

36 **Prompt:** Why do some health workers say they will not receive COVID-19 vaccination?  
37  
38

39  
40 Q5. Among the health workers that say they will receive COVID-19 vaccination, some say they will go  
41 and receive it after some days, some say after some weeks, some say after some months, others  
42 say after some years.  
43

44 What are the things that determines how long it takes before health workers go and receive  
45 COVID-19 vaccination?  
46

47 **Prompt:** What will make some health workers go and receive the COVID-19 vaccination earlier  
48 and others to go later?  
49  
50

51  
52  
53 Q6. What do you think should be done so that health workers who have not received COVID-19  
54 vaccination will go and receive or start planning to receive it?  
55

56 **Prompt:** How can health workers be made to accept COVID-19 vaccination? **Probe:** Role of  
57 government, other health workers etc.  
58  
59

60 *Thank you very much for your time and views.*

# BMJ Open

## COVID-19 vaccination acceptance among community members and health workers in Ebonyi state, Nigeria: study protocol for a concurrent-independent mixed method analyses of intention to receive, timeliness of the intention to receive, uptake, and hesitancy to COVID-19 vaccination and the determinants

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Manuscripts

1 **Title:** COVID-19 vaccination acceptance among  
2 community members and health workers in Ebonyi  
3 state, Nigeria: study protocol for a concurrent-  
4 independent mixed method analyses of intention to  
5 receive, timeliness of the intention to receive, uptake,  
6 and hesitancy to COVID-19 vaccination and the  
7 determinants

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## 25 **Abstract**

26 **Introduction** The coronavirus disease 2019 (COVID-19) pandemic has gravely affected the  
27 lives and economies of the global population including Nigeria. The attainment of herd  
28 immunity through mass COVID-19 vaccination is the foremost control strategy, however, the  
29 deployments of COVID-19 vaccinations are facing challenges of non-acceptance. Despite the  
30 efforts of the Nigerian government and COVAX facility in making COVID-19 vaccination  
31 more available/accessible, the vaccination rate remains unexpectedly very low in  
32 Nigeria/Ebonyi state. It is thus important to investigate the acceptability of COVID-19  
33 vaccination to elucidate the explanations for the very low coverage rate. This study aims to  
34 evaluate/explore COVID-19 vaccination acceptance and the determinants among community  
35 members and health workers in Ebonyi state, Nigeria.

36 **Methods and analyses** The study is an analytical cross-sectional survey with a concurrent-  
37 independent mixed method design. Quantitative data will be collected from all  
38 consenting/assenting community members aged 15 years and above, in 28 randomly selected  
39 geographical clusters, through structured interviewer-administered questionnaire household  
40 survey using KoBoCollect installed in android devices. Quantitative data will be collected from  
41 all consenting health workers, selected via convenience and snowball techniques, through  
42 structured self-administered questionnaire survey distributed via WhatsApp and interviewer-  
43 administered survey using KoBoCollect installed in android devices. Qualitative data will be  
44 collected from purposively selected community members and health workers through focus  
45 group discussions. Quantitative analyses will involve descriptive statistics, generalized  
46 estimating equations (for community members data), and generalized linear model (for health  
47 workers data). Qualitative analyses will employ the thematic approach.

48 **Ethics and dissemination** Ethical approval for this study was obtained from the Ebonyi State  
49 Health Research and Ethics Committee (EBSHREC/15/01/2022-02/01/2023) and Research  
50 and Ethics Committee of Alex Ekwueme Federal University Teaching Hospital Abakaliki  
51 (14/12/2021-17/02/2022) and verbal consent will be obtained from participants. Study findings  
52 will be reported at local, national, and international levels as appropriate.

53 **Trial registration number** ISRCTN16735844

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## 55 **Strengths and limitations of this study**

- 56 ➤ Our study will be the first geographical-community based study, using mixed method  
57 approach, to investigate COVID-19 vaccination acceptance (the intention to receive,  
58 timeliness of the intention to receive, uptake, and hesitancy) in the context where there is  
59 very low vaccination rate despite relative vaccine availability and public access to  
60 vaccination.
- 61 ➤ The study will be implemented after prospective registration with ISRCTN and based on  
62 available/accessible or disseminated protocol.
- 63 ➤ The study is prone to reporting bias due to the questionnaire-based data collection  
64 method. The convenience and snowballing sampling will make the health worker survey  
65 prone to selection bias.

## 76 **Introduction**

77 Coronavirus disease 2019 (COVID-19), a severe acute respiratory syndrome disease caused by  
78 severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), emerged by the end of 2019  
79 and became a pandemic. By 7th August, 2022, the COVID-19 pandemic had affected more  
80 than 581 million persons and had resulted in the death of over 6.4 million persons globally with  
81 more than 9.2 million cases and over 174000 deaths in Africa.<sup>1</sup> By 10th August, 2022, the total  
82 number of recorded confirmed cases of COVID-19 and COVID-19 related deaths were  
83 respectively 262402 and 3147 in Nigeria and 2064 and 32 in Ebonyi state.<sup>2</sup> The pandemic has  
84 overstretched the capacity of many countries' health care delivery and disrupted the global  
85 economy due to lockdown measures.<sup>3-7</sup>

86 Amongst the available control measures, perhaps the most cost-effective and sustainable  
87 control strategy is mass COVID-19 vaccination (with safe and effective vaccines). COVID-19  
88 vaccination reduces the incidence, severity, and death from COVID-19,<sup>8-11</sup> and is perhaps the  
89 foremost means of achieving herd immunity especially when all population groups including  
90 adults and children are vaccinated<sup>9-14</sup> because both adults and children are susceptible to  
91 COVID-19 infection.<sup>15-17</sup> However, the deployments of COVID-19 vaccinations are facing  
92 some challenges such as non-acceptance and misinformation propagated by anti-vaccine  
93 campaigners. Refusal and/or delay in accepting vaccinations (vaccine hesitancy) has become a  
94 major public health challenge over the past decade<sup>18,19</sup> and was noted as one of the top ten  
95 threats to global health in 2019.<sup>20</sup> Moreover, the unprecedented disruptive impact of the  
96 pandemic with the associated conspiracy theories being propagated in conventional and social  
97 media and the unprecedented rapid development and introduction of COVID-19 vaccines have  
98 generated an atmosphere of uncertainty and confusion which have further limited the  
99 acceptance of COVID-19 vaccination.<sup>21-23</sup>

1  
2  
3 100 COVID-19 vaccination started in March, 2021 in Nigeria under the COVAX initiative.<sup>24,25</sup>  
4  
5 101 Although the Nigerian government, with the support of the COVAX facility, is scaling up the  
6  
7 102 availability/access to COVID-19 vaccination, the coverage rate is still very low in Nigeria,  
8  
9 103 including Ebonyi state and Nigeria was not among the only five countries in Africa expected  
10  
11 104 to meet the target of about 40% COVID-19 vaccination coverage by end of 2021.<sup>26</sup> As of 26th  
12  
13 105 January, 2022 (before this study was implemented), only about 4.6% of eligible Nigerians had  
14  
15 106 received the second dose of COVID-19 vaccination,<sup>27</sup> about 10.5% had received the first  
16  
17 107 dose,<sup>28</sup> and Ebonyi state had about the least coverage rate in Nigeria.<sup>29</sup> As of 11th August,  
18  
19 108 2022, about 25.2% of eligible Nigerians had received the second dose (fully vaccinated)<sup>30</sup> and  
20  
21 109 about 10.6% had received the first dose (partially vaccinated)<sup>31</sup> and as of 12th August, 2022,  
22  
23 110 Ebonyi state had the second least coverage rate in Nigeria.<sup>32</sup> Moreover, these coverage rates  
24  
25 111 were among the current eligible population of 18 years and above and, the rates among the  
26  
27 112 population at risk, which is what is considered with regards to herd immunity, would be a  
28  
29 113 fraction of the above.

30  
31  
32  
33  
34  
35  
36 114 Although the incidence of COVID-19 in Nigeria has been relatively lower compared to many  
37  
38 115 other countries, high acceptance of COVID-19 vaccination among Nigerians is important in  
39  
40 116 order to prevent any possible upsurge of the disease especially due to new strains of the virus.  
41  
42 117 Resurgence of COVID-19 infections and COVID-19 related deaths are common especially  
43  
44 118 among populations with low COVID-19 vaccination coverage.<sup>9-11</sup>

45  
46  
47  
48 119 Although the issue of stock-out of COVID-19 vaccines and vaccination syringes cannot be  
49  
50 120 ignored in Nigeria and other African countries,<sup>26</sup> the slow pace of coverage may be partly due  
51  
52 121 to non-acceptance/hesitancy among the populace and health workers as we have observed  
53  
54 122 anecdotally in Ebonyi state. However, to our knowledge, the extent of COVID-19 vaccination  
55  
56 123 acceptance and the determinants among community members and health workers, as well as  
57  
58 124 the degree to which the very low COVID-19 vaccination coverage is explained by non-

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3 125 acceptance as against non-availability/non-access, have not been rigorously investigated  
4  
5 126 especially in Nigeria and particularly in Ebonyi state. Such investigation has become more  
6  
7 127 imperative since the introduction and scale up of COVID-19 vaccination across Nigeria. The  
8  
9 128 understanding of context-specific determinants of vaccination acceptance is a necessary  
10  
11 129 strategy in addressing the problem of non-acceptance of new vaccines such as the current  
12  
13 130 COVID-19 vaccines.<sup>33</sup>  
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17  
18 131 COVID-19 vaccination intentions among populations were assessed at the early phase of the  
19  
20 132 pandemic by studies across the world<sup>12-14,34-63</sup> and in Nigeria (mostly based on social media  
21  
22 133 platforms and among health workers)<sup>64-70</sup> during the development/clinical trial stage of  
23  
24 134 COVID-19 vaccines. Few studies were done at the early stage of the introduction and  
25  
26 135 deployment of COVID-19 vaccination.<sup>71,72</sup> However, these studies were done when COVID-  
27  
28 136 19 vaccination had not been introduced for public use or was just being introduced. Thus, the  
29  
30 137 perceptions of vaccination-related attributes such as importance, safety or side-effects, and  
31  
32 138 effectiveness were perhaps largely distal. Moreover, the findings of those studies might  
33  
34 139 markedly vary from that of studies conducted in situations where COVID-19 vaccination is  
35  
36 140 readily/relatively available/accessible and there are close/real experiences/perceptions of  
37  
38 141 vaccination activities and vaccination-related adverse events. Also, since the implementation  
39  
40 142 of COVID-19 vaccination in Nigeria, the amplification of reports of serious side-effects and  
41  
42 143 deaths following vaccination is common in the social and conventional media and on the  
43  
44 144 grapevine.  
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51 145 Moreover, decline in the intention to receive COVID-19 vaccination after the vaccine became  
52  
53 146 available has been reported across countries.<sup>73</sup> Anecdotal evidence shows that the initial waves  
54  
55 147 of fear of COVID-19 among the people, including health workers, has markedly waned  
56  
57 148 overtime especially in Ebonyi state and Nigeria as a whole where the pandemic has been much  
58  
59 149 less severe compared to some other climes. As a result, it is not surprising that COVID-19  
60

150 vaccination uptake is reportedly very low and more importantly, the drive to scale up the  
151 availability and uptake of COVID-19 vaccination may be up against an unexpected bottle-neck  
152 if there is hesitancy or no intention to receive the vaccination among the people.

153 Only few studies have assessed the uptake of actual COVID-19 vaccination among the general  
154 adult population<sup>55,74,75</sup> and among health workers<sup>76-79</sup> but most were among sub-populations  
155 and when the vaccination was still relatively less available and accessible.

156 This study aims to evaluate and explore COVID-19 vaccination acceptance (the intention to  
157 receive, timeliness of the intention to receive, uptake, and hesitancy) and the determinants  
158 among community members and health workers in Ebonyi state, Nigeria, in order to generate  
159 evidence to inform policy interventions and strategies on optimal COVID-19 vaccination  
160 acceptance and coverage.

### 161 **Study objectives**

162 The primary objectives are to evaluate and explore the following among community members  
163 and health workers in Ebonyi state, Nigeria:

- 164 1. The intention to receive COVID-19 vaccination and the determinants
- 165 2. Timeliness of the intention to receive COVID-19 vaccination and the determinants
- 166 3. The uptake of COVID-19 vaccination and the determinants
- 167 4. The hesitancy to COVID-19 vaccination and the determinants
- 168 5. The predictive power of acceptance factor compared with availability/access factor  
169 regarding the intention to receive, timeliness of the intention to receive, and uptake of  
170 COVID-19 vaccination



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3 171 The secondary objectives are to evaluate and explore the following among community  
4  
5 172 members and health workers in Ebonyi state, Nigeria:

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8 173 1. The COVID-19 experiences and perceptions and their determinants

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10  
11 174 2. The COVID-19 vaccination expectations and perceptions and their determinants

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13  
14 175 3. The COVID-19 vaccination process experiences and perceptions (availability/access  
15  
16  
17 176 factor) and their determinants

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20 177 4. The knowledge, attitude, and practices about COVID-19 and their determinants

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22  
23 178 5. The sources of information about COVID-19 and their determinants

24  
25  
26 179 6. The perceptions about COVID-19, COVID-19 vaccine/vaccination, and COVID-19  
27  
28  
29 180 vaccination process

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31  
32 181 **Study hypotheses**

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35 182 The primary hypotheses include:

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37  
38 183 1. Strong COVID-19 experience and perception increases COVID-19 vaccination acceptance  
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40  
41 184 (increases the intention to receive, timeliness of the intention to receive, and uptake and  
42  
43 185 reduces hesitancy) compared with not strong COVID-19 experience and perception

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45  
46 186 2. Increase in COVID-19 experiences and perceptions score increases COVID-19 vaccination  
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48  
49 187 acceptance

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52 188 3. Good COVID-19 vaccination expectation and perception increases COVID-19 vaccination  
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54 189 acceptance compared with poor COVID-19 vaccination expectation and perception

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56  
57 190 4. Increase in COVID-19 vaccination expectations and perceptions score increases COVID-  
58  
59 191 19 vaccination acceptance

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3 192 5. Acceptance factor (COVID-19 risk-COVID-19 vaccination benefit perception or disease  
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5 193 risk-remedy benefit perception (DR-RB or DRRB perception)) is significantly associated  
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7  
8 194 with COVID-19 vaccination acceptance  
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11 195 6. Positive COVID-19 vaccination process experience and perception (positive  
12  
13 196 availability/access factor) increases the intention to receive, timeliness of the intention to  
14  
15 197 receive, and uptake of COVID-19 vaccination compared with negative COVID-19  
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17 198 vaccination process experience and perception (negative availability/access factor)  
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20  
21 199 7. Increase in COVID-19 vaccination process experiences and perceptions score increases the  
22  
23 200 intention to receive, timeliness of the intention to receive, and uptake of COVID-19  
24  
25 201 vaccination  
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28 202 8. Acceptance-availability/access factor is significantly associated with the intention to  
29  
30 203 receive, timeliness of the intention to receive, and uptake of COVID-19 vaccination  
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34 204 9. Increase in acceptance factor score increases the intention to receive, timeliness of the  
35  
36 205 intention to receive, and uptake of COVID-19 vaccination compared with increase in  
37  
38 206 availability/access factor score  
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41  
42 207 10. The positive categories of COVID-19 experiences and perceptions, COVID-19  
43  
44 208 vaccination expectations and perceptions, and COVID-19 vaccination process experiences  
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46 209 and perceptions respectively increase COVID-19 vaccination acceptance compared with the  
47  
48 210 negative categories (as depicted in table 1)  
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52 211 The secondary hypotheses include:  
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55 212 11. Knowledge, attitude, and practices about COVID-19 are significantly associated with:  
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57 213 COVID-19 vaccination acceptance; COVID-19 experiences and perceptions; COVID-19  
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3 214 vaccination expectations and perceptions; and COVID-19 vaccination process experiences  
4  
5 215 and perceptions  
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8 216 12. Sources of information about COVID-19 are significantly associated with: COVID-19  
9  
10 217 vaccination acceptance; COVID-19 experiences and perceptions; COVID-19 vaccination  
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12 218 expectations and perceptions; COVID-19 vaccination process experiences and perceptions;  
13  
14 219 and knowledge, attitude, and practices about COVID-19  
15  
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18 220 13. Sociodemographic characteristics are significantly associated with: COVID-19  
19  
20 221 vaccination acceptance; COVID-19 experiences and perceptions; COVID-19 vaccination  
21  
22 222 expectations and perceptions; COVID-19 vaccination process experiences and perceptions;  
23  
24 223 knowledge, attitude, and practices about COVID-19; and sources of information about  
25  
26 224 COVID-19  
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30 225 14. Professional or work-related attributes of health workers are significantly associated with:  
31  
32 226 COVID-19 vaccination acceptance, COVID-19 experiences and perceptions; COVID-19  
33  
34 227 vaccination expectations and perceptions; COVID-19 vaccination process experiences and  
35  
36 228 perceptions; knowledge, attitude, and practices about COVID-19; and sources of information  
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38 229 about COVID-19  
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43 230 The hypothesized relationships between the independent factors and the outcome measures are  
44  
45 231 shown in the study's conceptual framework in figure 1. The conceptual framework was  
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47 232 designed based on the study hypotheses which were informed by published data on COVID-  
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49 233 19 and COVID-19 vaccination and the "3Cs" Vaccine Hesitancy Model by The SAGE  
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51 234 Working Group on Vaccine Hesitancy.<sup>18</sup>  
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55 235 In the conceptual framework (figure 1), strong COVID-19 experience and perception  
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57 236 (compared with not strong experience and perception), increase in COVID-19 experiences and  
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3 237 perceptions score, and the positive categories of COVID-19 experiences and perceptions  
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5 238 (compared with the negative categories) are expected to be associated with decrease in  
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7 239 complacency about COVID-19 vaccination which will result in increase in the intention to  
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9 240 receive, timeliness of the intention to receive, and uptake and decrease in hesitancy to COVID-  
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11 241 19 vaccination (increase in COVID-19 vaccination acceptance). Likewise, good COVID-19  
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13 242 vaccination expectation and perception (compared with poor expectation and perception),  
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15 243 increase in COVID-19 vaccination expectations and perceptions score, and the positive  
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17 244 categories of COVID-19 vaccination expectations and perceptions (compared with the negative  
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19 245 categories) are expected to be associated with increase in confidence in COVID-19 vaccination  
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21 246 which will lead to increase in COVID-19 vaccination acceptance.  
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26  
27 247 Positive COVID-19 vaccination process experience and perception (compared with negative  
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29 248 experience and perception), increase in COVID-19 vaccination process experiences and  
30  
31 249 perceptions score, and the positive categories of COVID-19 vaccination process experiences  
32  
33 250 and perceptions (compared with the negative categories) are expected to be associated with  
34  
35 251 increase in convenience in COVID-19 vaccination and then increase in the intention to receive,  
36  
37 252 timeliness of the intention to receive, and uptake of COVID-19 vaccination. Acceptance factor  
38  
39 253 is expected to be associated with increase in COVID-19 vaccination acceptance compared with  
40  
41 254 availability/access factor.  
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45  
46 255 As depicted in the conceptual framework (figure 1), knowledge, attitude, and practice about  
47  
48 256 COVID-19; sources of information about COVID-19; sociodemographic characteristics; and  
49  
50 257 professional or work-related attributes are expected to be associated with decrease in  
51  
52 258 complacency, increase in confidence, and increase in convenience in COVID-19 vaccination  
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54 259 and then increase in COVID-19 vaccination acceptance. These background characteristics are  
55  
56 260 also expected to be associated with COVID-19 experiences and perceptions, COVID-19  
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3 261 vaccination expectations and perceptions, and COVID-19 vaccination process experiences and  
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5 262 perceptions (figure 1).  
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## 8 263 **Methods and analyses**

### 9 264 **Design**

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15 265 The study is an analytical cross-sectional survey with a concurrent-independent mixed data  
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17 266 collection and data analysis and interpretation method. In this design, the quantitative and  
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19 267 qualitative aspects of the study will be implemented simultaneously and independently of each  
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21  
22 268 other.<sup>80</sup> The study protocol development was guided by the Standard Protocol Items:  
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24 269 Recommendations for Interventional Trials (SPIRIT) 2013 checklist and the Strengthening the  
25  
26 270 Reporting of Observational Studies in Epidemiology (STROBE) 2007 checklist for cross-  
27  
28  
29 271 sectional studies.  
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### 32 272 **Study area**

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35 273 The study is planned to be implemented between March and April, 2022, in Ebonyi state which  
36  
37 274 is located in south-eastern geopolitical zone of Nigeria (figure 2) with land area of 5,953 sq.  
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39 275 km. The population of the state was projected to be 3,313,229 in 2021 based on the 2006  
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41  
42 276 national census figure and a growth rate of 2.8% and christianity is the most practiced religion.  
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44 277 Ebonyi state has 13 Local Government Areas (LGAs) including the state capital (Abakaliki  
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46 278 LGA) and 171 political wards.<sup>81</sup> Each LGA is made up of political wards and autonomous  
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49 279 communities. Each autonomous community is made up of larger villages called autonomous  
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51 280 villages which consist of smaller villages or settlements. Each village/settlement has a head or  
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53  
54 281 traditional leader. Most parts of Ebonyi state are rural and there are only six towns (urban or  
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56 282 semi-urban areas), five of which are LGAs capitals with the adjoining areas.<sup>82</sup>  
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3 283 The federal ministry of health (FMOH) and its agencies provide the overarching guidance and  
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5 284 policy framework for public and private health service delivery in all states in Nigeria including  
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7 285 Ebonyi state. The FMOH provides health services in the state through tertiary health facilities  
8  
9 286 while the state ministry of health (SMOH) provides health service through secondary health  
10  
11 287 facilities (general hospitals). The SMOH and the state primary health care development agency  
12  
13 288 (SPHCDA) provide health care in the local governments through primary health care (PHC)  
14  
15 289 facilities. There is at least one PHC centre in each political ward. The national primary health  
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17 290 care development agency (NPHCDA) provides policy guidance and coordination for  
18  
19 291 immunisation/vaccination services in all states in Nigeria including Ebonyi state. The  
20  
21 292 NPHCDA provides vaccines and related products while the SMOH and SPHCDA coordinates  
22  
23 293 the implementation of immunisation/vaccination service delivery in the state (and LGAs)  
24  
25 294 through the tertiary, secondary, and primary health care (PHC) facilities.  
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### 31 **Participants**

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34 296 The participants include clusters, the community members within clusters, and health workers  
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36 297 in Ebonyi state. A cluster in this study is a geographical community (village(s)/settlement(s))  
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38 298 which is the immediate catchment area of a PHC centre. Eligible clusters for inclusion in the  
39  
40 299 study are those with at least 200 households or a population of 1000 people, whose PHC centres  
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42 300 are providing basic maternal and child health care services including routine childhood  
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44 301 immunisation, that can be easily accessed with a car, and where the cluster heads give verbal  
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46 302 consent/permission. In each of the selected clusters, community members aged 15 years and  
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48 303 above who give verbal consent/assent will be eligible to participate in a population-based  
49  
50 304 household survey. Health workers (both clinical and non-clinical staff) in public and private  
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52 305 health care sectors, including the patent medicine vendors (PMVs), who work or live in Ebonyi  
53  
54 306 state and give verbal consent will be eligible to participate in a health worker survey.  
55  
56 307 Community members aged 15 years and above who have resided in the community for at least  
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3 308 one year and who give verbal consent/assent will be eligible to participate in community-based  
4  
5 309 focus group discussions (FGDs) while health workers (both clinical and non-clinical staff) who  
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7 310 work or live in Ebonyi state, have at least one year of working experience, and give verbal  
8  
9 311 consent will be eligible to participate in health worker-based FGDs.  
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### 13 312 **Independent factors and outcome measures**

#### 14 15 16 313 **Independent factors, categories, scoring, and grading**

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18  
19 314 The independent factors among community members and health workers (see table 1) are  
20  
21 315 almost the same with few differences which include: occupation, monthly income, and  
22  
23 316 residence among the community members; and professional or work category/cadre, years of  
24  
25 317 working experience, and level of work among the health workers.  
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29 318 The independent factors are listed under seven headings labelled A–I: COVID-19 experiences  
30  
31 319 and perceptions; COVID-19 vaccination expectations and perceptions; COVID-19 vaccination  
32  
33 320 process experiences and perceptions (availability/access factor); Acceptance factor (COVID-  
34  
35 321 19 risk-COVID-19 vaccination benefit perception); Acceptance-availability/access factor;  
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37 322 Knowledge, attitude, and practice about COVID-19; Source of information about COVID-19;  
38  
39 323 Sociodemographic characteristics; and Professional or work-related attributes. These three  
40  
41 324 factors – COVID-19 experiences and perceptions; COVID-19 vaccination expectations and  
42  
43 325 perceptions; and COVID-19 vaccination process experiences and perceptions – will be  
44  
45 326 respectively measured using eight, five, and five questionnaire items each having five  
46  
47 327 categories grouped into positive and negative and scored from 0–4 as depicted in table 1.  
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53 328 The scoring will create three new continuous variables including COVID-19 experiences and  
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55 329 perceptions score (ranging from 0–32 for each participant); COVID-19 vaccination  
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57 330 expectations and perceptions score (ranging from 0–20); and COVID-19 vaccination process  
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**Table 1: Independent factors and their categories and category scores and grading among community members and health workers**

Independent factors	Categories (Scores)					
	Positive category			Negative category		
COVID-19 experiences and perceptions						
1. How fearful are you about getting COVID-19?	Very fearful (4)	A little fearful (3)	Not sure (2)	Not fearful (1)	Not fearful at all (0)	
2. How possible is it for you to get COVID-19?	Highly possible (4)	A bit possible (3)	Not sure (2)	Not possible (1)	Not possible at all (0)	
3. How possible is it for you to get severe COVID-19?	Highly possible (4)	A bit possible (3)	Not sure (2)	Not possible (1)	Not possible at all (0)	
4. Have you ever had COVID-19?	Yes, surely (4)	Yes, think so (3)	Not sure (2)	No, think so (1)	No, surely (0)	
5. Have you ever had severe COVID-19?	Yes, very serious (4)	Yes, a bit serious (3)	Not sure (2)	No, not serious (1)	No, not serious at all (0)	
6. Do you know any person who have had COVID-19?	A very close person (4)	A close person (3)	A distant person (2)	A very distant person (1)	No person (0)	
7. Do you know any person who have had severe COVID-19?	A very close person (4)	A close person (3)	A distant person (2)	A very distant person (1)	No person (0)	
8. Do you know any person who have died from COVID-19?	A very close person (4)	A close person (3)	A distant person (2)	A very distant person (1)	No person (0)	
Total	(32 <sup>HI</sup> )	-	-	-	(0 <sup>L</sup> )	
COVID-19 experiences and perceptions score						
9. Extent of COVID-19 experience and perception (COVID-19 risk perception) <sup>A</sup>	Strong experience and perception (high risk perception)	-	-	-	Not strong experience and perception (low risk perception)	
10. COVID-19 vaccination expectations and perceptions						
11. How important is it for you to receive COVID-19 vaccination?	Very important (4)	Important (3)	Not sure (2)	Not important (1)	Not important at all (0)	
12. How fearful are you about having severe side-effect from COVID-19 vaccination?	Not fearful at all (4)	Not fearful (3)	Not sure (2)	A little fearful (1)	Very fearful (0)	
13. What protection against COVID-19 will you get from receiving COVID-19 vaccination?	Full protection (4)	Partial protection (3)	Not sure (2)	No protection (1)	No protection at all (0)	
14. How do you trust the health workers who give COVID-19 vaccination?	Trust them very much (4)	Trust them (3)	Not sure (2)	Do not trust them (1)	Do not trust them at all (0)	
15. How do you trust the government who made COVID-19 vaccination available?	Trust them very much (4)	Trust them (3)	Not sure (2)	Do not trust them (1)	Do not trust them at all (0)	
Total	(20 <sup>HH</sup> )	-	-	-	(0 <sup>LL</sup> )	
COVID-19 vaccination expectations and perceptions score						
16. COVID-19 vaccination expectation and perception level (COVID-19 vaccination benefit perception) <sup>B</sup>	Good expectation and perception (high benefit perception)	-	-	-	Poor expectation and perception (low benefit perception)	
17. COVID-19 vaccination process experiences and perceptions (availability/access factor)						
18. Ever heard about COVID-19 vaccination?	Many times (4)	Once/few times (3)	Not sure (2)	No time (1)	No time at all (0)	
19. Know a COVID-19 vaccination place?	A very close place (4)	A close place (3)	A far place (2)	A very far place (1)	No place (0)	
20. Frequency of COVID-19 vaccination at the vaccination place?	Daily, down to twice a week (4)	Once a weekly (3)	Once in two-four weeks (2)	No fixed time (1)	Do not know (0)	
21. Queue at the vaccination place?	No queue (4)	Short queue (3)	Do not know (2)	Long queue (1)	Very long queue (0)	
22. How caring are the health workers at the vaccination place?	Very caring (4)	Caring (3)	Not sure (2)	Not caring (1)	Not caring at all (0)	
Total	(20 <sup>HHH</sup> )				(0 <sup>LLL</sup> )	
23. COVID-19 vaccination process experiences & perceptions score (availability/access factor score)						
24. COVID-19 vaccination process experience and perception level (availability/access factor level) <sup>C</sup>	Positive experience & perception (availability & access factor)	-	-	-	Negative experience & perception (availability & access factor)	
Acceptance factor level	Defined as COVID-19 risk-COVID-19 vaccination benefit perception or disease risk-remedy benefit perception level. Categories: High disease risk-high remedy benefit perception or high-high DR-RB perception, high-low DR-RB perception, low-high DR-RB perception, and low-low DR-RB perception					
Acceptance factor score	Defined as COVID-19 risk perception score plus COVID-19 vaccination benefit perceptions score or DR-RB perception score					
Acceptance-availability/access factor level	High-high-positive, High-high-negative, High-low-positive, High-low-negative, low-high-positive, low-high-negative, low-low-positive, low-low-negative					

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Table 1: Continued

Independent factors	Categories (Scores)				
	Positive category		Negative category		
Knowledge, Attitude, and Practice					
28. Knowledge score					
29. Level of knowledge of COVID-19 <sup>D</sup>	Good knowledge	–	–	–	Poor knowledge
30. Attitude score					
31. Level of attitude towards COVID-19 & COVID-19 vaccination <sup>E</sup>	Good attitude	–	–	–	Poor attitude
32. Practice score					
33. Level of practices about COVID-19 <sup>F</sup>	Good practice	–	–	–	Poor practice
34. Source of information about COVID-19	Interpersonal (Family members/Relatives/Friends, Other health workers, Place of work, Place of worship/Religious forums); Traditional media (Television, Radio, Prints (Newspaper/Magazine)); Internet, social media, & SMS ( WhatsApp, Facebook, Internet sites, Bulk SMS/Text messages)				
35. Main source of information	Interpersonal; Traditional media; Internet, social media, & SMS				
36. Most trusted source of information	Interpersonal; Traditional media; Internet, social media, & SMS				
37. Sociodemographic characteristics					
38. Gender	Male, Female				
39. Age					
40. Marital status	Married, Divorced, Separated, Widowed, Never married (single)				
41. Educational level	No formal education, Some primary, Completed primary, Some secondary, Completed secondary, Tertiary (diploma, first degree, masters/PHD/other equivalent)				
42. Occupation*	Farmer, Trader, Other-self-employment, Private paid work, Government paid work, Housewife, Student, Apprentice, Youth service (Corper), None				
43. Residence*	Rural, Semi-urban/Urban				
44. Usual monthly income (NGN) & income score	Income categories: "no income" up to "more than 300,000" with interval of 20,000, giving 18 categories. "no income" is scored "one" & the score increases by "one" for each higher category up to the highest score of 17				
45. Professional or work-related attributes <sup>A</sup>					
46. Professional cadre or work category	non-Clinical staff, Clinical staff (PMV, health attendant, JCHEW, CHEW, CHO, nurse/midwife, medical laboratory scientist, medical laboratory technologist, pharmacist, pharmacy technician, house officer, medical officer, medical doctor in specialist training, specialist medical doctor)				
47. Years of working experience					
48. Primary place of work	Public and private				
49. Level of primary place of work	Primary health care level (facility), Secondary health care level (facility), and Tertiary health care level (facility)				

33 <sup>H</sup>Highest attainable COVID-19 experiences and perceptions score for each participant (<sup>L</sup>Lowest attainable score). <sup>A</sup>COVID-19 experiences and perceptions score of  $\geq 50\%$  of the highest attainable score of 32 is strong experience and perception,  $< 50\%$  is not strong experience and perception. <sup>H<sup>H</sup></sup>Highest attainable COVID-19 vaccination expectations and perceptions score for each participant (<sup>L<sup>L</sup></sup>Lowest attainable score). <sup>B</sup>COVID-19 vaccination expectations and perceptions score of  $\geq 50\%$  of the highest attainable score of 20 is good expectation and perception,  $< 50\%$  is poor expectation and perception. <sup>H<sup>H<sup>H</sup></sup></sup>Highest attainable COVID-19 vaccination process experiences and perceptions score (<sup>L<sup>L<sup>L</sup></sup></sup>Lowest attainable score). <sup>C</sup>COVID-19 vaccination process experiences and perceptions score of  $\geq 50\%$  of the highest attainable score of 20 is positive experience and perception,  $< 50\%$  is negative experience and perception. <sup>D</sup>Knowledge score of  $\geq 75\%$  of the highest attainable score of 44 is good knowledge,  $< 75\%$  is poor knowledge (lowest attainable score is 0) (44 knowledge items scored "1" for each correct response and "0" for each incorrect response). <sup>E</sup>Attitude score of  $\geq 75\%$  of the highest attainable score of 80 is good attitude,  $< 75\%$  is poor attitude (lowest attainable score is 16) (each of 16 attitude items respectively scored from "1" to "5" or "5" to "1" as appropriate for "strongly disagree", "disagree", "not sure", "agree", & "strongly agree"). <sup>F</sup>Practice score of  $\geq 75\%$  of the highest attainable score of 24 is good practice,  $< 75\%$  is poor practice (lowest attainable score is 0) (24 practice items scored "1" for each correct response and "0" for each incorrect response).  
34 \*Among only community members. <sup>A</sup>Among only health workers. PMV=Patent Medicine Vendor. JCHEW=Junior Community Health Extension Worker.  
35 CHEW=Community Health Extension Worker. CHO=Community Health Officer.

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3 337 Acceptance factor will be created as the combination of COVID-19 experiences and  
4  
5 338 perceptions plus COVID-19 vaccination expectations and perceptions and defined as COVID-  
6  
7 339 19 risk-COVID-19 vaccination benefit perception (disease risk-remedy benefit perception  
8  
9 340 (DR-RB/DRRB perception)). Acceptance factor will be in contrast to availability/access factor  
10  
11 341 (COVID-19 vaccination process experience and perception). Acceptance-availability/access  
12  
13 342 factor will be created as the combination of acceptance and availability/access factors.  
14  
15 343 Acceptance factor score (ranging from 0–52 for each participant as the sum of disease-risk  
16  
17 344 perception score (0–32) and remedy-benefit perception score (0–20)) and availability/access  
18  
19 345 factor score (ranging from 0–20) will be converted to percentages of the maximum attainable  
20  
21 346 score for each participant so that the power of acceptance factor and availability/access factor  
22  
23 347 in predicting COVID-19 vaccination acceptance can be compared by comparing how unit  
24  
25 348 increase in the percentage scores (percentage point increase) affect COVID-19 vaccination  
26  
27 349 acceptance. The predictive power of disease-risk perception and remedy-benefit perception  
28  
29 350 will also be compared using similar technique.

30  
31 351 Basic knowledge, attitude, and practices about COVID-19 will be assessed, scored, and  
32  
33 352 categorised as stated in the legend of table 1.

### 34 353 **Outcome measures**

35  
36 354 The outcome measures are as defined in table 2. The primary outcomes among community  
37  
38 355 members and health workers include the intention to receive, timeliness of the intention to  
39  
40 356 receive, uptake, and hesitancy to COVID-19 vaccination. Hesitancy was conceptualized as:  
41  
42 357 non-receipt of a vaccination that is really available and accessible and perceived to be available  
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44 358 and accessible because one did not want to receive it and either intends to receive it at a later  
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46 359 time (delay) or intends not to receive it at a later time (refusal).

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Table 2: Outcome measures and their definitions		
SN	Primary Outcomes	Definitions
	<u>Among community members</u>	
1.	The intention to receive COVID-19 vaccination	The proportion of community members aged 15 years and above, who have not received COVID-19 vaccination, who intend (or plan) to receive COVID-19 vaccination that is available for them to receive. The component outcomes are those who will surely go and receive and those who think they will go and receive the vaccination. This outcome is in contrast to those who do not intend (or plan) to receive COVID-19 vaccination that is available for them to receive – consisting of those who are not sure, those who think they will not go and receive, and those who will surely not go and receive the vaccination.
2.	Timeliness of the intention to receive COVID-19 vaccination	The time (in days) that community members aged 15 years and above, who intend (or plan) to receive COVID-19 vaccination, intend (or plan) to take before they go and receive the vaccination. The component outcomes are the intended time to vaccination among those who will surely go and receive and those who think they will go and receive the vaccination.
3.	The uptake of COVID-19 vaccination	The proportion of community members aged 18 years and above who have received COVID-19 vaccination
4.	The hesitancy to COVID-19 vaccination (delay or refusal to receive)	The proportion of community members aged 18 years and above who have not received COVID-19 vaccination due to reasons that include only non-acceptance factor rather than only real/perceived non-availability/non-access factor or both non-acceptance and real/perceived non-availability/non-access factors. Non-acceptance factor is defined as consisting of one or more of: perceptions that the vaccination is not important, vaccine is not safe, vaccine is not effective, vaccine is new and/or waiting for others to take it first, and hearing of many bad stories about the vaccine. Real/perceived non-availability/non-access factor is defined as consisting of one or more of: ignorance of vaccination availability, ignorance of place and/or time of vaccination, long distance to vaccination site, being too busy, being ill and did not go for vaccination, being ill and went for vaccination but was not given, long waiting time, vaccine stock-out, absence of vaccinator, closure of health facility. The non-acceptance and real/perceived non-availability/non-access factors will be measured as the reasons given by respondents regarding why they have not received COVID-19 vaccination. Delay in receiving COVID-19 vaccination is the intention to receive the vaccination among those that are hesitant. Refusal to receive COVID-19 vaccination is the intention not to receive the vaccination among those that are hesitant.
5.	The intention for the children to receive COVID-19 vaccination	The proportion of community members aged 15 years and above who intend (or plan) for their children to receive COVID-19 vaccination if it is available for them to receive. The component outcomes are those who will surely take their children to receive and those who think they will take their children to receive the vaccination. This outcome is in contrast to those who do not intend (or plan) for their children to receive COVID-19 vaccination – consisting of those who are not sure, those who think they will not take their children to receive, and those who will surely not take their children to receive the vaccination
6.	Timeliness of the intention for the children to receive COVID-19 vaccination	The time (in days) that community members aged 15 years and above, who intend (or plan) for their children to receive COVID-19 vaccination, intend (or plan) to take before they take their children to receive the vaccination. The component outcomes are the intended time to vaccination for their children among those who will surely take their children to receive and those who think they will take their children to receive the vaccination
	<u>Among health workers</u>	
7.	The intention to receive COVID-19 vaccination	As for community members above
8.	Timeliness of the intention to receive COVID-19 vaccination	As for community members above
9.	The uptake of COVID-19 vaccination	As for community members above
10.	The hesitancy to COVID-19 vaccination	As for community members above
SN	Secondary Outcomes	Definitions
	<u>Among community members</u>	
1.	COVID-19 experiences and perceptions	COVID-19 experiences and perceptions score among community members aged 15 years and above
2.		The proportion of community members aged 15 years and above who have strong COVID-19 experience and perception (in contrast to those who have less strong experience and perception)
3.		The proportion of community members aged 15 years and above who have the positive categories of COVID-19 experiences and perceptions (in contrast to those who have the negative categories)
4.	COVID-19 vaccination expectations and perceptions	COVID-19 vaccination expectations and perceptions score among community members aged 15 years and above
5.		The proportion of community members aged 15 years and above who have good COVID-19 vaccination expectation and perception (in contrast to those who have poor expectation and perception)
6.		The proportion of community members aged 15 years and above who have the positive categories of COVID-19 vaccination expectations and perceptions (in contrast to those who have the negative categories)
7.	COVID-19 vaccination process experiences and perceptions	COVID-19 vaccination process experiences and perceptions score among community members aged 15 years and above
8.		The proportion of community members aged 15 years and above who have positive COVID-19 vaccination process experience and perception (in contrast to those who have negative experience and perception)
9.		The proportion of community members aged 15 years and above who have the positive categories of COVID-19 vaccination process experiences and perceptions (in contrast to those who have the negative categories)

Table 2: Continued		
SN	Secondary Outcomes	Definitions
10.	The knowledge of COVID-19	Knowledge score among community members aged 15 years and above
11.		The proportion of community members aged 15 years and above who have good knowledge of COVID-19 (in contrast to those who have poor knowledge)
12.	The attitude towards COVID-19 and COVID-19 vaccination	Attitude score among community members aged 15 years and above
13.		The proportion of community members aged 15 years and above who have good attitude towards COVID-19 and COVID-19 vaccination (in contrast to those who have poor attitude)
14.	The practices about COVID-19	Practice score among community members aged 15 years and above
15.		The proportion of community members aged 15 years and above who have good practice about COVID-19 (in contrast to those who have poor practice)
16.	The main source of information about COVID-19*	The proportion of community members aged 15 years and above whose main source of information about COVID-19 is interpersonal; traditional media; or Internet, social media, & SMS.
17.	The most trusted source of information about COVID-19*	The proportion of community members aged 15 years and above whose most trusted source of information about COVID-19 is interpersonal; traditional media; or Internet, social media, & SMS
	<u>Among health workers</u>	
18.	COVID-19 experiences and perceptions	As for community members above
19.	COVID-19 vaccination expectations and perceptions	As for community members above
20.	COVID-19 vaccination process experiences and perceptions	As for community members above
21.	The knowledge of COVID-19	As for community members above
22.	The attitude towards COVID-19 and COVID-19 vaccination	As for community members above
23.	The practices about COVID-19	As for community members above
24.	The main source of information about COVID-19	As for community members above
25.	The most trusted source of information about COVID-19	As for community members above

\*Interpersonal source includes Family members/Relatives/Friends, Other health workers, Place of work, Place of worship/Religious forums; Traditional media source includes Television, Radio, Prints (Newspaper/Magazine); Internet, social media, & SMS source includes WhatsApp, Facebook, Internet sites, Bulk SMS/Text messages.

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362 Hesitancy to COVID-19 vaccination was measured among the unvaccinated based on the  
 363 concepts of “non-acceptance factor” and real or perceived “non-availability (non-access)  
 364 factor” and delay vs refusal was measured based on intention vs non-intention to receive among  
 365 the unvaccinated (table 2).

366 The secondary outcomes include COVID-19 experiences and perceptions, COVID-19  
 367 vaccination expectations and perceptions, COVID-19 vaccination process experiences and  
 368 perceptions, knowledge of COVID-19, attitude towards COVID-19 and COVID-19  
 369 vaccination, practices about COVID-19, and main source and most trusted source of  
 370 information about COVID-19 (table 2).

### 371 **Measurement of independent factors and study outcomes**

372 Quantitative data will be measured through population-based household survey using  
373 structured community members questionnaire (supplementary file 1) and health workers  
374 survey using structured health workers questionnaire (supplementary file 2). The community  
375 members questionnaire and the health workers questionnaire are virtually the same except for  
376 the absence of identification section and the professional/work-related attributes in the  
377 sociodemographic section of the health worker questionnaire. The questionnaire was designed  
378 with the guide of data published by other studies,<sup>12,34,42,47</sup> the Report of the SAGE Working  
379 Group on Vaccine Hesitancy,<sup>18</sup> the WHO vaccination coverage questionnaire,<sup>83</sup> and basic facts  
380 about COVID-19 on WHO website.<sup>84</sup> The electronic versions of both questionnaires were  
381 programmed using the KoBoToolbox software and were pre-tested in non-participating  
382 clusters.

383 The community members questionnaire will be interviewer administered. The interviewers will  
384 administer the electronic questionnaire with KoBoCollect installed in their android phones or  
385 tablet devices. The interviewers will receive two days training on how to administer the  
386 electronic questionnaire. The training will include a detailed review and explanation of the  
387 questionnaire items, how to obtain consent from respondents, interview techniques, the  
388 translation of key words in the questionnaire to local language, household revisiting techniques,  
389 and how to collect data and upload completed forms with KoBoCollect.

390 During the household survey, all the households will be enumerated and household members  
391 aged 15 years and above in households where verbal consent is given by the heads of  
392 households will be enlisted and assigned unique numbers on a separate paper form before  
393 administering the anonymised electronic questionnaire. To enhance coverage and response,  
394 local residents who have good knowledge of the cluster environment will preferably be the

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3 395 interviewers so that they can visit households when household members are expected to be  
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5 396 around and revisit up to three times as necessary. The community members questionnaire has  
6  
7 397 seven sections: Identification (including cluster number, household number, participant  
8  
9 398 number); Sociodemographic characteristics; COVID-19 vaccination acceptance; COVID-19  
10  
11 399 experiences and perceptions; Basic knowledge of COVID-19; Attitude towards COVID-19 and  
12  
13 400 COVID-19 vaccination; and Practices about COVID-19 (supplementary file 1).  
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17 401 The health worker questionnaire will be both self-administered and interviewer-administered.  
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19 402 The web link for the electronic questionnaire will be distributed to health workers via social  
20  
21 403 media platform such as WhatsApp. However, interviewers will administer the health workers  
22  
23 404 questionnaire via KoBoCollect installed in android devices to health workers who do not have  
24  
25 405 online contact and those living in remote areas with poor internet access. The health workers  
26  
27 406 questionnaire has six sections: Sociodemographic characteristics; COVID-19 vaccination  
28  
29 407 acceptance; COVID-19 experiences and perceptions; Basic knowledge of COVID-19; Attitude  
30  
31 408 towards COVID-19 and COVID-19 vaccination; and Practices about COVID-19  
32  
33 409 (supplementary file 2).  
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39 410 Qualitative data will be measured through focus group discussions (FGDs) with community  
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41 411 members and health workers. A total of 20 FGDs with community members will be carried out  
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43 412 across 10 clusters with two FGDs (one male-FGD and one female-FGD) per cluster. A total of  
44  
45 413 14 FGDs with health workers will be conducted, five with non-clinical staff and nine with  
46  
47 414 clinical staff (five at PHC facilities and four at secondary/tertiary health facilities). The  
48  
49 415 investigators will conduct the FGDs using FGD guide (supplementary file 3) prepared in  
50  
51 416 English and pre-tested in non-participating clusters and among some health workers who will  
52  
53 417 later be exempted from the study. The FGD guides (supplementary file 3) contain step-by-step  
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55 418 instructions and both open-ended and more targeted questions designed to explore the  
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3 419 participants' perceptions about COVID-19, COVID-19 vaccine/vaccination, COVID-19  
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5 420 vaccination process, and the determinants of COVID-19 vaccination acceptance.  
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8 421 Before commencement of each FGD, the investigators will collect background data of  
9  
10 422 participants including age, sex, marital status, level of education, occupation or cadre, and years  
11  
12 423 of working experience as appropriate. The community members FGDs will be conducted in  
13  
14 424 local language and the health workers FGDs in English. Each FGD will consist of 7–8  
15  
16 425 participants (comprising a moderator, a note taker, and the respondents) and will last for about  
17  
18 426 45 minutes. The FGDs will be audio-recorded, the health workers FGDs will be transcribed  
19  
20 427 and community members FGDs will be translated and transcribed verbatim into English.  
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#### 25 428 **Data management and quality control**

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27  
28 429 The skip logic and validation criteria in KoBoToolbox software was utilized when  
29  
30 430 programming the electronic questionnaire to enhance the quality of data collection. To  
31  
32 431 minimise the potential bias in assessing the association between COVID-19 and COVID-19  
33  
34 432 vaccination related experiences and perceptions and uptake of COVID-19 vaccination, the  
35  
36 433 questionnaire items on these factors are subdivided into two subgroups: “have not received  
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38 434 COVID-19 vaccination” and “have received COVID-19 vaccination” and the items in each  
39  
40 435 subgroup are framed differently, respectively in present tense versus in past tense. For example,  
41  
42 436 those whose response to a preceding question indicate that they have not received COVID-19  
43  
44 437 vaccination will subsequently respond to the questions: “How fearful are you that you may  
45  
46 438 have very serious side-effect if you receive COVID-19 vaccination?” “How fearful are you  
47  
48 439 about getting COVID-19?” etc. In contrast, those who have received COVID-19 vaccination  
49  
50 440 will subsequently respond to the questions: “Regarding your experiences and perceptions  
51  
52 441 before the day you received the first dose of COVID-19 vaccination: How fearful were you  
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3 442 that you might have very serious side-effect if you received COVID-19 vaccination?” “How  
4  
5 443 fearful were you about getting COVID-19?”  
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8 444 To enhance the validity of the questionnaires, after the first drafts, there were several rounds  
9  
10 445 of systematic review-discussion-correction-redrafting by the research team. During this  
11  
12 446 iterative process, attention was paid to relevance of the questionnaire items to the study  
13  
14 447 objectives and the logical flow and order, wording, framing, clarity and appropriateness of the  
15  
16 448 questions. The validation process continued until the final version of the questionnaires which  
17  
18 449 were then pre-tested. During the pre-test, respondents’ understanding and interpretation of the  
19  
20 450 items and the options, their response time to individual items and time taken to complete a  
21  
22 451 questionnaire were assessed and the completed questionnaires were reviewed for any problems.  
23  
24 452 Minor adjustments were made thereafter.  
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30 453 The household interviewers will upload only completed anonymised questionnaires to the  
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32 454 online survey records at the end of each day’s survey and the transmitted questionnaires will  
33  
34 455 be reviewed for missing, incoherent, and illogical data. Any identified error will immediately  
35  
36 456 be communicated to the respective interviewers for correction by cross-checking with the  
37  
38 457 respective respondents. The investigators will supervise the household survey interviewers and  
39  
40 458 will revisit at least 20 eligible households per cluster with a specialised form of the survey  
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42 459 questionnaire to double check on responses and coverage.  
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47 460 Multiple submissions of the self-administered electronic questionnaire from a health worker  
48  
49 461 on the same device and browser will be prevented by deploying the questionnaire through the  
50  
51 462 online-only (once per respondent) option in KoBoToolbox. However, in any case where a  
52  
53 463 health worker who has completed the questionnaire agrees to give the android phone to any co-  
54  
55 464 worker – who do not have android phone or online address but is willing to participate in the  
56  
57 465 survey – to respond to the questionnaire, a web link for online-only (single submission) will be  
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3 466 sent to such health worker. The data utility in Stata will be used to check for duplicated  
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5 467 submissions (observations) and if found, only one will be kept, the duplicates will be deleted  
6  
7 468 from the dataset. Participation of study participants in the FGDs before the questionnaire  
8  
9  
10 469 surveys will be prevented. During the translation and transcribing of the community members  
11  
12 470 FGDs, exact and meaning-based translation will be used. The FGD transcripts will be  
13  
14 471 compared with the original recording to check for 'accuracy' before conducting analyses.  
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## 17 18 472 **Sample size**

19  
20  
21 473 Sample size is estimated using Stata/SE version 15.1 (Stata Corp, College Station, TX, USA).  
22  
23 474 For the community members survey, assuming a conservative estimate of 50% for the primary  
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25 475 outcome (the proportion of community members who have not received COVID-19  
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27 476 vaccination who intend (or plan) to receive COVID-19 vaccination that is available for them  
28  
29 477 to receive) among the community members who have not strong COVID-19 experience and  
30  
31 478 perception and 56% among those who have strong COVID-19 experience and perception, 80%  
32  
33 479 power at 2.5% probability of type one error (to correct for multiple comparisons),<sup>85</sup> 2630 is the  
34  
35 480 minimum total sample size required to detect the 6%-point difference in this primary outcome  
36  
37 481 between both comparison groups. Allowance for 70% response rate will increase the sample  
38  
39 482 size to 3758. To account for cluster sampling, 3758 is multiplied by a conservative estimate of  
40  
41 483 design effect of 4 to give a final minimum total sample size of 15032. As the clusters that will  
42  
43 484 be selected to participate in the study are those with minimum population size of 1000 per  
44  
45 485 cluster, and with 540 (54%) of the population expectedly falling within the age group of 15  
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47 486 years and above,<sup>86</sup> the study requires 28 clusters (15032/540) for the community members  
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49 487 survey.  
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56 488 Using similar parameters, the health workers survey requires a minimum total sample size of  
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58 489 940 to detect a 10%-point difference in this primary outcome between both comparison groups  
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3 490 (50% versus 60%). Because of the nature of the survey, such as the use of social media  
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6 491 platforms for distribution of the (self-administered) questionnaire, the length of the  
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8 492 questionnaire, and the sampling technique (convenience and snowball), allowance for 50%  
9  
10 493 acceptance rate to account for both non-response and incomplete response will increase the  
11  
12 494 minimum total sample size for the health worker survey to 1880. Also, due to the nature of the  
13  
14 495 survey, the 1880 is perhaps more of the number of health workers that will be targeted for  
15  
16 496 distribution of the questionnaire rather than for selection to participate in the survey.

### 17 497 **Sampling technique (Recruitment)**

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23 498 Community members will be selected by stratified cluster sampling technique. The sampling  
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25 499 frame will be the list of clusters obtained from the Ebonyi state ministry of health. The eligible  
26  
27 500 clusters will be stratified into two: rural and urban/semi-urban. A random sample of 21 clusters  
28  
29 501 will be selected from the rural stratum and a random sample of 7 clusters will be selected from  
30  
31 502 the urban/semi-urban stratum using the “sample” command in Stata. This will give a 3:1 rural  
32  
33 503 to urban ratio. If verbal consent/permission is not given by any of the selected cluster(s) head(s)  
34  
35 504 before commencement of household survey, replacement cluster(s) will be selected from the  
36  
37 505 remaining list of eligible clusters using the same technique. The study profile is shown in figure  
38  
39 506 3. In each of the selected clusters, all the households will be enumerated and all individuals  
40  
41 507 aged 15 year and above in each household will be selected for the community members survey.  
42  
43 508 About five to six eligible male and female community members, both those who have received  
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45 509 and those who have not received COVID-19 vaccination, in 10 clusters will be selected  
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47 510 purposively for FGDs.

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54 511 Health workers will be selected by convenience and snowballing techniques. To increase  
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56 512 acceptance rate, the research team will first make a physical and or phone contact with as many  
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58 513 health workers as possible to invite them to participate in the survey and seek their consent and  
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3 514 permission for the web link for the self-administered electronic questionnaire to be sent to them  
4  
5 515 via online platforms. For those who give consent and permission, the address or phone number  
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7 516 of their preferred online platform will be recorded and the web link for the questionnaire will  
8  
9 517 be sent to their private online pages. They will be implored to forward the web link to other  
10  
11 518 health workers that they know within the study area after they have completed the  
12  
13 519 questionnaires. The research team will send the web link for the questionnaire to the online  
14  
15 520 contacts (such as WhatsApp phone numbers) of as many eligible health workers as possible,  
16  
17 521 including both private and group pages. Interviewers will also use convenience sampling in  
18  
19 522 administering the health workers questionnaire (via KoBoCollect installed in android devices)  
20  
21 523 to those who do not have online contact and those living in remote areas with poor internet  
22  
23 524 connectivity. About five to six eligible health workers, both those who have received and those  
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25 525 who have not receive COVID-19 vaccination, will be selected purposively for FGDs.  
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### 31 526 **Data analyses**

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34 527 Data will be analysed using Stata/SE version 15.1 (Stata Corp, College Station, TX, USA).  
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36 528 Analyses of the community members data will be based on population-averaged models that  
37  
38 529 account for clustering. Point estimates of the outcome measures will be computed for each  
39  
40 530 comparison group as defined in the study hypotheses. Each hypothesis with dichotomous or  
41  
42 531 categorical independent factor will be tested by computing prevalence difference (with 97.5%  
43  
44 532 CI and p-values) in binary outcome measure using binomial identity, and mean difference (with  
45  
46 533 97.5% CI and p-values) in continuous outcome measure using gaussian identity, generalized  
47  
48 534 estimating equations (GEE) with an exchangeable correlation matrix and robust standard  
49  
50 535 errors. Each hypothesis with continuous independent factor will be tested by computing  
51  
52 536 coefficient (with 97.5% CI and p-values) in binary and continuous outcome measures,  
53  
54 537 respectively using the binomial identity and gaussian identity GEE models.  
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3 538 For each independent factor (in a hypothesis) being tested, adjusted analysis will be done by  
4  
5 539 in-putting into the GEE model the other independent factors as appropriate. For clarity, the  
6  
7  
8 540 potential independent factors to control for are presented in table 3. Both unadjusted and  
9  
10 541 adjusted results will be reported. If the binomial identity GEE model fails to run or convergence  
11  
12 542 is not achieved, gaussian identity GEE model, or generalized least square (GLS) random-  
13  
14 543 effects linear regression model (with robust standard errors), or maximum likelihood (ML)  
15  
16 544 random-effects linear regression model will be used instead.<sup>87</sup>

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20 545 The same analytic technique will be used for the analyses of the health workers data except  
21  
22 546 that generalized linear model (GLM) with robust standard errors will be used in place of GEE  
23  
24 547 model because of the absence of cluster design in the health worker survey.

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28 548 Summary statistics will be used to assess COVID-19 vaccination acceptance (the intention to  
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30 549 receive, timeliness of the intention to receive, uptake, and hesitancy); COVID-19 experiences  
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32 550 and perceptions; COVID-19 vaccination expectations and perceptions; COVID-19 vaccination  
33  
34 551 process experiences and perceptions; knowledge, attitude, and practices about COVID-19; and  
35  
36 552 sources of information about COVID-19 among community members and health workers.

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40 553 The qualitative data (focus group discussion transcripts) will be analysed thematically based  
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42 554 on pre-determined themes in the study's conceptual framework. The qualitative data will be  
43  
44 555 analysed, interpreted, and presented independently of the quantitative data.

#### 45 46 47 48 556 **Ethics and dissemination**

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50  
51 557 Ethical approval for this study was obtained from the Ebonyi State Health Research and Ethics  
52  
53 558 Committee (EBSHREC/15/01/2022-02/01/2023) and Research and Ethics Committee of Alex  
54  
55 559 Ekwueme Federal University Teaching Hospital Abakaliki (14/12/2021-17/02/2022). The  
56  
57 560 investigators will obtain verbal consent/permission from the heads of the selected clusters.

Table 3: Independent factors to in-put into multivariate models in adjusted analyses		
	Independent factors under test	Independent factors to control for (as appropriate)
	Primary hypotheses	
1.	Extent of COVID-19 experience and perception	COVID-19 vaccination expectation and perception level; COVID-19 vaccination process experience and perception level; Basic knowledge of COVID-19; Attitude towards COVID-19 and COVID-19 vaccination; Practices about COVID-19; Source of information about COVID-19 (Main source and Most trusted source of information about COVID-19); Sociodemographic characteristics (Gender, Age, Marital status, Educational level, Occupation*, Residence*, Monthly income/income score*); Professional or work-related attributes <sup>^</sup> (Work category (clinical and non-clinical), Years of working experience, Primary place of work (public and private), Level of primary place of work (primary, secondary, and tertiary))
2.	COVID-19 experiences and perceptions score	COVID-19 vaccination expectations and perceptions score; COVID-19 vaccination process experiences and perceptions score; Basic knowledge of COVID-19, Attitude towards COVID-19 and COVID-19 vaccination; Practices about COVID-19; Source of information about COVID-19; Sociodemographic characteristics; Work-related attributes <sup>^</sup>
3.	COVID-19 vaccination expectation and perception level	Extent of COVID-19 experience and perception; COVID-19 vaccination process experience and perception level; Basic knowledge of COVID-19; Attitude towards COVID-19 and COVID-19 vaccination; Practices about COVID-19; Source of information about COVID-19; Sociodemographic characteristics; Work-related attributes <sup>^</sup>
4.	COVID-19 vaccination expectations and perceptions score	COVID-19 experiences and perceptions score; COVID-19 vaccination process experiences and perceptions score; Basic knowledge of COVID-19; Attitude towards COVID-19 and COVID-19 vaccination; Practices about COVID-19; Source of information about COVID-19; Sociodemographic characteristics; Work-related attributes <sup>^</sup>
5.	Acceptance factor level (COVID-19 risk-COVID-19 vaccination benefit perception or disease risk-remedy benefit perception level)	Availability/access factor level (COVID-19 vaccination process experience and perception level); Basic knowledge of COVID-19; Attitude towards COVID-19 and COVID-19 vaccination; Practices about COVID-19; Source of information about COVID-19; Sociodemographic characteristics; Work-related attributes <sup>^</sup>
6.	COVID-19 vaccination process experience and perception level	Extent of COVID-19 experience and perception; COVID-19 vaccination expectation and perception level; Basic knowledge of COVID-19; Attitude towards COVID-19 and COVID-19 vaccination; Practices about COVID-19; Source of information about COVID-19; Sociodemographic characteristics; Work-related attributes <sup>^</sup>
7.	COVID-19 vaccination process experiences and perceptions score	COVID-19 experiences and perceptions score; COVID-19 vaccination expectations and perceptions score; Basic knowledge of COVID-19; Attitude towards COVID-19 and COVID-19 vaccination; Practices about COVID-19; Source of information about COVID-19; Sociodemographic characteristics; Work-related attributes <sup>^</sup>
8.	Acceptance-availability/access factor level	Basic knowledge of COVID-19; Attitude towards COVID-19 and COVID-19 vaccination; Practices about COVID-19; Source of information about COVID-19; Sociodemographic characteristics; Work-related attributes <sup>^</sup>
9.	Acceptance factor score and availability/access factor score	Basic knowledge of COVID-19; Attitude towards COVID-19 and COVID-19 vaccination; Practices about COVID-19; Source of information about COVID-19; Sociodemographic characteristics; Work-related attributes <sup>^</sup>
10.	COVID-19 experiences & perceptions <sup>a</sup> , COVID-19 vaccination expectations & perceptions <sup>b</sup> , COVID-19 vaccination process experiences & perceptions <sup>c</sup>	COVID-19 experiences & perceptions <sup>a</sup> , COVID-19 vaccination expectations & perceptions <sup>b</sup> , COVID-19 vaccination process experiences & perceptions <sup>c</sup> (as appropriate); Basic knowledge of COVID-19, Attitude towards COVID-19 and COVID-19 vaccination; Practices about COVID-19; Source of information about COVID-19; Sociodemographic characteristics; Work-related attributes <sup>^</sup>
	Secondary hypotheses	
1.	Knowledge of COVID-19	Attitude towards COVID-19; Practices about COVID-19; Source of information about COVID-19; Sociodemographic characteristics; Work-related attributes <sup>^</sup> ; Extent of COVID-19 experience and perception; COVID-19 vaccination expectation and perception level; COVID-19 vaccination process experience and perception level
2.	Attitude towards COVID-19	Knowledge of COVID-19; Practices about COVID-19; Source of information about COVID-19; Sociodemographic characteristics; Work-related attributes <sup>^</sup> ; Extent of COVID-19 experience and perception; COVID-19 vaccination expectation and perception level; COVID-19 vaccination process experience and perception level
3.	Practices about COVID-19	Knowledge of COVID-19; Attitude towards COVID-19; Source of information about COVID-19; Sociodemographic characteristics; Work-related attributes <sup>^</sup> ; Extent of COVID-19 experience and perception; COVID-19 vaccination expectation and perception level; COVID-19 vaccination process experience and perception level
4.	Main source of information about COVID-19	Most trusted source of information about COVID-19; Sociodemographic characteristics; Work-related attributes <sup>^</sup> ; Extent of COVID-19 experience and perception; COVID-19 vaccination expectation and perception level; COVID-19 vaccination process experience and perception level
5.	Most trusted source of information about COVID-19	Main source of information about COVID-19; Sociodemographic characteristics; Work-related attributes <sup>^</sup> ; Extent of COVID-19 experience and perception; COVID-19 vaccination expectation and perception level; COVID-19 vaccination process experience and perception level
6.	A sociodemographic characteristic	Other sociodemographic characteristics; Source of information about COVID-19; Work-related attributes <sup>^</sup> ; Extent of COVID-19 experience and perception; COVID-19 vaccination expectation and perception level; COVID-19 vaccination process experience and perception level
7.	A professional or work-related attribute <sup>^</sup>	Other professional or work-related attributes <sup>^</sup> ; Source of information about COVID-19; Sociodemographic characteristics; Extent of COVID-19 experience and perception; COVID-19 vaccination expectation and perception level; COVID-19 vaccination process experience and perception level

\*Among only community members. <sup>^</sup>Among only health workers. <sup>a</sup>Fear of getting COVID-19, possible to get (severe) COVID-19, ever had COVID-19, and knowledge of any person who have had COVID-19. <sup>b</sup>Importance of COVID-19 vaccination, fear of having severe side-effect from COVID-19 vaccination, protection from receiving COVID-19 vaccination, trust for the health workers who give COVID-19 vaccination, trust for the government who made COVID-19 vaccination available <sup>c</sup>Ever heard COVID-19 vaccination was available for receipt and knowledge of a COVID-19 vaccination place.

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3 562 During the household survey the interviewers will obtain verbal consent from the household  
4  
5 563 members aged 18 years and above and assent from household members aged less than 18 years  
6  
7 564 (after obtaining consent from the heads of households). The health workers will be informed  
8  
9 565 that only those that give consent should take the online survey. The moderators of the focus  
10  
11 566 group discussions (FGDs) will obtain verbal consent from the respondents before each FGD.  
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15 567 The purpose of the study, the kind of participation, likely duration of participation, voluntary  
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17 568 nature of participation, absence of potential harm, potential benefit, and confidential nature of  
18  
19 569 the study will be communicated to participants as required. The online record of the  
20  
21 570 anonymised quantitative data will be passworded and the audio recordings and the electronic  
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23 571 verbatim transcript of the FGDs will be stored in a passworded computer to prevent  
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25 572 unauthorised access.  
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30 573 Study findings will be reported at local, national, and international levels in high impact peer-  
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32 574 reviewed journals and conferences as appropriate.  
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### 35 575 **Patients and public involvement**

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38 576 Patients or the public were not involved in the design and reporting or dissemination plans  
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40 577 and will not be involved in the conduct of our research.  
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45

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47  
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49  
50 581 development of the study design, data collection tools, and original protocol. GEN and UIAN contributed to the  
51  
52 582 development of the study design, data collection tools, and final version of the protocol. All authors contributed to the  
53  
54 583 revision of the manuscript and read, edited, and approved the final manuscript.  
55

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57  
58 585 sectors.  
59

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## 823 **Figure legend**

824 Figure 1: Study conceptual framework

825 Figure 2: Map showing the study area (Ebonyi state) in the south-east geopolitical zone of  
826 Nigeria

827 Figure 3: Summary of study profile

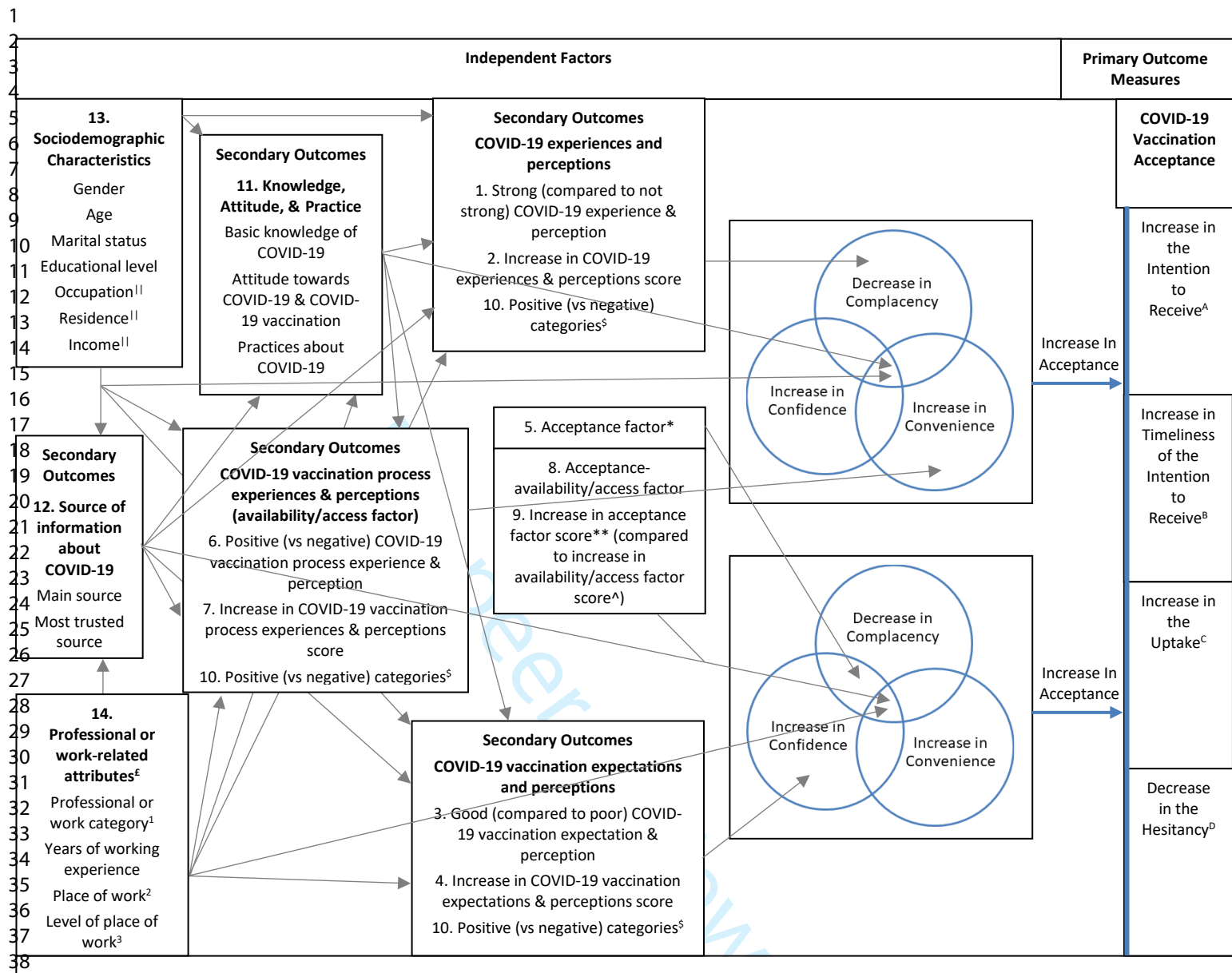
## 828 **Supplemental files**

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3 829 Supplementary file 1: COVID-19 Vaccination Questionnaire\_Community Members  
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6 830 Supplementary file 2: COVID-19 Vaccination Questionnaire\_Health Workers  
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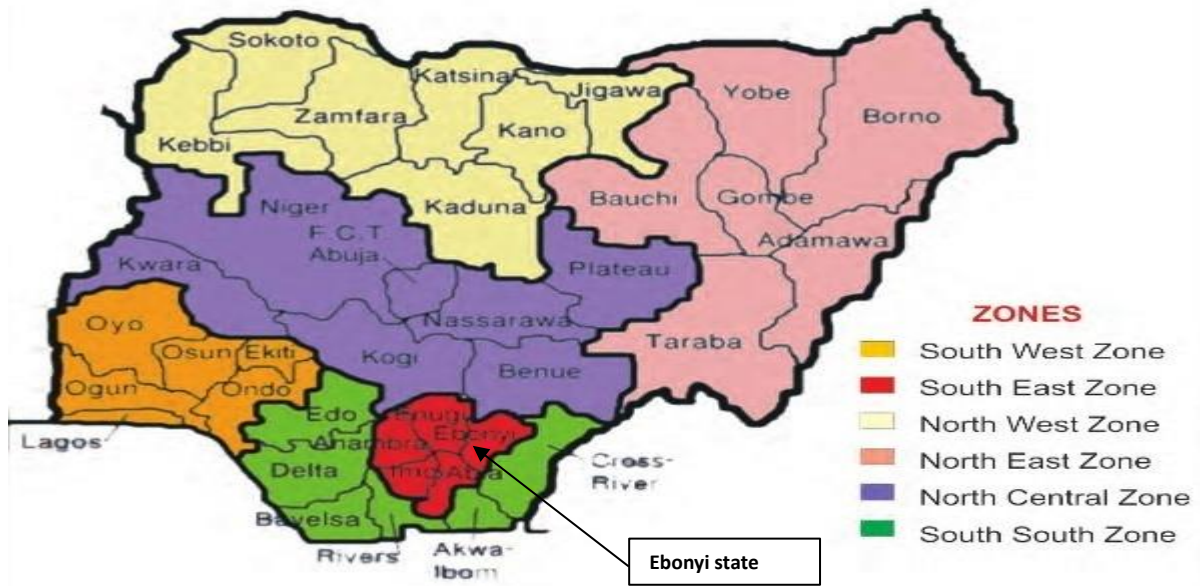
9 831 Supplementary file 3: FGD Guide\_Community Members and Health Workers  
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For peer review only



**Figure 1: Study conceptual framework**

<sup>A</sup>Measured as the proportion of participants who intended to receive covid-19 vaccination. <sup>B</sup>Measured as the time (in days) the participants, who intended to receive covid-19 vaccination, intended to take before they go and receive the COVID-19 vaccination (increase in timeliness means decrease in the intended days to vaccination). <sup>C</sup>Measured as the proportion of participants who had received covid-19 vaccination (including those who had completed the doses and those who had not). <sup>D</sup>Measured as the proportion of participants who had not received covid-19 vaccination due only to non-acceptance factor (perceptions that the vaccination was not important, vaccine was not safe, vaccine was not effective etc) rather than real or perceived non-availability (non-access) factor (ignorance of vaccination availability, long distance to place of vaccination, vaccine stock-out etc) or both. <sup>5</sup>As depicted in table 1. \*COVID-19 risk-COVID-19 vaccination benefit perception or disease risk-remedy benefit perception (DR-RB or DRRB perception)). \*\*Increase in COVID-19 risk-COVID-19 vaccination benefit perceptions score or DR-RB perception score. <sup>^</sup>Increase in COVID-19 vaccination process experience & perception score. <sup>||</sup>Among only community members. <sup>f</sup>Among only health workers. <sup>1</sup>Clinical and non-clinical. <sup>2</sup>Public and private. <sup>3</sup>Primary, secondary, and tertiary.



**Figure 2:** Map showing the study area (Ebonyi state) in the south-east geopolitical zone of Nigeria  
 (Source: National malaria strategic plan 2014–2020)



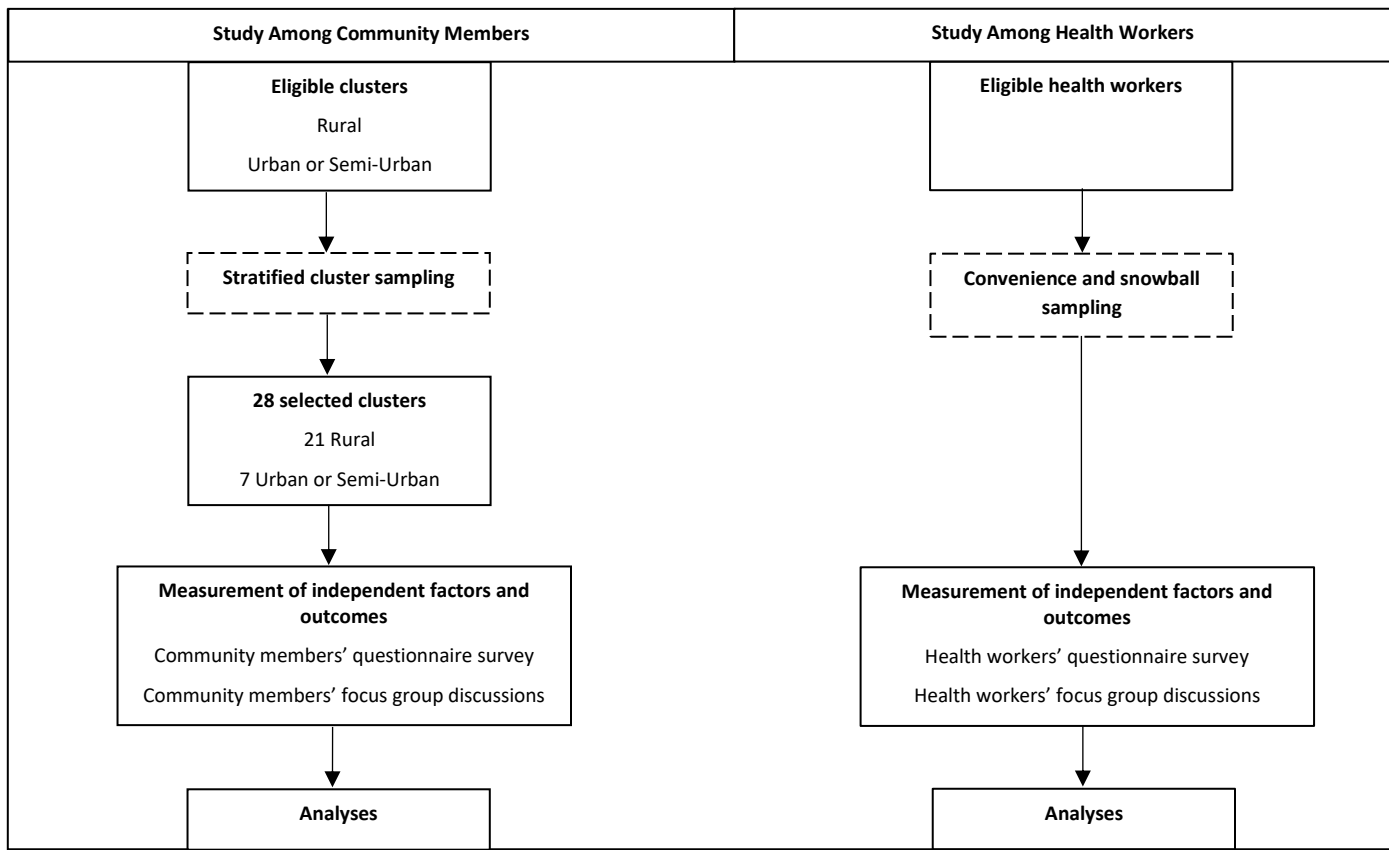


Figure 3: Summary of study profile

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## COVID-19 AND COVID-19 VACCINATION QUESTIONNAIRE FOR COMMUNITY MEMBERS

**NOTE:** Only Household Members Aged 15 years and Above Who Give Verbal Consent (or Assent) are Eligible to Participate in this Survey.

**Identification – Section 1**

1. Cluster ID Number: \_\_\_\_\_
2. Household ID Number (last 3 digits of household number): \_\_\_\_\_
3. Participant (Respondent) ID Number: \_\_\_\_\_
4. GPS
5. Date of interview (Year/Month/Day)

**Sociodemographic Characteristics – Section 2**

6. What is your Gender?
  1. Male
  2. Female
7. Age in years: How old were you during your last birthday? Number: \_\_\_\_\_
8. What is your Marital Status? **Probe:**
  1. Married
  2. Separated/Divorced
  3. Widowed
  4. Never married (Single)
9. What is your Educational Level? **Probe:**
  1. No formal education
  2. Some primary
  3. Completed primary
  4. Some secondary
  5. Completed secondary
  6. NCE/Diploma (ND, OND) (Tertiary)
  7. HND/First Degree (Tertiary)
  8. Masters/PHD/Other Equivalent (Tertiary)

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3 10. What is your Main Occupation? **NOTE: Record the most suitable option:**  
4

- 5 1. Farmer  
6 2. Trader  
7  
8 3. Other-self-employment  
9  
10 4. Private paid work  
11 5. Government paid work  
12  
13 6. Housewife  
14  
15 7. Student  
16  
17 8. Apprentice  
18  
19 9. Youth service (Corper)  
20  
21 10. None

22 11. What is your Usual Monthly Income in NGN from all sources including remittances and “pocket  
23 money” if any? **Probe:**

- |    |                       |                        |                          |
|----|-----------------------|------------------------|--------------------------|
| 24 | 25 1. No income       | 26 7. 101,000–120,000  | 27 13. 221,000–240,000   |
| 28 | 29 2. 20,000 and less | 30 8. 121,000–140,000  | 31 14. 241,000–260,000   |
| 32 | 33 3. 21,000–40,000   | 34 9. 141,000–160,000  | 35 15. 261,000–280,000   |
| 36 | 37 4. 41,000–60,000   | 38 10. 161,000–180,000 | 39 16. 281,000–300,000   |
| 40 | 41 5. 61,000–80,000   | 42 11. 181,000–200,000 | 43 17. More than 300,000 |
| 44 | 45 6. 81,000–100,000  | 46 12. 201,000–220,000 |                          |

47 **COVID-19 Vaccination Acceptance – Section 3**

48 12. Have you received COVID-19 vaccination?

- 49 1. Yes  
50 2. No

51 **NOTE: No. 13–27 is for those who have received COVID-19 vaccination:**

52 13. Which of the COVID-19 vaccination doses have you received? **Probe:**

- 53 1. First dose only  
54 2. Second dose only  
55 3. Second dose plus Booster

56 14. If no. 13 above is 1: Why have you not received the second dose of COVID-19 vaccination? **NOTE:**

57 **Multiple responses: Probe for respondent to select all that apply:**

- 58 1. No vaccine when you went (stock-out)  
59 2. No vaccinator when you went (health facility not Closed)  
60

3. Health facility was closed when you went
4. Place of vaccination was too far
5. You were too busy
6. You were ill and did not go for the remaining dose
7. You were ill, went but was not given the remaining dose
8. You had serious side effects from the first dose
9. The time for the second dose has not reached
10. Other (specify below)

15. If no. 14 above includes 10: Other reason, please specify. Phrase: \_\_\_\_\_

16. If no. 13 above is 2: Why have you not received a booster dose of COVID-19 vaccination? **NOTE:**

**Multiple responses: Probe for respondent to select all that apply:**

1. You are not aware of booster dose
2. You do not need booster dose (it is not important)
3. No vaccine when you went (stock-out)
4. No vaccinator when you went (health facility not Closed)
5. Health facility was closed when you went
6. Place of vaccination was too far
7. You were too busy
8. You were ill and did not go for the booster dose
9. You were ill, went but was not given the booster dose
10. You had serious side effects from the second dose
11. The time for a booster dose has not reached
12. Other (specify below)

17. If no. 16 above includes 12: Other reason, please specify. Phrase: \_\_\_\_\_

18. Regarding your experiences and perceptions before the day you received the first dose of COVID-19 vaccination: How often did you hear that COVID-19 vaccination was available for you to go and receive? **Probe:**

1. You heard about it many times before the day you received it
2. You heard about it few times (or once) before the day you received it
3. Not sure about it
4. You did not hear about it before the day you received it
5. You did not hear about it at all before the day you received it

19. Regarding your experiences and perceptions before the day you received the first dose of COVID-19 vaccination: Did you know any place or health facility where they gave COVID-19 vaccination? **Probe:**

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1. Yes, a place that was very close
  2. Yes, a place that was close
  3. Yes, a place that was far
  4. Yes, a place that was very far
  5. No, you did not know any place before the day you received COVID-19 vaccination

20. If no. 19 above is 1 or 2 or 3 or 4: Regarding your experiences and perceptions before the day you received the first dose of COVID-19 vaccination: How frequently were they giving COVID-19 vaccination at that place you mentioned above? **Probe:**

1. Daily or two/three times a week
2. Once a week
3. Once every two weeks/every month
4. No fixed time (not regular)
5. You did not know how frequently they were giving COVID-19 vaccination before the day you received it

21. If no. 19 above is 1 or 2 or 3 or 4: Regarding your experiences and perceptions before the day you received the first dose of COVID-19 vaccination: How was the queue (waiting time) at the place of vaccination that you mentioned above?

1. There was usually no queue (very short waiting time)
2. There was usually short queue (short waiting time)
3. You did not know what the queue (waiting time) was
4. There was usually long queue (long waiting time)
5. There was usually very long queue (very long waiting time)

22. If no. 19 above is 1 or 2 or 3 or 4: Regarding your expectations and perceptions before the day you received the first dose of COVID-19 vaccination: How caring (or kind/friendly) were the health workers at the place of vaccination that you mentioned above? **Probe:**

1. They were very caring
2. They were caring
3. Not sure whether they were caring or not
4. They were not caring
5. They were not caring at all

23. Regarding your expectations and perceptions before the day you received the first dose of COVID-19 vaccination: How important did you think it was for you to receive COVID-19 vaccination? **Probe:**

1. It was very important
2. It was important

3. Not sure whether it was important or not
4. It was not important
5. It was not important at all

24. **Regarding your expectations and perceptions before the day you received the first dose of COVID-19**

**vaccination:** How fearful were you that you might have severe or very serious side-effect if you received COVID-19 vaccination? **Probe:**

1. You were not fearful at all
2. You were not fearful
3. Not sure about it
4. You were a little fearful
5. You were very fearful

25. **Regarding your expectations and perceptions before the day you received the first dose of COVID-19**

**vaccination:** What protection did you think COVID-19 vaccination would give you if you received it?

**Probe:**

1. Full or complete protection from COVID-19
2. Partial or incomplete protection from COVID-19
3. You were not sure about it
4. No protection from COVID-19
5. No protection at all from COVID-19

26. **Regarding your expectations and perceptions before the day you received the first dose of COVID-19**

**vaccination:** How did you trust the health workers who gave COVID-19 vaccination?

1. You trusted them very much
2. You trusted them
3. Not sure about it
4. You did not trust them
5. You did not trust them at all

27. **Regarding your expectations and perceptions before the day you received the first dose of COVID-19**

**vaccination:** How did you trust the federal and state governments who made the COVID-19 vaccination available for people to receive? **Probe:**

1. You trusted them very much
2. You trusted them
3. Not sure about it
4. You did not trust them
5. You did not trust them at all

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2  
3 **NOTE: No. 28–43 is for those who have not received COVID-19 vaccination:**

4 28. Have you ever heard that COVID-19 vaccination is available for you to go and receive? **Probe:**

- 5  
6 1. Yes, you heard about it many times  
7  
8 2. Yes, you heard about it few times (or once)  
9  
10 3. Not sure  
11  
12 4. No, you have not heard about it  
13  
14 5. No, you have not heard about it at all

15 29. Do you know any place or health facility where they give COVID-19 vaccination? **Probe:**

- 16  
17 1. Yes, a place that is very close  
18  
19 2. Yes, a place that is close  
20  
21 3. Yes, a place that is far  
22  
23 4. Yes, a place that is very far  
24  
25 5. No, you do not know any place

26 30. If no. 29 above is 1 or 2 or 3 or 4: How frequently do they give COVID-19 vaccination at that place  
27 you mentioned above? **Probe:**

- 28  
29 1. Daily or two/three times a week  
30  
31 2. Once a week  
32  
33 3. Once every two weeks/every month  
34  
35 4. No fixed time (not regular)  
36  
37 5. Do not know

38 31. If no. 29 above is 1 or 2 or 3 or 4: How is the queue (waiting time) at the place of vaccination that  
39 you mentioned above? **Probe:**

- 40  
41 1. There is usually no queue (very short waiting time)  
42  
43 2. There is usually short queue (short waiting time)  
44  
45 3. Do not know  
46  
47 4. There is usually long queue (long waiting time)  
48  
49 5. There is usually very long queue (very long waiting time)

50 32. If no. 29 above is 1 or 2 or 3 or 4: How caring (or kind/friendly) are the health workers at the place  
51 of vaccination that you mentioned above? **Probe:**

- 52  
53 1. They are very caring  
54  
55 2. They are caring  
56  
57 3. You are not sure about it  
58  
59 4. They are not caring  
60  
5. They are not caring at all

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3 33. If no. 12 above is 2 & no. 7 above is  $\geq 18$ : Why have you not received COVID-19 vaccination? **NOTE:**

4  
5 **Multiple responses: Probe for respondent to select all that apply:**

- 6 1. You do not need the vaccine (it is not important)
- 7
- 8 2. You think the vaccine is not safe (you think it is harmful)
- 9
- 10 3. You think the vaccine is not effective
- 11
- 12 4. You have been hearing bad stories about the vaccine
- 13
- 14 5. The vaccine is new and/or you want others to take it first
- 15
- 16 6. You do not know the place and/or time of vaccination
- 17
- 18 7. Place of vaccination is too far
- 19
- 20 8. You have been too busy
- 21
- 22 9. You have been ill and did not go for vaccination
- 23
- 24 10. You have been ill, went but was not given vaccination
- 25
- 26 11. Long waiting time (long queue)
- 27
- 28 12. No vaccine (stock-out) when you went
- 29
- 30 13. No vaccinator (health facility not closed) when you went
- 31
- 32 14. Health facility was closed when you went
- 33
- 34 15. You are not aware of it
- 35
- 36 16. Other (specify below)

37 34. If no. 33 above includes 16: Other reason, please specify. Phrase: \_\_\_\_\_

38 35. How important is it for you to receive COVID-19 vaccination? **Probe:**

- 39 1. Very important for me to receive it
- 40
- 41 2. Important for me to receive it
- 42
- 43 3. Not sure about it
- 44
- 45 4. Not important for me to receive it
- 46
- 47 5. Not important at all for me to receive it

48 36. How fearful are you that you may have severe or very serious side-effect if you receive COVID-19 vaccination? **Probe:**

- 49 1. Not fearful at all
- 50
- 51 2. Not fearful
- 52
- 53 3. Not sure about it
- 54
- 55 4. A little fearful
- 56
- 57 5. Very fearful

58 37. What protection will COVID-19 vaccination give you if you receive it? **Probe:**

- 59 1. Full or complete protection from COVID-19
- 60



1  
2  
3 2. Partial or incomplete protection from COVID-19

4  
5 3. Not sure about it

6  
7 4. No protection from COVID-19

8  
9 5. No protection at all from COVID-19

10 38. How do you trust the health workers who give COVID-19 vaccination? **Probe:**

11  
12 1. You trust them very much

13  
14 2. You trust them

15  
16 3. Not sure about it

17  
18 4. You do not trust them

19  
20 5. You do not trust them at all

21 39. How do you trust the federal and state governments who made the COVID-19 vaccination  
22 available for people to receive? **Probe:**

23  
24 1. You trust them very much

25  
26 2. You trust them

27  
28 3. Not sure about it

29  
30 4. You do not trust them

31  
32 5. You do not trust them at all

33 40. Do you intend (or plan) to receive COVID-19 vaccination that is available for you to receive?

34 **Probe:**

35  
36 1. Yes, you will surely go and receive the vaccination

37  
38 2. Yes, you think you will go and receive the vaccination

39  
40 3. Not sure about it

41  
42 4. No, you think you will not go and receive the vaccination

43  
44 5. No, you will surely not go and receive the vaccination

45 **NOTE: If 3 or 4 or 5: Skip to no. 35**

46 41. If no. 40 above is 1 or 2: How long will it take before you go and receive the COVID-19 vaccination?

47 Number (in days): \_\_\_\_\_ **NOTE: Record Response in DAYS (Convert Weeks, Months, and Years to**

48 **DAYS). NOTE: Record "2000" for "do not know"**

49  
50  
51 42. If no. 40 above is 3 or 4 or 5: What is/are the reasons why you do not intend (or plan) to receive  
52 COVID-19 vaccination or are not sure about it? **NOTE: Multiple responses: Probe for respondent to select**

53  
54 **all that apply:**

55  
56 1. You do not need the vaccine (it is not important)

57  
58 2. You think the vaccine is not safe (I think it is harmful)

59  
60 3. You think the vaccine is not effective

4. You have been hearing bad stories about the vaccine
5. The vaccine is new and/or I want others to take it first
6. You do not know the place and/or time of vaccination
7. Place of vaccination is too far
8. Other reason (specify below)

43. If no. 42 above includes 8: Other reason, please specify. Phrase: \_\_\_\_\_

**NOTE: No. 44–51 is for all**

44. Do you have a child or children? 1=Yes 2=No. If 2: Skip to 52

45. How important is it for your child or children to receive COVID-19 vaccination if it is available for them to receive? **Probe:**

1. Very important for them to receive it
2. Important for them to receive it
3. Not sure about it
4. Not important for them to receive it
5. Not important at all for them to receive it

46. How fearful are you that your child/children may have severe or very serious side-effect if they receive COVID-19 vaccination that is available for them to receive? **Probe:**

1. Not fearful at all
2. Not fearful
3. Not sure about it
4. A little fearful
5. Very fearful

47. What protection will COVID-19 vaccination give your child or children if they receive the one that is available for them to receive? **Probe:**

1. It will give them full or complete protection from COVID-19
2. It will give them partial or incomplete protection from COVID-19
3. Not sure about it
4. It will give them no protection from COVID-19
5. It will give them no protection at all from COVID-19

48. Do you intend (or plan) for your child or children to receive COVID-19 vaccination if it is available for them to receive at [NAME OF CATCHMENT HEALTH FACILITY]?

1. Yes, you will surely take your child or children to receive the vaccination

2. Yes, you think you will take your child or children to receive the vaccination
3. Not sure about it
4. No, you think you will not take your child or children to receive the vaccination
5. No, you will surely not take your child or children to receive the vaccination

**NOTE: If 3 or 4 or 5: Skip to 50**

49. If no. 48 above is 1 or 2: How long will it take before you take your child or children to receive the COVID-19 vaccination if it is available for them to receive at [NAME OF CATCHMENT HEALTH FACILITY]? Number (in days): \_\_\_\_\_ **NOTE: Record Response in DAYS (Convert Weeks, Months, and Years to DAYS)**

50. If no. 48 above is 3 or 4 or 5: What is/are the reasons why you do not intend (or plan) for your child or children to receive the COVID-19 vaccination if it is available for them to receive at [NAME OF CATCHMENT HEALTH FACILITY] or are not sure about it? **NOTE: Multiple responses: Probe for respondent to select all that apply:**

1. The child/children do not need the vaccine (it is not important)
2. You think the vaccine is not safe (I think it is harmful)
3. You think the vaccine is not effective
4. You have been hearing bad stories about the vaccine
5. The vaccine is new and/or You want others to take it first
6. Other reason (specify below)

51. If no. 49 above includes 6: Other reason, please specify. Phrase: \_\_\_\_\_

#### COVID-19 Experiences and Perceptions – Section 4

**NOTE: No. 52–63 is for those who have received COVID-19 vaccination:**

52. Regarding your experiences and perceptions before the day you received the first dose of COVID-19 vaccination: How fearful were you about getting COVID-19? **Probe:**

1. You were very fearful
2. You were a little fearful
3. Not sure about it
4. You were not fearful
5. You were not fearful at all

53. Regarding your experiences and perceptions before the day you received the first dose of COVID-19 vaccination: Was it possible for someone like you to get COVID-19? **Probe:**

1. It was highly possible

2. It was a bit possible
3. Not sure about it
4. It was not possible
5. It was not possible at all

54. Regarding your experiences and perceptions before the day you received the first dose of COVID-19

vaccination: Was it possible for someone like you to get severe or very serious COVID-19? **Probe:**

1. It was highly possible
2. It was a bit possible
3. Not sure about it
4. It was not possible
5. It was not possible at all

55. Regarding your experiences and perceptions before the day you received the first dose of COVID-19

vaccination: Did you ever have COVID-19 before you received the vaccination? **Probe:**

1. Yes, you were sure
2. Yes, you thought so
3. Not sure about it
4. No, you thought so
5. No, you were sure

56. If no. 55 above is 1 or 2: Regarding your experiences and perceptions before the day you received the

first dose of COVID-19 vaccination: Did you ever have severe or very serious COVID-19 before you received the vaccination? **Probe:**

1. Yes, it was very serious
2. Yes, it was a bit serious
3. Not sure about it
4. No, it was not serious
5. No, it was not serious at all

57. Regarding your experiences and perceptions before the day you received the first dose of COVID-19

vaccination: Did you know any person who had COVID-19 before you received the vaccination?

**Probe:**

1. Yes, you knew a very close person
2. Yes, you knew a close person
3. Yes, you only knew a distant person
4. Yes, you only knew a very distant person
5. No, you did not know any person

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58. If no. 57 above is 1 or 2 or 3 or 4: Regarding your experiences and perceptions before the day you received the first dose of COVID-19 vaccination: Did you know any person who had severe or very serious COVID-19 before you received the vaccination? **Probe:**

1. Yes, you knew a very close person
2. Yes, you knew a close person
3. Yes, you only knew a distant person
4. Yes, you only knew a very distant person
5. No, you did not know any person

59. If no. 57 above is 1 or 2 or 3 or 4: Regarding your experiences and perceptions before the day you received the COVID-19 vaccination: Did you know any person who died from COVID-19 before you received the vaccination? **Probe:**

1. Yes, you knew a very close person
2. Yes, you knew a close person
3. Yes, you only knew a distant person
4. Yes, you only knew a very distant person
5. No, you did not know any person

60. Regarding your experiences and perceptions before the day you received the first dose of COVID-19 vaccination: What were your sources of information about COVID-19? **NOTE: Multiple responses: Probe for respondent to select all that apply:**

1. Family members/Relatives/Friends
  2. Health care providers/Health workers
  3. Television
  4. Radio
  5. Prints (Newspaper/Magazine)
  6. WhatsApp
  7. Facebook
  8. Internet sites
  9. Bulk SMS/Text messages (e.g from Nigerian CDC, NPHCDA, Bank etc)
  10. Workplace (Place of work)
  11. Place of worship/Religious forums
  12. Other (specify below)
- } Interpersonal
- } Traditional media
- } Internet and social media
- } Internet, social media, & SMS
- } Interpersonal

61. If no. 60 above includes 12: Please specify the other source. Word or Phrase: \_\_\_\_\_

62. If more than one sources given in no. 60 above: Which of the sources was your main source? **NOTE: Probe: Select the one mentioned: 1–12 above**

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3 63. If more than one sources given in no. 60 above: Which of the sources did you trust most? **NOTE:**

4  
5 **Probe:** Select the one mentioned: 1–12 above

6  
7  
8 **NOTE: No. 64–75 is for those who have not received COVID-19 vaccination:**

9  
10 64. How fearful are you about getting COVID-19? **Probe:**

- 11 1. Very fearful
- 12 2. A little fearful
- 13 3. Not sure about it
- 14 4. Not fearful
- 15 5. Not fearful at all

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20 65. Is it possible for someone like you to get COVID-19? **Probe:**

- 21 1. Highly possible
- 22 2. A bit possible
- 23 3. Not sure about it
- 24 4. Not possible
- 25 5. Not possible at all

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29  
30 66. Is it possible for someone like you to get severe or very serious COVID-19? **Probe:**

- 31 1. Highly possible
- 32 2. A bit possible
- 33 3. Not sure about it
- 34 4. Not possible
- 35 5. Not possible at all

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40 67. Have you ever had COVID-19? **Probe:**

- 41 1. Yes, you are sure
- 42 2. Yes, you think so
- 43 3. Not sure about it
- 44 4. No, you think so
- 45 5. No, you are sure

46  
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48  
49  
50 68. If no 67 above is 1 or 2: Have you ever had severe or very serious COVID-19? **Probe:**

- 51 1. Yes, it was very serious
- 52 2. Yes, it was a bit serious
- 53 3. Not sure about it
- 54 4. No, it was not serious
- 55 5. No, it was not serious at all

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3 69. Do you know any person who have had COVID-19? **Probe:**

- 4  
5 1. Yes, you know a very close person  
6 2. Yes, you know a close person  
7 3. Yes, you only know a distant person  
8 4. Yes, you only know a very distant person  
9 5. No, you do not know any person

10  
11  
12  
13 70. If no. 69 above is 1 or 2 or 3 or 4: Do you know any person who have had severe or very serious  
14 COVID-19? **Probe:**

- 15  
16 1. Yes, you know a very close person  
17 2. Yes, you know a close person  
18 3. Yes, you only know a distant person  
19 4. Yes, you only know a very distant person  
20 5. No, you do not know any person

21  
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24  
25 71. If no. 69 above is 1 or 2 or 3 or 4: Do you know any person who have died from COVID-19? **Probe:**

- 26  
27 1. Yes, you know a very close person  
28 2. Yes, you know a close person  
29 3. Yes, you only know a distant person  
30 4. Yes, you only know a very distant person  
31 5. No, you do not know any person

32  
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34  
35 72. What are your sources of information about COVID-19? **NOTE: Multiple responses: Probe for**  
36 **respondent to select all that apply:**

- 37  
38 1. Family members/Relatives/Friends  
39 2. Health care providers/Health workers } Interpersonal  
40 3. Television  
41 4. Radio  
42 5. Prints (Newspaper/Magazine) } Traditional media  
43 6. WhatsApp  
44 7. Facebook } Internet and social media  
45 8. Internet sites } Internet, social media, & SMS  
46 9. Bulk SMS/Text messages (e.g from Nigerian CDC, NPHCDA, Bank etc)  
47 10. Workplace (Place of work)  
48 11. Place of worship/Religious forums } Interpersonal  
49 12. Other (specify below)

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59 73. If no. 72 above includes 12: Please specify the other source. Word or Phrase: \_\_\_\_\_  
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3 74. If more than one sources given in no. 72 above: Which of the sources is your main source? **NOTE:**

4  
5 **Probe: Select the one mentioned: 1–12 above**

6  
7 75. If more than one sources given in no. 72 above: Which of the sources do you trust most? **NOTE:**

8  
9 **Probe: Select the one mentioned: 1–12 above**

10  
11  
12  
13 **Basic Knowledge of COVID-19 – Section 5**

14  
15 76. What is COVID-19? **Probe:**

- 16  
17 1. A new disease (caused by a new micro-organism)
- 18 2. An old disease (caused by an old micro-organism)
- 19  
20 99. Do not know

21  
22 77. How do people get COVID-19? **Probe:**

- 23  
24 1. By staying close to infected persons when they cough or sneezes
- 25 2. From bat
- 26 3. From rat
- 27 4. From spiritual attack
- 28 5. Other (specify below)
- 29  
30 99. Do not know

31  
32 78. If no. 77 above is 5: Please specify how people get COVID-19. Word or Phrase: \_\_\_\_\_

33  
34 79. When somebody gets COVID-19, how long does it usually take before the person starts to show  
35 symptoms? **Probe:**

- 36  
37 1. 2–14 days (within 2 weeks)
- 38 2. 2–4 weeks
- 39 3. >4 weeks
- 40  
41 99. Do not know

42  
43 80. What are the symptoms of COVID-19 (symptoms that someone with COVID-19 can have)? **NOTE:**

44  
45 **Multiple responses: Probe for respondent to select all that apply:**

- 46  
47 1. Fever
- 48 2. Cough
- 49 3. Tiredness
- 50 4. Body aches and pains
- 51 5. Sore throat
- 52 6. Difficulty breathing or shortness of breath
- 53 7. Chest pain
- 54  
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- 3 8. Headache
- 4
- 5 9. Loss of taste or smell
- 6
- 7 10. Diarrhoea
- 8
- 9 11. Nausea or vomiting
- 10
- 11 12. other (specify below)
- 12
- 13 99. Do not know

14 **81. If no. 80 above includes 12:** Please specify the other symptom. Word or Phrase:\_\_\_\_\_

15 **82. Can people also have COVID-19 without showing any symptoms?**

- 16 1. Yes
- 17
- 18 2. No
- 19
- 20 99. Do Not Know
- 21
- 22

23 **83. Who are more at risk of having severe COVID-19? NOTE: Multiple responses: Probe for respondent**

24 **to select all that apply:**

- 25 1. Children
- 26
- 27 2. Younger adults
- 28
- 29 3. Elderly people
- 30
- 31 4. Slim people
- 32
- 33 5. Obese people
- 34
- 35 6. People with chronic illness
- 36
- 37 7. People who smoke
- 38
- 39 8. Pregnant women
- 40
- 41 99. Do not know

42 **84. Is there a laboratory test to diagnose COVID-19?**

- 43 1. Yes
- 44
- 45 2. No
- 46
- 47 99. Do not know. **If 2 OR 99: Skip to 87**

48 **85. If no. 84 above is 1:** Where is laboratory test to diagnose COVID-19 done in Ebonyi state? **NOTE:**

49 **Multiple responses: Probe for respondent to select all that apply:**

- 50
- 51 1. AEFUTHA
- 52
- 53 2. General hospitals
- 54
- 55 3. PHC centres
- 56
- 57 4. Missionary hospitals
- 58
- 59 5. Private hospitals
- 60
- 60 6. Private laboratory

1  
2  
3 7. Other (specify below)

4  
5 99. Do not know

6  
7 86. If no. 85 above includes 7: Please specify the other place lab test for COVID-19 is done in Ebonyi  
8 state. Word or Phrase: \_\_\_\_\_

9  
10 87. Are there treatments for COVID-19?

11 1. Yes

12 2. No

13 99. Do Not Know

14  
15 88. Are there vaccines for COVID-19?

16 1. Yes

17 2. No

18 99. Do Not Know

19  
20 89. If no. 88 above is 1: Do you know any place where one can go and receive COVID-19 vaccination in  
21 Ebonyi state?

22 1. Yes

23 2. No

24  
25 90. What are the ways to avoid/prevent getting COVID-19? **NOTE: Multiple responses: Probe for**  
26 **respondent to select all that apply:**

27 1. Avoiding crowd (large group of people)

28 2. Maintaining at least 1–2 metre distance away from people coughing or sneezing

29 3. Wearing of face mask in public places (especially indoor public places)

30 4. Frequent hands washing with soap and water

31 5. Frequent hand cleaning with alcoholic sanitisers

32 6. Avoiding touching of face (eyes, nose, & mouth) when one is in public places

33 7. COVID-19 vaccination

34 8. Taking chloroquine

35 9. Use of herbs or roots (“Agbo”)

36 10. Use of ginger or garlic

37 11. Taking hot drinks or “ogogoro”

38 12. Other (specify below)

39 99. Do Not Know

40  
41 91. If no. 90 above includes 12: Please specify other way to avoid getting COVID-19. Word or Phrase: \_\_\_\_\_

## Attitude Towards COVID-19 and COVID-19 Vaccination – Section 6

**NOTE: Tell the respondents you will make statements and for each statement, they should: Strongly Disagree, Disagree, Say if they are Not Sure/Do Not Know, Agree, or Strongly Agree.**

92. COVID-19 is real. **Probe:**

1. Strongly Disagree
2. Disagree
3. Not Sure
4. Agree
5. Strongly Agree

93. COVID-19 a serious illness that can kill.

94. Everybody is susceptible to COVID-19 infection (it is possible for anybody to get COVID-19).

95. The risk of getting COVID-19 can be reduced by avoiding crowd (large group of people).

96. The risk of getting COVID-19 can be reduced by maintaining at least 1–2 metre distance away from people coughing or sneezing

97. The risk of getting COVID-19 can be reduced if everybody covers the mouth and nose (with handkerchief or bent elbow) when coughing or sneezing

98. The risk of getting COVID-19 can be reduced by wearing face mask when going out to public places (especially indoor public places).

99. The risk of getting COVID-19 can be reduced by washing hands with soap and water frequently (e.g before touching the face, before eating).

100. The risk of getting COVID-19 can be reduced by cleaning hands with alcoholic sanitisers frequently.

101. Chloroquine is an effective treatment (prevention) for COVID-19.

102. Herbs and roots (“Agbo”) are effective treatments (prevention) for COVID-19.

103. Ginger and garlic are effective treatments (prevention) for COVID-19.

104. Hot drinks or “ogogoro” are effective treatments (prevention) for COVID-19

105. COVID-19 vaccines are safe for people to receive

106. The risk of COVID-19 can be reduced by receiving COVID-19 vaccination

107. Everybody should receive COVID-19 vaccination that is recommended by the government

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### Practices about COVID-19 – Section 7

108. Since the COVID-19 pandemic started spreading in Ebonyi state (since 2020 till now), which of the following have you Ever Practiced because you wanted to Avoid or Prevent transmission of

COVID-19? **NOTE: Multiple responses: Probe for respondent to select all that apply:**

1. Avoiding crowd (large group of people)
2. Maintaining at least 1–2 metre distance away from people coughing or sneezing
3. Wearing of a face mask when going out to public places (especially indoor public places)
4. Frequent hand washing with soap and water
5. Frequent hand cleaning with alcoholic sanitisers
6. Avoiding touching your face (eyes, nose, mouth) when you are in public places
7. Covering your mouth and nose (with handkerchief or your bent elbow) when coughing or sneezing
8. Use of bleach/Jik or spirit/alcohol to clean surfaces that people touch frequently such as door handles, table tops etc
9. None of the above was ever practiced

109. Among those that you have ever practiced, which ones have you Been Practicing in the Last Two Weeks because you want to Avoid or Prevent transmission of COVID-19? **NOTE: Multiple**

**responses: Probe for respondent to select all that apply:**

1. Avoiding crowd (large group of people)
2. Maintaining at least 1–2 metre distance away from people coughing or sneezing
3. Wearing of a face mask when going out to public places (especially indoor public places)
4. Frequent hand washing with soap and water
5. Frequent hand cleaning with alcoholic sanitisers
6. Avoiding touching your face (eyes, nose, mouth) when you are in public places
7. Covering your mouth and nose (with handkerchief or your bent elbow) when coughing or sneezing
8. Use of bleach/Jik or spirit/alcohol to clean surfaces that people touch frequently such as door handles, table tops etc
9. None of the above was practiced in the last two weeks

110. Since the COVID-19 pandemic started spreading in Ebonyi state (since 2020 till now), which of the following have you Ever Practiced because you wanted to Treat or Prevent COVID-19? **NOTE:**

**Multiple responses: Probe for respondent to select all that apply:**

1. Taking chloroquine
2. Using herbs or roots (“Agbo”)

3. Using ginger or garlic
4. Using hot drinks or “ogogoro”
5. None of the above was ever practiced

111. Among those that you have ever practiced, which ones have you Been Practicing in the Last Two Weeks because you want to Treat or Prevent COVID-19? **NOTE: Multiple responses: Probe for respondent to select all that apply:**

1. Taking chloroquine
2. Using herbs or roots (“Agbo”)
3. Using ginger or garlic
4. Using hot drinks or “ogogoro”
5. None of the above was practiced in the last two weeks

## COVID-19 AND COVID-19 VACCINATION QUESTIONNAIRE FOR HEALTH WORKERS

**NOTE: All health workers (both clinical and non-clinical) working or living in Eboni state who give consent are eligible to participate in this survey.**

**Sociodemographic Characteristics**

1. What is your Gender?

1. Male
2. Female

2. Age in years: How old were you during your last birthday? Number: \_\_\_\_\_

3. What is your Marital Status?

1. Married
2. Separated/Divorced
3. Widowed
4. Never married (Single)

4. What is your Educational Level?

1. No formal education
2. Some primary
3. Completed primary
4. Some secondary
5. Completed secondary
6. NCE/Diploma (ND, OND) (Tertiary)
7. HND/First Degree (Tertiary)
8. Masters/PHD/Other Equivalent (Tertiary)

5. What is your Category or Cadre?

1. non-Clinical staff
2. PMV
3. Health attendant
4. JCHEW
5. CHEW
6. CHO
7. Nurse/Midwife
8. Medical laboratory technologist

- 1
- 2
- 3 9. Medical laboratory scientist
- 4
- 5 10. Pharmacy technician
- 6
- 7 11. Pharmacist
- 8
- 9 12. House officer
- 10
- 11 13. Medical officer
- 12
- 13 14. Medical doctor in specialist training (Resident doctor)
- 14
- 15 15. Specialist medical doctor (Fellow)
- 16
- 17 16. Other (specify below)

18  
19 6. If no. 5 above is 16: Please specify your Category or Cadre. Word or Phrase: \_\_\_\_\_

20  
21 7. How many years of working experience do you have? NOTE: Use "0" for less than one year. Number: \_\_\_\_\_

22  
23 8. Where is your current primary place of work?

- 24 1. PMV
- 25 2. PHC centre
- 26 3. Private laboratory
- 27 4. Private pharmacy
- 28 5. Private hospital/clinic
- 29 6. Missionary hospital
- 30 7. General hospital
- 31 8. NOFIC
- 32 9. AEFUTHA
- 33 10. Other (specify below)

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38  
39 9. If no. 8 above is 10: Please specify your current primary place of work. Word or Phrase: \_\_\_\_\_

#### 40 41 42 43 **COVID-19 Vaccination Acceptance**

44  
45 10. Have you received COVID-19 vaccination?

- 46 1. Yes
- 47 2. No

48  
49  
50  
51 **NOTE: No. 11–25 is for those who have received COVID-19 vaccination:**

52 11. Which of the COVID-19 vaccination doses have you received?

- 53 1. First dose only
- 54 2. Second dose only
- 55 3. Second dose plus Booster

56  
57  
58  
59 12. If no. 11 above is 1: Why have you not received the second dose of COVID-19 vaccination?

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2  
3 **NOTE: select all that apply:**  
4

- 5 1. No vaccine when you went (stock-out)
- 6 2. No vaccinator when you went (health facility not Closed)
- 7 3. Health facility was closed when you went
- 8 4. Place of vaccination was too far
- 9 5. You were too busy
- 10 6. You were ill and did not go for the remaining dose
- 11 7. You were ill, went but was not given the remaining dose
- 12 8. You had serious side effects from the first dose
- 13 9. The time for the second dose has not reached
- 14 10. Other (specify below)

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21 13. If no. 12 above includes 10: Other reason, please specify. Phrase: \_\_\_\_\_  
22

23  
24 14. If no. 11 above is 2: Why have you not received a booster dose of COVID-19 vaccination?  
25

26 **NOTE: select all that apply:**

- 27 1. You are not aware of booster dose
- 28 2. You do not need booster dose (it is not important)
- 29 3. No vaccine when you went (stock-out)
- 30 4. No vaccinator when you went (health facility not Closed)
- 31 5. Health facility was closed when you went
- 32 6. Place of vaccination was too far
- 33 7. You were too busy
- 34 8. You were ill and did not go for the booster dose
- 35 9. You were ill, went but was not given the booster dose
- 36 10. You had serious side effects from the second dose
- 37 11. The time for a booster dose has not reached
- 38 12. Other (specify below)

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47 15. If no. 14 above includes 12: Other reason, please specify. Phrase: \_\_\_\_\_  
48

49  
50  
51 **NOTE: No. 16–25 is about your experiences and perceptions before the day you received the first dose of**  
52 **COVID-19 vaccination:**

53  
54 16. How often did you hear that COVID-19 vaccination was available for you to go and receive?

- 55 1. You heard about it many times before the day you received it
- 56 2. You heard about it few times (or once) before the day you received it
- 57 3. Not sure



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  - 60
4. You did not hear about it before the day you received it
  5. You did not hear about it at all before the day you received it

17. Did you know any place or health facility where they gave COVID-19 vaccination?

1. Yes, a place that was very close
2. Yes, a place that was close
3. Yes, a place that was far
4. Yes, a place that was too far
5. No, you did not know any place before the day you received COVID-19 vaccination

18. If no. 17 above is 1 or 2 or 3 or 4: How frequently were they giving COVID-19 vaccination at that place you mentioned above?

1. Daily or two/three times a week
2. Once a week
3. Once every two weeks/every month
4. No fixed time (not regular)
5. You did not know how frequently they were giving COVID-19 vaccination before the day you received it

19. If no. 17 above is 1 or 2 or 3 or 4: How was the queue (waiting time) at the place of vaccination that you mentioned above?

1. There was usually no queue (very short waiting time)
2. There was usually short queue (short waiting time)
3. You did not know what the queue (waiting time) was
4. There was usually long queue (long waiting time)
5. There was usually very long queue (very long waiting time)

20. If no. 17 above is 1 or 2 or 3 or 4: How caring (or kind/friendly) were the health workers at the place of vaccination that you mentioned above?

1. They were very caring
2. They were caring
3. Not sure whether they were caring or not
4. They were not caring
5. They were not caring at all

21. How important did you think it was for you to receive COVID-19 vaccination?

1. It was very important
2. It was important

3. Not sure whether it was important or not
4. It was not important
5. It was not important at all

22. How fearful were you that you might have severe or very serious side-effect if you received COVID-19 vaccination?

1. You were not fearful at all
2. You were not fearful
3. Not sure about it
4. You were a little fearful
5. You were very fearful

23. What protection did you think COVID-19 vaccination would give you if you received it?

1. Full or complete protection from COVID-19
2. Partial or incomplete protection from COVID-19
3. You were not sure about it
4. No protection from COVID-19
5. No protection at all from COVID-19

24. How did you trust the health workers who gave COVID-19 vaccination?

1. You trusted them very much
2. You trusted them
3. Not sure about it
4. You did not trust them
5. You did not trust them at all

25. How did you trust the federal and state governments who made the COVID-19 vaccination available for people to receive?

1. You trusted them very much
2. You trusted them
3. Not sure about it
4. You did not trust them
5. You did not trust them at all

**NOTE: No. 26–41 is for those who have not received COVID-19 vaccination:**

26. Have you ever heard that COVID-19 vaccination is available for you to go and receive?

1. Yes, you heard about it many times
2. Yes, you heard about it few times (or once)

3. Not sure
4. No, you have not heard about it
5. No, you have not heard about it at all

27. Do you know any place or health facility where they give COVID-19 vaccination?

1. Yes, a place that is very close
2. Yes, a place that is close
3. Yes, a place that is far
4. Yes, a place that is very far
5. No, you do not know any place

28. If no. 27 above is 1 or 2 or 3 or 4: How frequently do they give COVID-19 vaccination at that place you mentioned above?

1. Daily or two/three times a week
2. Once a week
3. Once every two weeks/every month
4. No fixed time (not regular)
5. Do not know

29. If no. 27 above is 1 or 2 or 3 or 4: How is the queue (waiting time) at the place of vaccination that you mentioned above?

1. There is usually no queue (very short waiting time)
2. There is usually short queue (short waiting time)
3. Do not know
4. There is usually long queue (long waiting time)
5. There is usually very long queue (very long waiting time)

30. If no. 27 above is 1 or 2 or 3 or 4: How caring (or kind/friendly) are the health workers at the place of vaccination that you mentioned above?

1. They are very caring
2. They are caring
3. You are not sure about it
4. They are not caring
5. They are not caring at all

31. If no. 10 above is 2 & no. 2 above is  $\geq 18$ : Why have you not received COVID-19 vaccination? **NOTE:**

Select all that apply:

1. You do not need the vaccine (it is not important)
2. You think the vaccine is not safe (you think it is harmful)

3. You think the vaccine is not effective
4. You have been hearing bad stories about the vaccine
5. The vaccine is new and/or you want others to take it first
6. You do not know the place and/or time of vaccination
7. Place of vaccination is too far
8. You have been too busy
9. You have been ill and did not go for vaccination
10. You have been ill, went but was not given vaccination
11. Long waiting time (long queue)
12. No vaccine (stock-out) when you went
13. No vaccinator (health facility not Closed) when you went
14. Health facility was closed when you went
15. You are not aware of it
16. Other (specify below)

32. If no. 31 above includes 16: Other reason, please specify. Phrase: \_\_\_\_\_

33. How important is it for you to receive COVID-19 vaccination?

1. Very important for me to receive it
2. Important for me to receive it
3. Not sure about it
4. Not important for me to receive it
5. Not important at all for me to receive it

34. How fearful are you that you may have severe or very serious side-effect if you receive COVID-19 vaccination?

1. Not fearful at all
2. Not fearful
3. Not sure about it
4. A little fearful
5. Very fearful

35. What protection will COVID-19 vaccination give you if you receive it?

1. Full or complete protection from COVID-19
2. Partial or incomplete protection from COVID-19
3. Not sure about it
4. No protection from COVID-19
5. No protection at all from COVID-19

1  
2  
3 36. How do you trust the health workers who give COVID-19 vaccination?  
4

- 5 1. You trust them very much  
6 2. You trust them  
7  
8 3. Not sure about it  
9  
10 4. You do not trust them  
11  
12 5. You do not trust them at all

13 37. How do you trust the federal and state governments who made the COVID-19 vaccination  
14 available for people to receive?  
15

- 16 1. You trust them very much  
17 2. You trust them  
18  
19 3. Not sure about it  
20  
21 4. You do not trust them  
22  
23 5. You do not trust them at all  
24

25 38. Do you intend (or plan) to receive COVID-19 vaccination that is available for you to receive?  
26

- 27 1. Yes, you will surely go and receive the vaccination  
28  
29 2. Yes, you think you will go and receive the vaccination  
30  
31 3. Not sure about it  
32  
33 4. No, you think you will not go and receive the vaccination  
34  
35 5. No, you will surely not go and receive the vaccination

36 **NOTE: If 3 or 4 or 5: Skip to no. 40**

37 39. If no. 38 above is 1 or 2: How many DAYS or WEEKS or MONTHS or YEARS will it take before you go  
38 and receive the COVID-19 vaccination? Number plus Word: \_\_\_\_\_  
39

40 40. If no. 38 above is 3 or 4 or 5: What is/are the reasons why you do not intend (or plan) to receive  
41 COVID-19 vaccination? **NOTE: Select all that apply:**  
42

- 43 1. You do not need the vaccine (it is not important)  
44  
45 2. You think the vaccine is not safe (I think it is harmful)  
46  
47 3. You think the vaccine is not effective  
48  
49 4. You have been hearing bad stories about the vaccine  
50  
51 5. The vaccine is new and/or I want others to take it first  
52  
53 6. You do not know the place and/or time of vaccination  
54  
55 7. Place of vaccination is too far  
56  
57 8. Other reason (specify below)

58 41. If no. 40 above includes 8: Other reason, please specify. Phrase: \_\_\_\_\_  
59  
60

## COVID-19 Experiences and Perceptions

NOTE: No. 42–53 is for those who have received COVID-19 vaccination:

NOTE: No. 42–53 is about your experiences and perceptions before the day you received the first dose of COVID-19 vaccination:

42. How fearful were you about getting COVID-19?

1. You were very fearful
2. You were a little fearful
3. Not sure about it
4. You were not fearful
5. You were not fearful at all

43. Was it possible for someone like you to get COVID-19?

1. It was highly possible
2. It was a bit possible
3. Not sure about it
4. It was not possible
5. It was not possible at all

44. Was it possible for someone like you to get severe or very serious COVID-19?

1. It was highly possible
2. It was a bit possible
3. Not sure about it
4. It was not possible
5. It was not possible at all

45. Did you ever have COVID-19 before you received the vaccination?

1. Yes, you were sure
2. Yes, you thought so
3. Not sure about it
4. No, you thought so
5. No, you were sure

46. If no. 45 above is 1 or 2: Did you ever have severe or very serious COVID-19 before you received the vaccination?

1. Yes, it was very serious
2. Yes, it was a bit serious
3. Not sure about it
4. No, it was not serious

1  
2  
3 5. No, it was not serious at all  
4

5 47. Did you know any person who had COVID-19 before you received the vaccination?  
6

- 7 1. Yes, you knew a very close person  
8  
9 2. Yes, you knew a close person  
10  
11 3. Yes, you only knew a distant person  
12  
13 4. Yes, you only knew a very distant person  
14  
15 5. No, you did not know any person

16 48. If no. 47 above is 1 or 2 or 3 or 4: Did you know any person who had severe or very serious COVID-  
17 19 before you received the vaccination?  
18

- 19 1. Yes, you knew a very close person  
20  
21 2. Yes, you knew a close person  
22  
23 3. Yes, you only knew a distant person  
24  
25 4. Yes, you only knew a very distant person  
26  
27 5. No, you did not know any person

28 49. If no. 47 above is 1 or 2 or 3 or 4: Did you know any person who died from COVID-19 before you  
29 received the vaccination?  
30

- 31 1. Yes, you knew a very close person  
32  
33 2. Yes, you knew a close person  
34  
35 3. Yes, you only knew a distant person  
36  
37 4. Yes, you only knew a very distant person  
38  
39 5. No, you did not know any person

40 50. What were your sources of information about COVID-19? **NOTE: Select all that apply:**

- 41 1. Family members/Relatives/Friends  
42 2. Other health workers } Interpersonal  
43  
44 3. Television  
45 4. Radio } Traditional media  
46 5. Prints (Newspaper/Magazine)  
47  
48 6. WhatsApp  
49 7. Facebook } Internet and social media  
50 8. Internet sites } Internet, social media, & SMS  
51  
52 9. Bulk SMS/Text messages (e.g from Nigerian CDC, NPHCDA, Bank etc)  
53  
54 10. Workplace (Place of work)  
55 11. Place of worship/Religious forums } Interpersonal  
56  
57 12. Other (specify below)  
58  
59  
60

1  
2  
3 51. If no. 50 above includes 12: Please specify the other source. Word or Phrase: \_\_\_\_\_  
4

5 52. If more than one sources given in no. 50 above: Which of the sources was your main source?  
6

7 53. If more than one sources given in no. 50 above: Which of the sources did you trust most?  
8  
9

10  
11 **NOTE: No. 54–65 is for those who have not received COVID-19 vaccination:**  
12

13 54. How fearful are you about getting COVID-19?  
14

- 15 1. Very fearful
- 16 2. A little fearful
- 17 3. Not sure about it
- 18 4. Not fearful
- 19 5. Not fearful at all

20  
21  
22 55. Is it possible for someone like you to get COVID-19?  
23

- 24 1. Highly possible
- 25 2. A bit possible
- 26 3. Not sure about it
- 27 4. Not possible
- 28 5. Not possible at all

29  
30  
31 56. Is it possible for someone like you to get severe or very serious COVID-19?  
32

- 33 1. Highly possible
- 34 2. A bit possible
- 35 3. Not sure about it
- 36 4. Not possible
- 37 5. Not possible at all

38  
39  
40 57. Have you ever had COVID-19?  
41

- 42 1. Yes, you are sure
- 43 2. Yes, you think so
- 44 3. Not sure about it
- 45 4. No, you think so
- 46 5. No, you are sure

47  
48  
49 58. If no. 57 above is 1 or 2: Have you ever had severe or very serious COVID-19?  
50

- 51 1. Yes, it was very serious
- 52 2. Yes, it was a bit serious
- 53 3. Not sure about it



- 1  
2  
3 4. No, it was not serious  
4  
5 5. No, it was not serious at all  
6

7 59. Do you know any person who have had COVID-19?

- 8  
9 1. Yes, you know a very close person  
10  
11 2. Yes, you know a close person  
12  
13 3. Yes, you only know a distant person  
14  
15 4. Yes, you only know a very distant person  
16  
17 5. No, you do not know any person

18 60. If no. 59 above is 1 or 2 or 3 or 4: Do you know any person who have had severe or very serious  
19 COVID-19?

- 20  
21 1. Yes, you know a very close person  
22  
23 2. Yes, you know a close person  
24  
25 3. Yes, you only know a distant person  
26  
27 4. Yes, you only know a very distant person  
28  
29 5. No, you do not know any person

30 61. If no 59 above is 1 or 2 or 3 or 4: Do you know any persons who have died from COVID-19?

- 31  
32 1. Yes, you know a very close person  
33  
34 2. Yes, you know a close person  
35  
36 3. Yes, you only know a distant person  
37  
38 4. Yes, you only know a very distant person  
39  
40 5. No, you do not know any person

41 62. What are your sources of information about COVID-19? **NOTE: Select all that apply:**

- 42 1. Family members/Relatives/Friends  
43 2. Other health workers } Interpersonal  
44  
45 3. Television  
46 4. Radio } Traditional media  
47 5. Prints (Newspaper/Magazine)  
48  
49 6. WhatsApp  
50 7. Facebook } Internet and social media  
51 8. Internet sites } Internet, social media, & SMS  
52  
53 9. Bulk SMS/Text messages (e.g from Nigerian CDC, NPHCDA, Bank etc)  
54  
55 10. Workplace (Place of work)  
56 11. Place of worship/Religious forums } Interpersonal  
57  
58 12. Other (specify below)  
59  
60

1  
2  
3 63. If no. 62 above includes 12: Please specify the other source. Word or Phrase: \_\_\_\_\_  
4

5 64. If more than one sources given in no. 62 above: Which of the sources is your main source?  
6

7 65. If more than one sources given in no. 62 above: Which of the sources do you trust most?  
8  
9

10  
11  
12 **Basic Knowledge of COVID-19**  
13

14 66. What is COVID-19?

- 15 1. A new type of coronavirus disease  
16  
17 2. An old type of coronavirus disease  
18  
19 99. Do not know  
20

21 67. How do people get COVID-19?

- 22  
23 1. By staying close to infected persons when they cough or sneezes  
24  
25 2. From bat  
26  
27 3. From rat  
28  
29 4. From spiritual attack  
30  
31 5. Other (specify below)  
32 99. Do not know

33 68. If no. 67 above is 5: Please specify how people get COVID-19. Word or Phrase: \_\_\_\_\_  
34

35 69. When somebody gets COVID-19, how long does it usually take before the person starts to show  
36 symptoms?  
37

- 38 1. 2–14 days (within 2 weeks)  
39  
40 2. 2–4 weeks  
41  
42 3. >4 weeks  
43  
44 99. Do not know  
45

46 70. What are the symptoms of COVID-19? **NOTE: Select all that apply:**

- 47 1. Fever  
48  
49 2. Cough  
50  
51 3. Tiredness  
52  
53 4. Body aches and pains  
54  
55 5. Sore throat  
56  
57 6. Difficulty breathing or shortness of breath  
58  
59 7. Chest pain  
60  
60 8. Headache

1  
2  
3 9. Loss of taste or smell

4  
5 10. Diarrhoea

6  
7 11. Nausea or vomiting

8  
9 12. other (specify below)

10  
11 99. Do not know

12 71. If no. 70 above includes 12: Please specify the other symptom. Word or Phrase:\_\_\_\_\_

13  
14 72. Can people also have COVID-19 without showing any symptoms?

15  
16 1. Yes

17  
18 2. No

19  
20 99. Do Not Know

21 73. Who are more at risk of having severe COVID-19? **NOTE: Select all that apply:**

22  
23 1. Children

24  
25 2. Younger adults

26  
27 3. Elderly people

28  
29 4. Slim people

30  
31 5. Obese people

32  
33 6. People with chronic illness

34  
35 7. People who smoke

36  
37 8. Pregnant women

38  
39 99. Do not know

40 74. Is there a laboratory test to diagnose COVID-19?

41  
42 1. Yes

43  
44 2. No

45  
46 99. Do not know. If 2 OR 99: Skip to 77

47 75. Where is laboratory test to diagnose COVID-19 done in Ebonyi state? **NOTE: Select all that apply:**

48  
49 1. AEFUTHA

50  
51 2. General hospitals

52  
53 3. PHC centres

54  
55 4. Missionary hospitals

56  
57 5. Private hospitals

58  
59 6. Private laboratory

60 7. Other (specify below)

99. Do not know

1  
2  
3 76. If no. 75 above includes 7: Please specify the other place lab test for COVID-19 is done in Ebonyi  
4 state. Word or Phrase: \_\_\_\_\_  
5  
6

7 77. Are there treatments for COVID-19?

- 8 1. Yes  
9  
10 2. No  
11  
12 99. Do Not Know  
13

14 78. Are there vaccines for COVID-19?

- 15 1. Yes  
16  
17 2. No  
18  
19 99. Do Not Know  
20

21 79. If no. 78 above is 1: Do you know any place where one can go and receive COVID-19 vaccination in  
22 Ebonyi state?  
23

- 24 1. Yes  
25  
26 2. No  
27

28 80. What are the ways to avoid/prevent getting COVID-19? **NOTE: Select all that apply:**

- 29  
30 1. Avoiding crowd (large group of people)  
31  
32 2. Maintaining at least 1–2 metre distance away from people coughing or sneezing  
33  
34 3. Wearing of face mask in public places (especially indoor public places)  
35  
36 4. Frequent hands washing with soap and water  
37  
38 5. Frequent hand cleaning with alcoholic sanitisers  
39  
40 6. Avoiding touching of face (eyes, nose, & mouth) when one is in public places  
41  
42 7. COVID-19 vaccination  
43  
44 8. Taking chloroquine  
45  
46 9. Use of herbs or roots (“Agbo”)  
47  
48 10. Use of ginger or garlic  
49  
50 11. Taking hot drinks or “ogogoro”  
51  
52 12. Other (specify below)  
53  
54 99. Do Not Know  
55  
56  
57  
58  
59  
60

81. If no. 80 above includes 12: Please specify other way. Word or Phrase: \_\_\_\_\_

### Attitude Towards COVID-19 and COVID-19 Vaccination

**NOTE: For each of the statements below, take one option whether you: Strongly Disagree, Disagree, Not Sure/Do Not Know, Agree, or Strongly Agree.**

82. COVID-19 is real.

1. Strongly Disagree
2. Disagree
3. Not Sure
4. Agree
5. Strongly Agree

83. COVID-19 a serious illness that can kill.

84. Everybody is susceptible to COVID-19 infection (Anybody can get COVID-19).

85. The risk of getting COVID-19 can be reduced by avoiding crowd (large group of people).

86. The risk of getting COVID-19 can be reduced by maintaining at least 1–2 metre distance away from people coughing or sneezing

87. The risk of getting COVID-19 can be reduced if everybody covers the mouth and nose (with handkerchief or bent elbow) when coughing or sneezing

88. The risk of getting COVID-19 can be reduced by wearing face mask when going out to public places (especially indoor public places).

89. The risk of getting COVID-19 can be reduced by washing hands with soap and water frequently (e.g before touching the face, before eating).

90. The risk of getting COVID-19 can be reduced by cleaning hands with alcoholic sanitisers frequently.

91. Chloroquine is an effective treatment (prevention) for COVID-19.

92. Herbs and roots (“Agbo”) are effective treatments (prevention) for COVID-19.

93. Ginger and garlic are effective treatments (prevention) for COVID-19.

94. Hot drinks or “ogogoro” are effective treatments (prevention) for COVID-19

95. COVID-19 vaccines are safe for people to receive

96. The risk of COVID-19 can be reduced by receiving COVID-19 vaccination

97. Everybody should receive COVID-19 vaccination that is recommended by the government

**Practices about COVID-19**

98. Since the COVID-19 pandemic started spreading in Ebonyi state (since 2020 till now), which of the following have you Ever Practiced because you wanted to Avoid or Prevent transmission of

COVID-19? **NOTE: Select all that apply:**

1. Avoiding crowd (large group of people)
2. Maintaining at least 1–2 metre distance away from people coughing or sneezing
3. Wearing of a face mask when going out to public places (especially indoor public places)
4. Frequent hand washing with soap and water
5. Frequent hand cleaning with alcoholic sanitisers
6. Avoiding touching your face (eyes, nose, mouth) when you are in public places
7. Covering your mouth and nose (with handkerchief or your bent elbow) when coughing or sneezing
8. Use of bleach/Jik or spirit/alcohol to clean surfaces that people touch frequently such as door handles, table tops etc
9. None of the above was ever practiced

99. Among those that you have ever practiced, which ones have you Been Practicing in the Last Two Weeks because you want to Avoid or Prevent transmission of COVID-19? **NOTE: Select all that apply:**

1. Avoiding crowd (large group of people)
2. Maintaining at least 1–2 metre distance away from people coughing or sneezing
3. Wearing of a face mask when going out to public places (especially indoor public places)
4. Frequent hand washing with soap and water
5. Frequent hand cleaning with alcoholic sanitisers
6. Avoiding touching your face (eyes, nose, mouth) when you are in public places
7. Covering your mouth and nose (with handkerchief or your bent elbow) when coughing or sneezing
8. Use of bleach/Jik or spirit/alcohol to clean surfaces that people touch frequently such as door handles, table tops etc
9. None of the above was practiced in the last two weeks

100. Since the COVID-19 pandemic started spreading in Ebonyi state (since 2020 till now), which of the following have you Ever Practiced because you wanted to Treat or Prevent COVID-19? **NOTE:**

**Select all that apply:**

1. Taking chloroquine
2. Using herbs or roots (“Agbo”)
3. Using ginger or garlic
4. Using hot drinks or “ogogoro”
5. None of the above was ever practiced

1  
2  
3 101. Among those that you have ever practiced, which ones have you Been Practicing in the Last  
4 Two Weeks because you want to Treat or Prevent COVID-19? **NOTE: Select all that apply:**

- 5  
6 1. Taking chloroquine  
7  
8 2. Using herbs or roots (“Agbo”)  
9  
10 3. Using ginger or garlic  
11  
12 4. Using hot drinks or “ogogoro”  
13  
14 5. None of the above was practiced in the last two weeks  
15  
16  
17  
18  
19  
20  
21  
22  
23  
24  
25  
26  
27  
28  
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30  
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59  
60

For peer review only

## FGD Guide for FGD with Community Members

1  
2  
3  
4 Q1. What is COVID-19?

5 **Prompts:**

- 6 1. Is COVID-19 real or not?  
7  
8 2. Is COVID-19 a new disease or an old disease?  
9  
10 3. Is COVID-19 a serious disease that can kill?

11 **Probe:** their views on cause, transmission, symptoms, diagnosis, treatment, and prevention of  
12 COVID-19

13 **Prompt:** Are there vaccines for COVID-19?  
14

15  
16  
17 Q2. What are your views about COVID-19 vaccine/vaccination and the vaccination process?

18 **Probe:** safety, effectiveness, universal COVID-19 vaccination, and vaccination process

19  
20  
21 Q3. Some people have received COVID-19 vaccination but others have not received. What are the  
22 things that make people to receive or not to received COVID-19 vaccination?

23 **Prompt:** Why have some people not received COVID-19 vaccination?

24  
25  
26 Why have some people not received COVID-19 vaccination that *is available close to them*?

27  
28  
29 Q4. Among the people that currently have not received COVID-19 vaccination, some intend or plan  
30 to receive it but others do not intend or plan to receive it.

31  
32  
33 What are the things that make people to plan to receive or to plan not to received COVID-19  
34 vaccination?

35  
36 **Prompt:** Why do some people say they will not receive COVID-19 vaccination?  
37

38  
39 Q5. Among the people that say they will receive COVID-19 vaccination, some say they will go and  
40 receive it after some days, some say after some weeks, some say after some months, others say  
41 after some years.

42  
43  
44 What are the things that determines how long it takes before people go and receive COVID-19  
45 vaccination?

46  
47  
48 **Prompt:** What will make some people go and receive the COVID-19 vaccination earlier and  
49 others to go later?  
50

51  
52 Q6. What do you think should be done so that people who have not received COVID-19 vaccination  
53 will go and receive or start planning to receive it?

54  
55  
56 **Prompt:** How can people be made to accept COVID-19 vaccination? Probe: Role of government,  
57 health workers etc.  
58

59  
60 *Thank you very much for your time and views.*



## FGD Guide for FGD with Health Workers

1  
2  
3  
4 Q1. What is COVID-19?

5 **Prompts:**

- 6 1. Is COVID-19 real or not?  
7  
8 2. Is COVID-19 a new disease or an old disease?  
9  
10 3. Is COVID-19 a serious disease that can kill?

11 **Probe:** their views on cause, transmission, symptoms, diagnosis, treatment, and prevention of  
12 COVID-19

13 **Prompt:** Are there vaccines for COVID-19?

14  
15  
16  
17 Q2. What are your views about COVID-19 vaccine/vaccination and the vaccination process?

18 **Probe:** safety, effectiveness, universal COVID-19 vaccination, and vaccination process

19  
20  
21 Q3. Some health workers have received COVID-19 vaccination but others have not received. What  
22 are the things that make health workers to receive or not to received COVID-19 vaccination?

23 **Prompt:** Why have some health workers not received COVID-19 vaccination?

24 Why have some health workers not received COVID-19 vaccination that is *available close*  
25 *to them?*

26  
27  
28  
29 Q4. Among the health workers that currently have not received COVID-19 vaccination, some intend  
30 or plan to receive it but others do not intend or plan to receive it.

31  
32  
33 What are the things that make health workers to plan to receive or to plan not to received  
34 COVID-19 vaccination?

35 **Prompt:** Why do some health workers say they will not receive COVID-19 vaccination?

36  
37  
38  
39 Q5. Among the health workers that say they will receive COVID-19 vaccination, some say they will go  
40 and receive it after some days, some say after some weeks, some say after some months, others  
41 say after some years.

42  
43  
44 What are the things that determines how long it takes before health workers go and receive  
45 COVID-19 vaccination?

46  
47  
48 **Prompt:** What will make some health workers go and receive the COVID-19 vaccination earlier  
49 and others to go later?

50  
51  
52  
53 Q6. What do you think should be done so that health workers who have not received COVID-19  
54 vaccination will go and receive or start planning to receive it?

55  
56  
57 **Prompt:** How can health workers be made to accept COVID-19 vaccination? **Probe:** Role of  
58 government, other health workers etc.

59  
60  
*Thank you very much for your time and views.*

# BMJ Open

## COVID-19 vaccination acceptance among community members and health workers in Ebonyi state, Nigeria: study protocol for a concurrent-independent mixed method analyses of intention to receive, timeliness of the intention to receive, uptake, and hesitancy to COVID-19 vaccination and the determinants

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Manuscripts

1 **Title:** COVID-19 vaccination acceptance among  
2 community members and health workers in Ebonyi  
3 state, Nigeria: study protocol for a concurrent-  
4 independent mixed method analyses of intention to  
5 receive, timeliness of the intention to receive, uptake,  
6 and hesitancy to COVID-19 vaccination and the  
7 determinants

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## 25 **Abstract**

26 **Introduction** The coronavirus disease 2019 (COVID-19) pandemic has gravely affected the  
27 lives and economies of the global population including Nigeria. The attainment of herd  
28 immunity through mass COVID-19 vaccination is the foremost control strategy, however, the  
29 deployments of COVID-19 vaccinations are facing challenges of non-acceptance. Despite the  
30 efforts of the Nigerian government and COVAX facility in making COVID-19 vaccination  
31 more available/accessible, the vaccination rate remains unexpectedly very low in  
32 Nigeria/Ebonyi state. It is thus important to investigate the acceptability of COVID-19  
33 vaccination to elucidate the explanations for the very low coverage rate. This study aims to  
34 evaluate/explore COVID-19 vaccination acceptance and the determinants among community  
35 members and health workers in Ebonyi state, Nigeria.

36 **Methods and analyses** The study is an analytical cross-sectional survey with a concurrent-  
37 independent mixed method design. Quantitative data will be collected from all  
38 consenting/assenting community members aged 15 years and above, in 28 randomly selected  
39 geographical clusters, through structured interviewer-administered questionnaire household  
40 survey using KoBoCollect installed in android devices. Quantitative data will be collected from  
41 all consenting health workers, selected via convenience and snowball techniques, through  
42 structured self-administered questionnaire survey distributed via WhatsApp and interviewer-  
43 administered survey using KoBoCollect installed in android devices. Qualitative data will be  
44 collected from purposively selected community members and health workers through focus  
45 group discussions. Quantitative analyses will involve descriptive statistics, generalized  
46 estimating equations (for community members data), and generalized linear model (for health  
47 workers data). Qualitative analyses will employ the thematic approach.

48 **Ethics and dissemination** Ethical approval for this study was obtained from the Ebonyi State  
49 Health Research and Ethics Committee (EBSHREC/15/01/2022-02/01/2023) and Research  
50 and Ethics Committee of Alex Ekwueme Federal University Teaching Hospital Abakaliki  
51 (14/12/2021-17/02/2022) and verbal consent will be obtained from participants. Study findings  
52 will be reported at local, national, and international levels as appropriate.

53 **Trial registration number** ISRCTN16735844

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## 55 **Strengths and limitations of this study**

- 56 ➤ Our study will be the first geographical-community based study, using mixed method  
57 approach, to investigate COVID-19 vaccination acceptance (the intention to receive,  
58 timeliness of the intention to receive, uptake, and hesitancy) in the context where there is  
59 very low vaccination rate despite relative vaccine availability and public access to  
60 vaccination.
- 61 ➤ The study will be implemented after prospective registration with ISRCTN and based on  
62 available/accessible or disseminated protocol.
- 63 ➤ The study is prone to reporting bias due to the questionnaire-based data collection  
64 method. The convenience and snowballing sampling will make the health worker survey  
65 prone to selection bias.

## 76 Introduction

77 Coronavirus disease 2019 (COVID-19), a severe acute respiratory syndrome disease caused by  
78 severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), emerged by the end of 2019  
79 and became a pandemic. By 7th August, 2022, the COVID-19 pandemic had affected more  
80 than 581 million persons and had resulted in the death of over 6.4 million persons globally with  
81 more than 9.2 million cases and over 174000 deaths in Africa.<sup>1</sup> By 10th August, 2022, the total  
82 number of recorded confirmed cases of COVID-19 and COVID-19 related deaths were  
83 respectively 262402 and 3147 in Nigeria and 2064 and 32 in Ebonyi state.<sup>2</sup> The pandemic has  
84 overstretched the capacity of many countries' health care delivery and disrupted the global  
85 economy due to lockdown measures.<sup>3-7</sup>

86 Amongst the available control measures, perhaps the most cost-effective and sustainable  
87 control strategy is mass COVID-19 vaccination (with safe and effective vaccines). COVID-19  
88 vaccination reduces the incidence, severity, and death from COVID-19,<sup>8-11</sup> and is perhaps the  
89 foremost means of achieving herd immunity especially when all population groups including  
90 adults and children are vaccinated<sup>9-14</sup> because both adults and children are susceptible to  
91 COVID-19 infection.<sup>15-17</sup> However, the deployments of COVID-19 vaccinations are facing  
92 some challenges such as non-acceptance and misinformation propagated by anti-vaccine  
93 campaigners. Refusal and/or delay in accepting vaccinations (vaccine hesitancy) has become a  
94 major public health challenge over the past decade<sup>18,19</sup> and was noted as one of the top ten  
95 threats to global health in 2019.<sup>20</sup> Moreover, the unprecedented disruptive impact of the  
96 pandemic with the associated conspiracy theories being propagated in conventional and social  
97 media and the unprecedented rapid development and introduction of COVID-19 vaccines have  
98 generated an atmosphere of uncertainty and confusion which have further limited the  
99 acceptance of COVID-19 vaccination.<sup>21-23</sup>

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3 100 COVID-19 vaccination started in March, 2021 in Nigeria under the COVAX initiative.<sup>24,25</sup>  
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5 101 Although the Nigerian government, with the support of the COVAX facility, is scaling up the  
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7 102 availability/access to COVID-19 vaccination, the coverage rate is still very low in Nigeria,  
8  
9 103 including Ebonyi state and Nigeria was not among the only five countries in Africa expected  
10  
11 104 to meet the target of about 40% COVID-19 vaccination coverage by end of 2021.<sup>26</sup> As of 26th  
12  
13 105 January, 2022 (before this study was implemented), only about 4.6% of eligible Nigerians had  
14  
15 106 received the second dose of COVID-19 vaccination,<sup>27</sup> about 10.5% had received the first  
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17 107 dose,<sup>28</sup> and Ebonyi state had about the least coverage rate in Nigeria.<sup>29</sup> As of 11th August,  
18  
19 108 2022, about 25.2% of eligible Nigerians had received the second dose (fully vaccinated)<sup>30</sup> and  
20  
21 109 about 10.6% had received the first dose (partially vaccinated)<sup>31</sup> and as of 12th August, 2022,  
22  
23 110 Ebonyi state had the second least coverage rate in Nigeria.<sup>32</sup> Moreover, these coverage rates  
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25 111 were among the current eligible population of 18 years and above and, the rates among the  
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27 112 population at risk, which is what is considered with regards to herd immunity, would be a  
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29 113 fraction of the above.

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36 114 Although the incidence of COVID-19 in Nigeria has been relatively lower compared to many  
37  
38 115 other countries, high acceptance of COVID-19 vaccination among Nigerians is important in  
39  
40 116 order to prevent any possible upsurge of the disease especially due to new strains of the virus.  
41  
42 117 Resurgence of COVID-19 infections and COVID-19 related deaths are common especially  
43  
44 118 among populations with low COVID-19 vaccination coverage.<sup>9-11</sup>

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48 119 Although the issue of stock-out of COVID-19 vaccines and vaccination syringes cannot be  
49  
50 120 ignored in Nigeria and other African countries,<sup>26</sup> the slow pace of coverage may be partly due  
51  
52 121 to non-acceptance/hesitancy among the populace and health workers as we have observed  
53  
54 122 anecdotally in Ebonyi state. However, to our knowledge, the extent of COVID-19 vaccination  
55  
56 123 acceptance and the determinants among community members and health workers, as well as  
57  
58 124 the degree to which the very low COVID-19 vaccination coverage is explained by non-



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3 125 acceptance as against non-availability/non-access, have not been rigorously investigated  
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5 126 especially in Nigeria and particularly in Ebonyi state. Such investigation has become more  
6  
7 127 imperative since the introduction and scale up of COVID-19 vaccination across Nigeria. The  
8  
9 128 understanding of context-specific determinants of vaccination acceptance is a necessary  
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11 129 strategy in addressing the problem of non-acceptance of new vaccines such as the current  
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13 130 COVID-19 vaccines.<sup>33</sup>  
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18 131 COVID-19 vaccination intentions among populations were assessed at the early phase of the  
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20 132 pandemic by studies across the world<sup>12-14,34-63</sup> and in Nigeria (mostly based on social media  
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22 133 platforms and among health workers)<sup>64-70</sup> during the development/clinical trial stage of  
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24 134 COVID-19 vaccines. Few studies were done at the early stage of the introduction and  
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26 135 deployment of COVID-19 vaccination.<sup>71,72</sup> However, these studies were done when COVID-  
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28 136 19 vaccination had not been introduced for public use or was just being introduced. Thus, the  
29  
30 137 perceptions of vaccination-related attributes such as importance, safety or side-effects, and  
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32 138 effectiveness were perhaps largely distal. Moreover, the findings of those studies might  
33  
34 139 markedly vary from that of studies conducted in situations where COVID-19 vaccination is  
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36 140 readily/relatively available/accessible and there are close/real experiences/perceptions of  
37  
38 141 vaccination activities and vaccination-related adverse events. Also, since the implementation  
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40 142 of COVID-19 vaccination in Nigeria, the amplification of reports of serious side-effects and  
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42 143 deaths following vaccination is common in the social and conventional media and on the  
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44 144 grapevine.  
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51 145 Moreover, decline in the intention to receive COVID-19 vaccination after the vaccine became  
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53 146 available has been reported across countries.<sup>73</sup> Anecdotal evidence shows that the initial waves  
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55 147 of fear of COVID-19 among the people, including health workers, has markedly waned  
56  
57 148 overtime especially in Ebonyi state and Nigeria as a whole where the pandemic has been much  
58  
59 149 less severe compared to some other climes. As a result, it is not surprising that COVID-19  
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150 vaccination uptake is reportedly very low and more importantly, the drive to scale up the  
151 availability and uptake of COVID-19 vaccination may be up against an unexpected bottle-neck  
152 if there is hesitancy or no intention to receive the vaccination among the people.

153 Only few studies have assessed the uptake of actual COVID-19 vaccination among the general  
154 adult population<sup>55,74,75</sup> and among health workers<sup>76-79</sup> but most were among sub-populations  
155 and when the vaccination was still relatively less available and accessible.

156 This study aims to evaluate and explore COVID-19 vaccination acceptance (the intention to  
157 receive, timeliness of the intention to receive, uptake, and hesitancy) and the determinants  
158 among community members and health workers in Ebonyi state, Nigeria, in order to generate  
159 evidence to inform policy interventions and strategies on optimal COVID-19 vaccination  
160 acceptance and coverage.

### 161 **Study objectives**

162 The primary objectives are to evaluate and explore the following among community members  
163 and health workers in Ebonyi state, Nigeria:

- 164 1. The intention to receive COVID-19 vaccination and the determinants
- 165 2. Timeliness of the intention to receive COVID-19 vaccination and the determinants
- 166 3. The uptake of COVID-19 vaccination and the determinants
- 167 4. The hesitancy to COVID-19 vaccination and the determinants
- 168 5. The predictive power of acceptance factor compared with availability/access factor  
169 regarding the intention to receive, timeliness of the intention to receive, and uptake of  
170 COVID-19 vaccination

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3 171 The secondary objectives are to evaluate and explore the following among community  
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5 172 members and health workers in Ebonyi state, Nigeria:

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8 173 1. The COVID-19 experiences and perceptions and their determinants  
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11 174 2. The COVID-19 vaccination expectations and perceptions and their determinants  
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14 175 3. The COVID-19 vaccination process experiences and perceptions (availability/access  
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17 176 factor) and their determinants  
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20 177 4. The knowledge, attitude, and practices about COVID-19 and their determinants  
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23 178 5. The sources of information about COVID-19 and their determinants  
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26 179 6. The perceptions about COVID-19, COVID-19 vaccine/vaccination, and COVID-19  
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28  
29 180 vaccination process

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32 181 **Study hypotheses**

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35 182 The primary hypotheses include:

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38 183 1. Strong COVID-19 experience and perception increases COVID-19 vaccination acceptance  
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40 184 (increases the intention to receive, timeliness of the intention to receive, and uptake and  
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42 185 reduces hesitancy) compared with not strong COVID-19 experience and perception  
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44  
45 186 2. Increase in COVID-19 experiences and perceptions score increases COVID-19 vaccination  
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47 187 acceptance  
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50 188 3. Good COVID-19 vaccination expectation and perception increases COVID-19 vaccination  
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52 189 acceptance compared with poor COVID-19 vaccination expectation and perception  
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55 190 4. Increase in COVID-19 vaccination expectations and perceptions score increases COVID-  
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57 191 19 vaccination acceptance  
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3 192 5. Acceptance factor (COVID-19 risk-COVID-19 vaccination benefit perception or disease  
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5 193 risk-remedy benefit perception (DR-RB or DRRB perception)) is significantly associated  
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8 194 with COVID-19 vaccination acceptance  
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11 195 6. Positive COVID-19 vaccination process experience and perception (positive  
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13 196 availability/access factor) increases the intention to receive, timeliness of the intention to  
14  
15 197 receive, and uptake of COVID-19 vaccination compared with negative COVID-19  
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17 198 vaccination process experience and perception (negative availability/access factor)  
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21 199 7. Increase in COVID-19 vaccination process experiences and perceptions score increases the  
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23 200 intention to receive, timeliness of the intention to receive, and uptake of COVID-19  
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25 201 vaccination  
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28 202 8. Acceptance-availability/access factor is significantly associated with the intention to  
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30 203 receive, timeliness of the intention to receive, and uptake of COVID-19 vaccination  
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34 204 9. Increase in acceptance factor score increases the intention to receive, timeliness of the  
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36 205 intention to receive, and uptake of COVID-19 vaccination compared with increase in  
37  
38 206 availability/access factor score  
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42 207 10. The positive categories of COVID-19 experiences and perceptions, COVID-19  
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44 208 vaccination expectations and perceptions, and COVID-19 vaccination process experiences  
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46 209 and perceptions respectively increase COVID-19 vaccination acceptance compared with the  
47  
48 210 negative categories (as depicted in table 1)  
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52 211 The secondary hypotheses include:  
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55 212 11. Knowledge, attitude, and practices about COVID-19 are significantly associated with:  
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57 213 COVID-19 vaccination acceptance; COVID-19 experiences and perceptions; COVID-19  
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3 214 vaccination expectations and perceptions; and COVID-19 vaccination process experiences  
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5 215 and perceptions  
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8 216 12. Sources of information about COVID-19 are significantly associated with: COVID-19  
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10 217 vaccination acceptance; COVID-19 experiences and perceptions; COVID-19 vaccination  
11  
12 218 expectations and perceptions; COVID-19 vaccination process experiences and perceptions;  
13  
14 219 and knowledge, attitude, and practices about COVID-19  
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18 220 13. Sociodemographic characteristics are significantly associated with: COVID-19  
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20 221 vaccination acceptance; COVID-19 experiences and perceptions; COVID-19 vaccination  
21  
22 222 expectations and perceptions; COVID-19 vaccination process experiences and perceptions;  
23  
24 223 knowledge, attitude, and practices about COVID-19; and sources of information about  
25  
26 224 COVID-19  
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31 225 14. Professional or work-related attributes of health workers are significantly associated with:  
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33 226 COVID-19 vaccination acceptance, COVID-19 experiences and perceptions; COVID-19  
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35 227 vaccination expectations and perceptions; COVID-19 vaccination process experiences and  
36  
37 228 perceptions; knowledge, attitude, and practices about COVID-19; and sources of information  
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39 229 about COVID-19  
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43 230 The hypothesized relationships between the independent factors and the outcome measures are  
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45 231 shown in the study's conceptual framework in figure 1. The conceptual framework was  
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47 232 designed based on the study hypotheses which were informed by published data on COVID-  
48  
49 233 19 and COVID-19 vaccination and the "3Cs" Vaccine Hesitancy Model by The SAGE  
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51 234 Working Group on Vaccine Hesitancy.<sup>18</sup>  
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55 235 In the conceptual framework (figure 1), strong COVID-19 experience and perception  
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57 236 (compared with not strong experience and perception), increase in COVID-19 experiences and  
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3 237 perceptions score, and the positive categories of COVID-19 experiences and perceptions  
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5 238 (compared with the negative categories) are expected to be associated with decrease in  
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7 239 complacency about COVID-19 vaccination which will result in increase in the intention to  
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9 240 receive, timeliness of the intention to receive, and uptake and decrease in hesitancy to COVID-  
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11 241 19 vaccination (increase in COVID-19 vaccination acceptance). Likewise, good COVID-19  
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13 242 vaccination expectation and perception (compared with poor expectation and perception),  
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15 243 increase in COVID-19 vaccination expectations and perceptions score, and the positive  
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17 244 categories of COVID-19 vaccination expectations and perceptions (compared with the negative  
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19 245 categories) are expected to be associated with increase in confidence in COVID-19 vaccination  
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21 246 which will lead to increase in COVID-19 vaccination acceptance.  
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27 247 Positive COVID-19 vaccination process experience and perception (compared with negative  
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29 248 experience and perception), increase in COVID-19 vaccination process experiences and  
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31 249 perceptions score, and the positive categories of COVID-19 vaccination process experiences  
32  
33 250 and perceptions (compared with the negative categories) are expected to be associated with  
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35 251 increase in convenience in COVID-19 vaccination and then increase in the intention to receive,  
36  
37 252 timeliness of the intention to receive, and uptake of COVID-19 vaccination. Acceptance factor  
38  
39 253 is expected to be associated with increase in COVID-19 vaccination acceptance compared with  
40  
41 254 availability/access factor.  
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46 255 As depicted in the conceptual framework (figure 1), knowledge, attitude, and practice about  
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48 256 COVID-19; sources of information about COVID-19; sociodemographic characteristics; and  
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50 257 professional or work-related attributes are expected to be associated with decrease in  
51  
52 258 complacency, increase in confidence, and increase in convenience in COVID-19 vaccination  
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54 259 and then increase in COVID-19 vaccination acceptance. These background characteristics are  
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56 260 also expected to be associated with COVID-19 experiences and perceptions, COVID-19  
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3 261 vaccination expectations and perceptions, and COVID-19 vaccination process experiences and  
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5 262 perceptions (figure 1).  
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## 8 263 **Methods and analyses**

### 9 264 **Design**

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15 265 The study is an analytical cross-sectional survey with a concurrent-independent mixed data  
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17 266 collection and data analysis and interpretation method. In this design, the quantitative and  
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19 267 qualitative aspects of the study will be implemented simultaneously and independently of each  
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22 268 other.<sup>80</sup> The study protocol development was guided by the Standard Protocol Items:  
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24 269 Recommendations for Interventional Trials (SPIRIT) 2013 checklist and the Strengthening the  
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26 270 Reporting of Observational Studies in Epidemiology (STROBE) 2007 checklist for cross-  
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29 271 sectional studies.  
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### 32 272 **Study area**

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35 273 The study is planned to be implemented between March and April, 2022, in Ebonyi state which  
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37 274 is located in south-eastern geopolitical zone of Nigeria with land area of 5,953 sq. km. The  
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39 275 population of the state was projected to be 3,313,229 in 2021 based on the 2006 national census  
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41  
42 276 figure and a growth rate of 2.8% and christianity is the most practiced religion. Ebonyi state  
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44 277 has 13 Local Government Areas (LGAs) including the state capital (Abakaliki LGA) and 171  
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46 278 political wards.<sup>81</sup> Each LGA is made up of political wards and autonomous communities. Each  
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48 279 autonomous community is made up of larger villages called autonomous villages which consist  
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51 280 of smaller villages or settlements. Each village/settlement has a head or traditional leader. Most  
52  
53 281 parts of Ebonyi state are rural and there are only six towns (urban or semi-urban areas), five of  
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56 282 which are LGAs capitals with the adjoining areas.<sup>82</sup>  
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3 283 The federal ministry of health (FMOH) and its agencies provide the overarching guidance and  
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5 284 policy framework for public and private health service delivery in all states in Nigeria including  
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7 285 Ebonyi state. The FMOH provides health services in the state through tertiary health facilities  
8  
9 286 while the state ministry of health (SMOH) provides health service through secondary health  
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11 287 facilities (general hospitals). The SMOH and the state primary health care development agency  
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13 288 (SPHCDA) provide health care in the local governments through primary health care (PHC)  
14  
15 289 facilities. There is at least one PHC centre in each political ward. The national primary health  
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17 290 care development agency (NPHCDA) provides policy guidance and coordination for  
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19 291 immunisation/vaccination services in all states in Nigeria including Ebonyi state. The  
20  
21 292 NPHCDA provides vaccines and related products while the SMOH and SPHCDA coordinates  
22  
23 293 the implementation of immunisation/vaccination service delivery in the state (and LGAs)  
24  
25 294 through the tertiary, secondary, and primary health care (PHC) facilities.  
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### 31 **Participants**

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34 296 The participants include clusters, the community members within clusters, and health workers  
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36 297 in Ebonyi state. A cluster in this study is a geographical community (village(s)/settlement(s))  
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38 298 which is the immediate catchment area of a PHC centre. Eligible clusters for inclusion in the  
39  
40 299 study are those with at least 200 households or a population of 1000 people, whose PHC centres  
41  
42 300 are providing basic maternal and child health care services including routine childhood  
43  
44 301 immunisation, that can be easily accessed with a car, and where the cluster heads give verbal  
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46 302 consent/permission. In each of the selected clusters, community members aged 15 years and  
47  
48 303 above who give verbal consent/assent will be eligible to participate in a population-based  
49  
50 304 household survey. Health workers (both clinical and non-clinical staff) in public and private  
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52 305 health care sectors, including the patent medicine vendors (PMVs), who work or live in Ebonyi  
53  
54 306 state and give verbal consent will be eligible to participate in a health worker survey.  
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56 307 Community members aged 15 years and above who have resided in the community for at least  
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3 308 one year and who give verbal consent/assent will be eligible to participate in community-based  
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5 309 focus group discussions (FGDs) while health workers (both clinical and non-clinical staff) who  
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7 310 work or live in Ebonyi state, have at least one year of working experience, and give verbal  
8  
9 311 consent will be eligible to participate in health worker-based FGDs.  
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### 13 312 **Independent factors and outcome measures**

#### 14 15 16 313 **Independent factors, categories, scoring, and grading**

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19 314 The independent factors among community members and health workers (see table 1) are  
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21 315 almost the same with few differences which include: occupation, monthly income, and  
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23 316 residence among the community members; and professional or work category/cadre, years of  
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25 317 working experience, and level of work among the health workers.  
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29 318 The independent factors are listed under seven headings labelled A–I: COVID-19 experiences  
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31 319 and perceptions; COVID-19 vaccination expectations and perceptions; COVID-19 vaccination  
32  
33 320 process experiences and perceptions (availability/access factor); Acceptance factor (COVID-  
34  
35 321 19 risk-COVID-19 vaccination benefit perception); Acceptance-availability/access factor;  
36  
37 322 Knowledge, attitude, and practice about COVID-19; Source of information about COVID-19;  
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39 323 Sociodemographic characteristics; and Professional or work-related attributes. These three  
40  
41 324 factors – COVID-19 experiences and perceptions; COVID-19 vaccination expectations and  
42  
43 325 perceptions; and COVID-19 vaccination process experiences and perceptions – will be  
44  
45 326 respectively measured using eight, five, and five questionnaire items each having five  
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47 327 categories grouped into positive and negative and scored from 0–4 as depicted in table 1.  
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53 328 The scoring will create three new continuous variables including COVID-19 experiences and  
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55 329 perceptions score (ranging from 0–32 for each participant); COVID-19 vaccination  
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57 330 expectations and perceptions score (ranging from 0–20); and COVID-19 vaccination process  
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**Table 1: Independent factors and their categories and category scores and grading among community members and health workers**

Independent factors	Categories (Scores)					
	Positive category			Negative category		
COVID-19 experiences and perceptions						
1. How fearful are you about getting COVID-19?	Very fearful (4)	A little fearful (3)	Not sure (2)	Not fearful (1)	Not fearful at all (0)	
2. How possible is it for you to get COVID-19?	Highly possible (4)	A bit possible (3)	Not sure (2)	Not possible (1)	Not possible at all (0)	
3. How possible is it for you to get severe COVID-19?	Highly possible (4)	A bit possible (3)	Not sure (2)	Not possible (1)	Not possible at all (0)	
4. Have you ever had COVID-19?	Yes, surely (4)	Yes, think so (3)	Not sure (2)	No, think so (1)	No, surely (0)	
5. Have you ever had severe COVID-19?	Yes, very serious (4)	Yes, a bit serious (3)	Not sure (2)	No, not serious (1)	No, not serious at all (0)	
6. Do you know any person who have had COVID-19?	A very close person (4)	A close person (3)	A distant person (2)	A very distant person (1)	No person (0)	
7. Do you know any person who have had severe COVID-19?	A very close person (4)	A close person (3)	A distant person (2)	A very distant person (1)	No person (0)	
8. Do you know any person who have died from COVID-19?	A very close person (4)	A close person (3)	A distant person (2)	A very distant person (1)	No person (0)	
Total	(32 <sup>HI</sup> )	-	-	-	(0 <sup>L</sup> )	
COVID-19 experiences and perceptions score						
9. Extent of COVID-19 experience and perception (COVID-19 risk perception) <sup>A</sup>	Strong experience and perception (high risk perception)	-	-	-	Not strong experience and perception (low risk perception)	
10. COVID-19 vaccination expectations and perceptions						
11. How important is it for you to receive COVID-19 vaccination?	Very important (4)	Important (3)	Not sure (2)	Not important (1)	Not important at all (0)	
12. How fearful are you about having severe side-effect from COVID-19 vaccination?	Not fearful at all (4)	Not fearful (3)	Not sure (2)	A little fearful (1)	Very fearful (0)	
13. What protection against COVID-19 will you get from receiving COVID-19 vaccination?	Full protection (4)	Partial protection (3)	Not sure (2)	No protection (1)	No protection at all (0)	
14. How do you trust the health workers who give COVID-19 vaccination?	Trust them very much (4)	Trust them (3)	Not sure (2)	Do not trust them (1)	Do not trust them at all (0)	
15. How do you trust the government who made COVID-19 vaccination available?	Trust them very much (4)	Trust them (3)	Not sure (2)	Do not trust them (1)	Do not trust them at all (0)	
Total	(20 <sup>HH</sup> )	-	-	-	(0 <sup>LL</sup> )	
COVID-19 vaccination expectations and perceptions score						
16. COVID-19 vaccination expectation and perception level (COVID-19 vaccination benefit perception) <sup>B</sup>	Good expectation and perception (high benefit perception)	-	-	-	Poor expectation and perception (low benefit perception)	
17. COVID-19 vaccination process experiences and perceptions (availability/access factor)						
18. Ever heard about COVID-19 vaccination?	Many times (4)	Once/few times (3)	Not sure (2)	No time (1)	No time at all (0)	
19. Know a COVID-19 vaccination place?	A very close place (4)	A close place (3)	A far place (2)	A very far place (1)	No place (0)	
20. Frequency of COVID-19 vaccination at the vaccination place?	Daily, down to twice a week (4)	Once a weekly (3)	Once in two-four weeks (2)	No fixed time (1)	Do not know (0)	
21. Queue at the vaccination place?	No queue (4)	Short queue (3)	Do not know (2)	Long queue (1)	Very long queue (0)	
22. How caring are the health workers at the vaccination place?	Very caring (4)	Caring (3)	Not sure (2)	Not caring (1)	Not caring at all (0)	
Total	(20 <sup>HHH</sup> )				(0 <sup>LLL</sup> )	
23. COVID-19 vaccination process experiences & perceptions score (availability/access factor score)						
24. COVID-19 vaccination process experience and perception level (availability/access factor level) <sup>C</sup>	Positive experience & perception (availability & access factor)	-	-	-	Negative experience & perception (availability & access factor)	
25. Acceptance factor level	Defined as COVID-19 risk-COVID-19 vaccination benefit perception or disease risk-remedy benefit perception level. Categories: High disease risk-high remedy benefit perception or high-high DR-RB perception, high-low DR-RB perception, low-high DR-RB perception, and low-low DR-RB perception					
26. Acceptance factor score	Defined as COVID-19 risk perception score plus COVID-19 vaccination benefit perceptions score or DR-RB perception score					
27. Acceptance-availability/access factor level	High-high-positive, High-high-negative, High-low-positive, High-low-negative, low-high-positive, low-high-negative, low-low-positive, low-low-negative					

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Table 1: Continued

Independent factors	Categories (Scores)				
	Positive category		Negative category		
Knowledge, Attitude, and Practice					
28. Knowledge score					
29. Level of knowledge of COVID-19 <sup>D</sup>	Good knowledge	–	–	–	Poor knowledge
30. Attitude score					
31. Level of attitude towards COVID-19 & COVID-19 vaccination <sup>E</sup>	Good attitude	–	–	–	Poor attitude
32. Practice score					
33. Level of practices about COVID-19 <sup>F</sup>	Good practice	–	–	–	Poor practice
34. Source of information about COVID-19	Interpersonal (Family members/Relatives/Friends, Other health workers, Place of work, Place of worship/Religious forums); Traditional media (Television, Radio, Prints (Newspaper/Magazine)); Internet, social media, & SMS ( WhatsApp, Facebook, Internet sites, Bulk SMS/Text messages)				
35. Main source of information	Interpersonal; Traditional media; Internet, social media, & SMS				
36. Most trusted source of information	Interpersonal; Traditional media; Internet, social media, & SMS				
37. Sociodemographic characteristics					
38. Gender	Male, Female				
39. Age					
40. Marital status	Married, Divorced, Separated, Widowed, Never married (single)				
41. Educational level	No formal education, Some primary, Completed primary, Some secondary, Completed secondary, Tertiary (diploma, first degree, masters/PHD/other equivalent)				
42. Occupation*	Farmer, Trader, Other-self-employment, Private paid work, Government paid work, Housewife, Student, Apprentice, Youth service (Corper), None				
43. Residence*	Rural, Semi-urban/Urban				
44. Usual monthly income (NGN) & income score	Income categories: "no income" up to "more than 300,000" with interval of 20,000, giving 18 categories. "no income" is scored "one" & the score increases by "one" for each higher category up to the highest score of 17				
45. Professional or work-related attributes <sup>A</sup>					
46. Professional cadre or work category	non-Clinical staff, Clinical staff (PMV, health attendant, JCHEW, CHEW, CHO, nurse/midwife, medical laboratory scientist, medical laboratory technologist, pharmacist, pharmacy technician, house officer, medical officer, medical doctor in specialist training, specialist medical doctor)				
47. Years of working experience					
48. Primary place of work	Public and private				
49. Level of primary place of work	Primary health care level (facility), Secondary health care level (facility), and Tertiary health care level (facility)				

33 <sup>H</sup>Highest attainable COVID-19 experiences and perceptions score for each participant (<sup>L</sup>Lowest attainable score). <sup>A</sup>COVID-19 experiences and perceptions score of  $\geq 50\%$  of the highest attainable score of 32 is strong experience and perception,  $< 50\%$  is not strong experience and perception. <sup>H<sup>H</sup></sup>Highest attainable COVID-19 vaccination expectations and perceptions score for each participant (<sup>L<sup>L</sup></sup>Lowest attainable score). <sup>B</sup>COVID-19 vaccination expectations and perceptions score of  $\geq 50\%$  of the highest attainable score of 20 is good expectation and perception,  $< 50\%$  is poor expectation and perception. <sup>H<sup>H<sup>H</sup></sup></sup>Highest attainable COVID-19 vaccination process experiences and perceptions score (<sup>L<sup>L<sup>L</sup></sup></sup>Lowest attainable score). <sup>C</sup>COVID-19 vaccination process experiences and perceptions score of  $\geq 50\%$  of the highest attainable score of 20 is positive experience and perception,  $< 50\%$  is negative experience and perception. <sup>D</sup>Knowledge score of  $\geq 75\%$  of the highest attainable score of 44 is good knowledge,  $< 75\%$  is poor knowledge (lowest attainable score is 0) (44 knowledge items scored "1" for each correct response and "0" for each incorrect response). <sup>E</sup>Attitude score of  $\geq 75\%$  of the highest attainable score of 80 is good attitude,  $< 75\%$  is poor attitude (lowest attainable score is 16) (each of 16 attitude items respectively scored from "1" to "5" or "5" to "1" as appropriate for "strongly disagree", "disagree", "not sure", "agree", & "strongly agree"). <sup>F</sup>Practice score of  $\geq 75\%$  of the highest attainable score of 24 is good practice,  $< 75\%$  is poor practice (lowest attainable score is 0) (24 practice items scored "1" for each correct response and "0" for each incorrect response).  
34 \*Among only community members. <sup>A</sup>Among only health workers. PMV=Patent Medicine Vendor. JCHEW=Junior Community Health Extension Worker.  
35 CHEW=Community Health Extension Worker. CHO=Community Health Officer.

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332 experiences and perceptions score (ranging from 0–20). These continuous variables will then  
333 be graded on a two-level scale such that scores  $\geq 50\%$  of the total versus  $< 50\%$  will  
334 respectively be considered to be: strong versus not strong COVID-19 experience and  
335 perception; good versus poor COVID-19 vaccination expectation and perception; and positive  
336 versus negative COVID-19 vaccination process experience and perception.

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3 337 Acceptance factor will be created as the combination of COVID-19 experiences and  
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5 338 perceptions plus COVID-19 vaccination expectations and perceptions and defined as COVID-  
6  
7 339 19 risk-COVID-19 vaccination benefit perception (disease risk-remedy benefit perception  
8  
9 340 (DR-RB/DRRB perception)). Acceptance factor will be in contrast to availability/access factor  
10  
11 341 (COVID-19 vaccination process experience and perception). Acceptance-availability/access  
12  
13 342 factor will be created as the combination of acceptance and availability/access factors.  
14  
15 343 Acceptance factor score (ranging from 0–52 for each participant as the sum of disease-risk  
16  
17 344 perception score (0–32) and remedy-benefit perception score (0–20)) and availability/access  
18  
19 345 factor score (ranging from 0–20) will be converted to percentages of the maximum attainable  
20  
21 346 score for each participant so that the power of acceptance factor and availability/access factor  
22  
23 347 in predicting COVID-19 vaccination acceptance can be compared by comparing how unit  
24  
25 348 increase in the percentage scores (percentage point increase) affect COVID-19 vaccination  
26  
27 349 acceptance. The predictive power of disease-risk perception and remedy-benefit perception  
28  
29 350 will also be compared using similar technique.

30  
31 351 Basic knowledge, attitude, and practices about COVID-19 will be assessed, scored, and  
32  
33 352 categorised as stated in the legend of table 1.

### 34 353 **Outcome measures**

35  
36 354 The outcome measures are as defined in table 2. The primary outcomes among community  
37  
38 355 members and health workers include the intention to receive, timeliness of the intention to  
39  
40 356 receive, uptake, and hesitancy to COVID-19 vaccination. Hesitancy was conceptualized as:  
41  
42 357 non-receipt of a vaccination that is really available and accessible and perceived to be available  
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44 358 and accessible because one did not want to receive it and either intends to receive it at a later  
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46 359 time (delay) or intends not to receive it at a later time (refusal).

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Table 2: Outcome measures and their definitions		
SN	Primary Outcomes	Definitions
	<u>Among community members</u>	
1.	The intention to receive COVID-19 vaccination	The proportion of community members aged 15 years and above, who have not received COVID-19 vaccination, who intend (or plan) to receive COVID-19 vaccination that is available for them to receive. The component outcomes are those who will surely go and receive and those who think they will go and receive the vaccination. This outcome is in contrast to those who do not intend (or plan) to receive COVID-19 vaccination that is available for them to receive – consisting of those who are not sure, those who think they will not go and receive, and those who will surely not go and receive the vaccination.
2.	Timeliness of the intention to receive COVID-19 vaccination	The time (in days) that community members aged 15 years and above, who intend (or plan) to receive COVID-19 vaccination, intend (or plan) to take before they go and receive the vaccination. The component outcomes are the intended time to vaccination among those who will surely go and receive and those who think they will go and receive the vaccination.
3.	The uptake of COVID-19 vaccination	The proportion of community members aged 18 years and above who have received COVID-19 vaccination
4.	The hesitancy to COVID-19 vaccination (delay or refusal to receive)	The proportion of community members aged 18 years and above who have not received COVID-19 vaccination due to reasons that include only non-acceptance factor rather than only real/perceived non-availability/non-access factor or both non-acceptance and real/perceived non-availability/non-access factors. Non-acceptance factor is defined as consisting of one or more of: perceptions that the vaccination is not important, vaccine is not safe, vaccine is not effective, vaccine is new and/or waiting for others to take it first, and hearing of many bad stories about the vaccine. Real/perceived non-availability/non-access factor is defined as consisting of one or more of: ignorance of vaccination availability, ignorance of place and/or time of vaccination, long distance to vaccination site, being too busy, being ill and did not go for vaccination, being ill and went for vaccination but was not given, long waiting time, vaccine stock-out, absence of vaccinator, closure of health facility. The non-acceptance and real/perceived non-availability/non-access factors will be measured as the reasons given by respondents regarding why they have not received COVID-19 vaccination. Delay in receiving COVID-19 vaccination is the intention to receive the vaccination among those that are hesitant. Refusal to receive COVID-19 vaccination is the intention not to receive the vaccination among those that are hesitant.
5.	The intention for the children to receive COVID-19 vaccination	The proportion of community members aged 15 years and above who intend (or plan) for their children to receive COVID-19 vaccination if it is available for them to receive. The component outcomes are those who will surely take their children to receive and those who think they will take their children to receive the vaccination. This outcome is in contrast to those who do not intend (or plan) for their children to receive COVID-19 vaccination – consisting of those who are not sure, those who think they will not take their children to receive, and those who will surely not take their children to receive the vaccination
6.	Timeliness of the intention for the children to receive COVID-19 vaccination	The time (in days) that community members aged 15 years and above, who intend (or plan) for their children to receive COVID-19 vaccination, intend (or plan) to take before they take their children to receive the vaccination. The component outcomes are the intended time to vaccination for their children among those who will surely take their children to receive and those who think they will take their children to receive the vaccination
	<u>Among health workers</u>	
7.	The intention to receive COVID-19 vaccination	As for community members above
8.	Timeliness of the intention to receive COVID-19 vaccination	As for community members above
9.	The uptake of COVID-19 vaccination	As for community members above
10.	The hesitancy to COVID-19 vaccination	As for community members above
SN	Secondary Outcomes	Definitions
	<u>Among community members</u>	
1.	COVID-19 experiences and perceptions	COVID-19 experiences and perceptions score among community members aged 15 years and above
2.		The proportion of community members aged 15 years and above who have strong COVID-19 experience and perception (in contrast to those who have less strong experience and perception)
3.		The proportion of community members aged 15 years and above who have the positive categories of COVID-19 experiences and perceptions (in contrast to those who have the negative categories)
4.	COVID-19 vaccination expectations and perceptions	COVID-19 vaccination expectations and perceptions score among community members aged 15 years and above
5.		The proportion of community members aged 15 years and above who have good COVID-19 vaccination expectation and perception (in contrast to those who have poor expectation and perception)
6.		The proportion of community members aged 15 years and above who have the positive categories of COVID-19 vaccination expectations and perceptions (in contrast to those who have the negative categories)
7.	COVID-19 vaccination process experiences and perceptions	COVID-19 vaccination process experiences and perceptions score among community members aged 15 years and above
8.		The proportion of community members aged 15 years and above who have positive COVID-19 vaccination process experience and perception (in contrast to those who have negative experience and perception)
9.		The proportion of community members aged 15 years and above who have the positive categories of COVID-19 vaccination process experiences and perceptions (in contrast to those who have the negative categories)

Table 2: Continued		
SN	Secondary Outcomes	Definitions
10.	The knowledge of COVID-19	Knowledge score among community members aged 15 years and above
11.		The proportion of community members aged 15 years and above who have good knowledge of COVID-19 (in contrast to those who have poor knowledge)
12.	The attitude towards COVID-19 and COVID-19 vaccination	Attitude score among community members aged 15 years and above
13.		The proportion of community members aged 15 years and above who have good attitude towards COVID-19 and COVID-19 vaccination (in contrast to those who have poor attitude)
14.	The practices about COVID-19	Practice score among community members aged 15 years and above
15.		The proportion of community members aged 15 years and above who have good practice about COVID-19 (in contrast to those who have poor practice)
16.	The main source of information about COVID-19*	The proportion of community members aged 15 years and above whose main source of information about COVID-19 is interpersonal; traditional media; or Internet, social media, & SMS.
17.	The most trusted source of information about COVID-19*	The proportion of community members aged 15 years and above whose most trusted source of information about COVID-19 is interpersonal; traditional media; or Internet, social media, & SMS
	<u>Among health workers</u>	
18.	COVID-19 experiences and perceptions	As for community members above
19.	COVID-19 vaccination expectations and perceptions	As for community members above
20.	COVID-19 vaccination process experiences and perceptions	As for community members above
21.	The knowledge of COVID-19	As for community members above
22.	The attitude towards COVID-19 and COVID-19 vaccination	As for community members above
23.	The practices about COVID-19	As for community members above
24.	The main source of information about COVID-19	As for community members above
25.	The most trusted source of information about COVID-19	As for community members above

\*Interpersonal source includes Family members/Relatives/Friends, Other health workers, Place of work, Place of worship/Religious forums; Traditional media source includes Television, Radio, Prints (Newspaper/Magazine); Internet, social media, & SMS source includes WhatsApp, Facebook, Internet sites, Bulk SMS/Text messages.

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362 Hesitancy to COVID-19 vaccination was measured among the unvaccinated based on the  
 363 concepts of “non-acceptance factor” and real or perceived “non-availability (non-access)  
 364 factor” and delay vs refusal was measured based on intention vs non-intention to receive among  
 365 the unvaccinated (table 2).

366 The secondary outcomes include COVID-19 experiences and perceptions, COVID-19  
 367 vaccination expectations and perceptions, COVID-19 vaccination process experiences and  
 368 perceptions, knowledge of COVID-19, attitude towards COVID-19 and COVID-19  
 369 vaccination, practices about COVID-19, and main source and most trusted source of  
 370 information about COVID-19 (table 2).

### 371 **Measurement of independent factors and study outcomes**

372 Quantitative data will be measured through population-based household survey using  
373 structured community members questionnaire (supplementary file 1) and health workers  
374 survey using structured health workers questionnaire (supplementary file 2). The community  
375 members questionnaire and the health workers questionnaire are virtually the same except for  
376 the absence of identification section and the professional/work-related attributes in the  
377 sociodemographic section of the health worker questionnaire. The questionnaire was designed  
378 with the guide of data published by other studies,<sup>12,34,42,47</sup> the Report of the SAGE Working  
379 Group on Vaccine Hesitancy,<sup>18</sup> the WHO vaccination coverage questionnaire,<sup>83</sup> and basic facts  
380 about COVID-19 on WHO website.<sup>84</sup> The electronic versions of both questionnaires were  
381 programmed using the KoBoToolbox software and were pre-tested in non-participating  
382 clusters.

383 The community members questionnaire will be interviewer administered. The interviewers will  
384 administer the electronic questionnaire with KoBoCollect installed in their android phones or  
385 tablet devices. The interviewers will receive two days training on how to administer the  
386 electronic questionnaire. The training will include a detailed review and explanation of the  
387 questionnaire items, how to obtain consent from respondents, interview techniques, the  
388 translation of key words in the questionnaire to local language, household revisiting techniques,  
389 and how to collect data and upload completed forms with KoBoCollect.

390 During the household survey, all the households will be enumerated and household members  
391 aged 15 years and above in households where verbal consent is given by the heads of  
392 households will be enlisted and assigned unique numbers on a separate paper form before  
393 administering the anonymised electronic questionnaire. To enhance coverage and response,  
394 local residents who have good knowledge of the cluster environment will preferably be the

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3 395 interviewers so that they can visit households when household members are expected to be  
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5 396 around and revisit up to three times as necessary. The community members questionnaire has  
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7 397 seven sections: Identification (including cluster number, household number, participant  
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9 398 number); Sociodemographic characteristics; COVID-19 vaccination acceptance; COVID-19  
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11 399 experiences and perceptions; Basic knowledge of COVID-19; Attitude towards COVID-19 and  
12  
13 400 COVID-19 vaccination; and Practices about COVID-19 (supplementary file 1).  
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17 401 The health worker questionnaire will be both self-administered and interviewer-administered.  
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19 402 The web link for the electronic questionnaire will be distributed to health workers via social  
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21 403 media platform such as WhatsApp. However, interviewers will administer the health workers  
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23 404 questionnaire via KoBoCollect installed in android devices to health workers who do not have  
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25 405 online contact and those living in remote areas with poor internet access. The health workers  
26  
27 406 questionnaire has six sections: Sociodemographic characteristics; COVID-19 vaccination  
28  
29 407 acceptance; COVID-19 experiences and perceptions; Basic knowledge of COVID-19; Attitude  
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31 408 towards COVID-19 and COVID-19 vaccination; and Practices about COVID-19  
32  
33 409 (supplementary file 2).  
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39 410 Qualitative data will be measured through focus group discussions (FGDs) with community  
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41 411 members and health workers. A total of 20 FGDs with community members will be carried out  
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43 412 across 10 clusters with two FGDs (one male-FGD and one female-FGD) per cluster. A total of  
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45 413 14 FGDs with health workers will be conducted, five with non-clinical staff and nine with  
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47 414 clinical staff (five at PHC facilities and four at secondary/tertiary health facilities). The  
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49 415 investigators will conduct the FGDs using FGD guide (supplementary file 3) prepared in  
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51 416 English and pre-tested in non-participating clusters and among some health workers who will  
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53 417 later be exempted from the study. The FGD guides (supplementary file 3) contain step-by-step  
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55 418 instructions and both open-ended and more targeted questions designed to explore the  
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3 419 participants' perceptions about COVID-19, COVID-19 vaccine/vaccination, COVID-19  
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5 420 vaccination process, and the determinants of COVID-19 vaccination acceptance.  
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8 421 Before commencement of each FGD, the investigators will collect background data of  
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10 422 participants including age, sex, marital status, level of education, occupation or cadre, and years  
11  
12 423 of working experience as appropriate. The community members FGDs will be conducted in  
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14 424 local language and the health workers FGDs in English. Each FGD will consist of 7–8  
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16 425 participants (comprising a moderator, a note taker, and the respondents) and will last for about  
17  
18 426 45 minutes. The FGDs will be audio-recorded, the health workers FGDs will be transcribed  
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20 427 and community members FGDs will be translated and transcribed verbatim into English.  
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#### 25 428 **Data management and quality control**

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28 429 The skip logic and validation criteria in KoBoToolbox software was utilized when  
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30 430 programming the electronic questionnaire to enhance the quality of data collection. To  
31  
32 431 minimise the potential bias in assessing the association between COVID-19 and COVID-19  
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34 432 vaccination related experiences and perceptions and uptake of COVID-19 vaccination, the  
35  
36 433 questionnaire items on these factors are subdivided into two subgroups: “have not received  
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38 434 COVID-19 vaccination” and “have received COVID-19 vaccination” and the items in each  
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40 435 subgroup are framed differently, respectively in present tense versus in past tense. For example,  
41  
42 436 those whose response to a preceding question indicate that they have not received COVID-19  
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44 437 vaccination will subsequently respond to the questions: “How fearful are you that you may  
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46 438 have very serious side-effect if you receive COVID-19 vaccination?” “How fearful are you  
47  
48 439 about getting COVID-19?” etc. In contrast, those who have received COVID-19 vaccination  
49  
50 440 will subsequently respond to the questions: “Regarding your experiences and perceptions  
51  
52 441 before the day you received the first dose of COVID-19 vaccination: How fearful were you  
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3 442 that you might have very serious side-effect if you received COVID-19 vaccination?” “How  
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5 443 fearful were you about getting COVID-19?”  
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8 444 To enhance the validity of the questionnaires, after the first drafts, there were several rounds  
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10 445 of systematic review-discussion-correction-redrafting by the research team. During this  
11  
12 446 iterative process, attention was paid to relevance of the questionnaire items to the study  
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14 447 objectives and the logical flow and order, wording, framing, clarity and appropriateness of the  
15  
16 448 questions. The validation process continued until the final version of the questionnaires which  
17  
18 449 were then pre-tested. During the pre-test, respondents’ understanding and interpretation of the  
19  
20 450 items and the options, their response time to individual items and time taken to complete a  
21  
22 451 questionnaire were assessed and the completed questionnaires were reviewed for any problems.  
23  
24 452 Minor adjustments were made thereafter.  
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30 453 The household interviewers will upload only completed anonymised questionnaires to the  
31  
32 454 online survey records at the end of each day’s survey and the transmitted questionnaires will  
33  
34 455 be reviewed for missing, incoherent, and illogical data. Any identified error will immediately  
35  
36 456 be communicated to the respective interviewers for correction by cross-checking with the  
37  
38 457 respective respondents. The investigators will supervise the household survey interviewers and  
39  
40 458 will revisit at least 20 eligible households per cluster with a specialised form of the survey  
41  
42 459 questionnaire to double check on responses and coverage.  
43  
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46

47 460 Multiple submissions of the self-administered electronic questionnaire from a health worker  
48  
49 461 on the same device and browser will be prevented by deploying the questionnaire through the  
50  
51 462 online-only (once per respondent) option in KoBoToolbox. However, in any case where a  
52  
53 463 health worker who has completed the questionnaire agrees to give the android phone to any co-  
54  
55 464 worker – who do not have android phone or online address but is willing to participate in the  
56  
57 465 survey – to respond to the questionnaire, a web link for online-only (single submission) will be  
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3 466 sent to such health worker. The data utility in Stata will be used to check for duplicated  
4  
5 467 submissions (observations) and if found, only one will be kept, the duplicates will be deleted  
6  
7 468 from the dataset. Participation of study participants in the FGDs before the questionnaire  
8  
9  
10 469 surveys will be prevented. During the translation and transcribing of the community members  
11  
12 470 FGDs, exact and meaning-based translation will be used. The FGD transcripts will be  
13  
14  
15 471 compared with the original recording to check for 'accuracy' before conducting analyses.

## 17 18 472 **Sample size**

19  
20  
21 473 Sample size is estimated using Stata/SE version 15.1 (Stata Corp, College Station, TX, USA).  
22  
23 474 For the community members survey, assuming a conservative estimate of 50% for the primary  
24  
25 475 outcome (the proportion of community members who have not received COVID-19  
26  
27 476 vaccination who intend (or plan) to receive COVID-19 vaccination that is available for them  
28  
29 477 to receive) among the community members who have not strong COVID-19 experience and  
30  
31  
32 478 perception and 56% among those who have strong COVID-19 experience and perception, 80%  
33  
34 479 power at 2.5% probability of type one error (to correct for multiple comparisons),<sup>85</sup> 2630 is the  
35  
36 480 minimum total sample size required to detect the 6%-point difference in this primary outcome  
37  
38  
39 481 between both comparison groups. Allowance for 70% response rate will increase the sample  
40  
41 482 size to 3758. To account for cluster sampling, 3758 is multiplied by a conservative estimate of  
42  
43 483 design effect of 4 to give a final minimum total sample size of 15032. As the clusters that will  
44  
45 484 be selected to participate in the study are those with minimum population size of 1000 per  
46  
47 485 cluster, and with 540 (54%) of the population expectedly falling within the age group of 15  
48  
49 486 years and above,<sup>86</sup> the study requires 28 clusters (15032/540) for the community members  
50  
51  
52 487 survey.

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55  
56 488 Using similar parameters, the health workers survey requires a minimum total sample size of  
57  
58 489 940 to detect a 10%-point difference in this primary outcome between both comparison groups  
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3 490 (50% versus 60%). Because of the nature of the survey, such as the use of social media  
4  
5  
6 491 platforms for distribution of the (self-administered) questionnaire, the length of the  
7  
8 492 questionnaire, and the sampling technique (convenience and snowball), allowance for 50%  
9  
10 493 acceptance rate to account for both non-response and incomplete response will increase the  
11  
12 494 minimum total sample size for the health worker survey to 1880. Also, due to the nature of the  
13  
14 495 survey, the 1880 is perhaps more of the number of health workers that will be targeted for  
15  
16 496 distribution of the questionnaire rather than for selection to participate in the survey.

### 17 497 **Sampling technique (Recruitment)**

18  
19  
20  
21  
22  
23 498 Community members will be selected by stratified cluster sampling technique. The sampling  
24  
25 499 frame will be the list of clusters obtained from the Ebonyi state ministry of health. The eligible  
26  
27 500 clusters will be stratified into two: rural and urban/semi-urban. A random sample of 21 clusters  
28  
29 501 will be selected from the rural stratum and a random sample of 7 clusters will be selected from  
30  
31 502 the urban/semi-urban stratum using the “sample” command in Stata. This will give a 3:1 rural  
32  
33 503 to urban ratio. If verbal consent/permission is not given by any of the selected cluster(s) head(s)  
34  
35 504 before commencement of household survey, replacement cluster(s) will be selected from the  
36  
37 505 remaining list of eligible clusters using the same technique. The study profile is shown in figure  
38  
39 506 2. In each of the selected clusters, all the households will be enumerated and all individuals  
40  
41 507 aged 15 year and above in each household will be selected for the community members survey.  
42  
43 508 About five to six eligible male and female community members, both those who have received  
44  
45 509 and those who have not received COVID-19 vaccination, in 10 clusters will be selected  
46  
47 510 purposively for FGDs.

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54 511 Health workers will be selected by convenience and snowballing techniques. To increase  
55  
56 512 acceptance rate, the research team will first make a physical and or phone contact with as many  
57  
58 513 health workers as possible to invite them to participate in the survey and seek their consent and  
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3 514 permission for the web link for the self-administered electronic questionnaire to be sent to them  
4  
5 515 via online platforms. For those who give consent and permission, the address or phone number  
6  
7 516 of their preferred online platform will be recorded and the web link for the questionnaire will  
8  
9 517 be sent to their private online pages. They will be implored to forward the web link to other  
10  
11 518 health workers that they know within the study area after they have completed the  
12  
13 519 questionnaires. The research team will send the web link for the questionnaire to the online  
14  
15 520 contacts (such as WhatsApp phone numbers) of as many eligible health workers as possible,  
16  
17 521 including both private and group pages. Interviewers will also use convenience sampling in  
18  
19 522 administering the health workers questionnaire (via KoBoCollect installed in android devices)  
20  
21 523 to those who do not have online contact and those living in remote areas with poor internet  
22  
23 524 connectivity. About five to six eligible health workers, both those who have received and those  
24  
25 525 who have not receive COVID-19 vaccination, will be selected purposively for FGDs.  
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### 31 526 **Data analyses**

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34 527 Data will be analysed using Stata/SE version 15.1 (Stata Corp, College Station, TX, USA).  
35  
36 528 Analyses of the community members data will be based on population-averaged models that  
37  
38 529 account for clustering. Point estimates of the outcome measures will be computed for each  
39  
40 530 comparison group as defined in the study hypotheses. Each hypothesis with dichotomous or  
41  
42 531 categorical independent factor will be tested by computing prevalence difference (with 97.5%  
43  
44 532 CI and p-values) in binary outcome measure using binomial identity, and mean difference (with  
45  
46 533 97.5% CI and p-values) in continuous outcome measure using gaussian identity, generalized  
47  
48 534 estimating equations (GEE) with an exchangeable correlation matrix and robust standard  
49  
50 535 errors. Each hypothesis with continuous independent factor will be tested by computing  
51  
52 536 coefficient (with 97.5% CI and p-values) in binary and continuous outcome measures,  
53  
54 537 respectively using the binomial identity and gaussian identity GEE models.  
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3 538 For each independent factor (in a hypothesis) being tested, adjusted analysis will be done by  
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5 539 in-putting into the GEE model the other independent factors as appropriate. For clarity, the  
6  
7  
8 540 potential independent factors to control for are presented in table 3. Both unadjusted and  
9  
10 541 adjusted results will be reported. If the binomial identity GEE model fails to run or convergence  
11  
12 542 is not achieved, gaussian identity GEE model, or generalized least square (GLS) random-  
13  
14 543 effects linear regression model (with robust standard errors), or maximum likelihood (ML)  
15  
16 544 random-effects linear regression model will be used instead.<sup>87</sup>

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20 545 The same analytic technique will be used for the analyses of the health workers data except  
21  
22 546 that generalized linear model (GLM) with robust standard errors will be used in place of GEE  
23  
24 547 model because of the absence of cluster design in the health worker survey.

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28 548 Summary statistics will be used to assess COVID-19 vaccination acceptance (the intention to  
29  
30 549 receive, timeliness of the intention to receive, uptake, and hesitancy); COVID-19 experiences  
31  
32 550 and perceptions; COVID-19 vaccination expectations and perceptions; COVID-19 vaccination  
33  
34 551 process experiences and perceptions; knowledge, attitude, and practices about COVID-19; and  
35  
36 552 sources of information about COVID-19 among community members and health workers.

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40 553 The qualitative data (focus group discussion transcripts) will be analysed thematically based  
41  
42 554 on pre-determined themes in the study's conceptual framework. The qualitative data will be  
43  
44 555 analysed, interpreted, and presented independently of the quantitative data.

#### 45 46 47 48 556 **Ethics and dissemination**

49  
50  
51 557 Ethical approval for this study was obtained from the Ebonyi State Health Research and Ethics  
52  
53 558 Committee (EBSHREC/15/01/2022-02/01/2023) and Research and Ethics Committee of Alex  
54  
55 559 Ekwueme Federal University Teaching Hospital Abakaliki (14/12/2021-17/02/2022). The  
56  
57 560 investigators will obtain verbal consent/permission from the heads of the selected clusters.

Table 3: Independent factors to in-put into multivariate models in adjusted analyses		
	Independent factors under test	Independent factors to control for (as appropriate)
Primary hypotheses		
1.	Extent of COVID-19 experience and perception	COVID-19 vaccination expectation and perception level; COVID-19 vaccination process experience and perception level; Basic knowledge of COVID-19; Attitude towards COVID-19 and COVID-19 vaccination; Practices about COVID-19; Source of information about COVID-19 (Main source and Most trusted source of information about COVID-19); Sociodemographic characteristics (Gender, Age, Marital status, Educational level, Occupation*, Residence*, Monthly income/income score*); Professional or work-related attributes <sup>^</sup> (Work category (clinical and non-clinical), Years of working experience, Primary place of work (public and private), Level of primary place of work (primary, secondary, and tertiary))
2.	COVID-19 experiences and perceptions score	COVID-19 vaccination expectations and perceptions score; COVID-19 vaccination process experiences and perceptions score; Basic knowledge of COVID-19, Attitude towards COVID-19 and COVID-19 vaccination; Practices about COVID-19; Source of information about COVID-19; Sociodemographic characteristics; Work-related attributes <sup>^</sup>
3.	COVID-19 vaccination expectation and perception level	Extent of COVID-19 experience and perception; COVID-19 vaccination process experience and perception level; Basic knowledge of COVID-19; Attitude towards COVID-19 and COVID-19 vaccination; Practices about COVID-19; Source of information about COVID-19; Sociodemographic characteristics; Work-related attributes <sup>^</sup>
4.	COVID-19 vaccination expectations and perceptions score	COVID-19 experiences and perceptions score; COVID-19 vaccination process experiences and perceptions score; Basic knowledge of COVID-19; Attitude towards COVID-19 and COVID-19 vaccination; Practices about COVID-19; Source of information about COVID-19; Sociodemographic characteristics; Work-related attributes <sup>^</sup>
5.	Acceptance factor level (COVID-19 risk-COVID-19 vaccination benefit perception or disease risk-remedy benefit perception level)	Availability/access factor level (COVID-19 vaccination process experience and perception level); Basic knowledge of COVID-19; Attitude towards COVID-19 and COVID-19 vaccination; Practices about COVID-19; Source of information about COVID-19; Sociodemographic characteristics; Work-related attributes <sup>^</sup>
6.	COVID-19 vaccination process experience and perception level	Extent of COVID-19 experience and perception; COVID-19 vaccination expectation and perception level; Basic knowledge of COVID-19; Attitude towards COVID-19 and COVID-19 vaccination; Practices about COVID-19; Source of information about COVID-19; Sociodemographic characteristics; Work-related attributes <sup>^</sup>
7.	COVID-19 vaccination process experiences and perceptions score	COVID-19 experiences and perceptions score; COVID-19 vaccination expectations and perceptions score; Basic knowledge of COVID-19; Attitude towards COVID-19 and COVID-19 vaccination; Practices about COVID-19; Source of information about COVID-19; Sociodemographic characteristics; Work-related attributes <sup>^</sup>
8.	Acceptance-availability/access factor level	Basic knowledge of COVID-19; Attitude towards COVID-19 and COVID-19 vaccination; Practices about COVID-19; Source of information about COVID-19; Sociodemographic characteristics; Work-related attributes <sup>^</sup>
9.	Acceptance factor score and availability/access factor score	Basic knowledge of COVID-19; Attitude towards COVID-19 and COVID-19 vaccination; Practices about COVID-19; Source of information about COVID-19; Sociodemographic characteristics; Work-related attributes <sup>^</sup>
10.	COVID-19 experiences & perceptions <sup>a</sup> , COVID-19 vaccination expectations & perceptions <sup>b</sup> , COVID-19 vaccination process experiences & perceptions <sup>c</sup>	COVID-19 experiences & perceptions <sup>a</sup> , COVID-19 vaccination expectations & perceptions <sup>b</sup> , COVID-19 vaccination process experiences & perceptions <sup>c</sup> (as appropriate); Basic knowledge of COVID-19, Attitude towards COVID-19 and COVID-19 vaccination; Practices about COVID-19; Source of information about COVID-19; Sociodemographic characteristics; Work-related attributes <sup>^</sup>
Secondary hypotheses		
1.	Knowledge of COVID-19	Attitude towards COVID-19; Practices about COVID-19; Source of information about COVID-19; Sociodemographic characteristics; Work-related attributes <sup>^</sup> ; Extent of COVID-19 experience and perception; COVID-19 vaccination expectation and perception level; COVID-19 vaccination process experience and perception level
2.	Attitude towards COVID-19	Knowledge of COVID-19; Practices about COVID-19; Source of information about COVID-19; Sociodemographic characteristics; Work-related attributes <sup>^</sup> ; Extent of COVID-19 experience and perception; COVID-19 vaccination expectation and perception level; COVID-19 vaccination process experience and perception level
3.	Practices about COVID-19	Knowledge of COVID-19; Attitude towards COVID-19; Source of information about COVID-19; Sociodemographic characteristics; Work-related attributes <sup>^</sup> ; Extent of COVID-19 experience and perception; COVID-19 vaccination expectation and perception level; COVID-19 vaccination process experience and perception level
4.	Main source of information about COVID-19	Most trusted source of information about COVID-19; Sociodemographic characteristics; Work-related attributes <sup>^</sup> ; Extent of COVID-19 experience and perception; COVID-19 vaccination expectation and perception level; COVID-19 vaccination process experience and perception level
5.	Most trusted source of information about COVID-19	Main source of information about COVID-19; Sociodemographic characteristics; Work-related attributes <sup>^</sup> ; Extent of COVID-19 experience and perception; COVID-19 vaccination expectation and perception level; COVID-19 vaccination process experience and perception level
6.	A sociodemographic characteristic	Other sociodemographic characteristics; Source of information about COVID-19; Work-related attributes <sup>^</sup> ; Extent of COVID-19 experience and perception; COVID-19 vaccination expectation and perception level; COVID-19 vaccination process experience and perception level
7.	A professional or work-related attribute <sup>^</sup>	Other professional or work-related attributes <sup>^</sup> ; Source of information about COVID-19; Sociodemographic characteristics; Extent of COVID-19 experience and perception; COVID-19 vaccination expectation and perception level; COVID-19 vaccination process experience and perception level

\*Among only community members. <sup>^</sup>Among only health workers. <sup>a</sup>Fear of getting COVID-19, possible to get (severe) COVID-19, ever had COVID-19, and knowledge of any person who have had COVID-19. <sup>b</sup>Importance of COVID-19 vaccination, fear of having severe side-effect from COVID-19 vaccination, protection from receiving COVID-19 vaccination, trust for the health workers who give COVID-19 vaccination, trust for the government who made COVID-19 vaccination available <sup>c</sup>Ever heard COVID-19 vaccination was available for receipt and knowledge of a COVID-19 vaccination place.

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3 562 During the household survey the interviewers will obtain verbal consent from the household  
4  
5 563 members aged 18 years and above and assent from household members aged less than 18 years  
6  
7 564 (after obtaining consent from the heads of households). The health workers will be informed  
8  
9 565 that only those that give consent should take the online survey. The moderators of the focus  
10  
11 566 group discussions (FGDs) will obtain verbal consent from the respondents before each FGD.  
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15 567 The purpose of the study, the kind of participation, likely duration of participation, voluntary  
16  
17 568 nature of participation, absence of potential harm, potential benefit, and confidential nature of  
18  
19 569 the study will be communicated to participants as required. The online record of the  
20  
21 570 anonymised quantitative data will be passworded and the audio recordings and the electronic  
22  
23 571 verbatim transcript of the FGDs will be stored in a passworded computer to prevent  
24  
25 572 unauthorised access.  
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30 573 Study findings will be reported at local, national, and international levels in high impact peer-  
31  
32 574 reviewed journals and conferences as appropriate.  
33  
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### 35 575 **Patients and public involvement**

36  
37  
38 576 Patients or the public were not involved in the design and reporting or dissemination plans  
39  
40 577 and will not be involved in the conduct of our research.  
41  
42  
43

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45

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47  
48 580 wrote the protocol and the manuscript. OI, RLE, CIA, OOU, VUU, ASA, COI, OON, OOU, and IMO contributed to the  
49  
50 581 development of the study design, data collection tools, and original protocol. GEN and UIAN contributed to the  
51  
52 582 development of the study design, data collection tools, and final version of the protocol. All authors contributed to the  
53  
54 583 revision of the manuscript and read, edited, and approved the final manuscript.  
55

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58 585 sectors.  
59

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## 822 **Figure legend**

823 Figure 1: Study conceptual framework

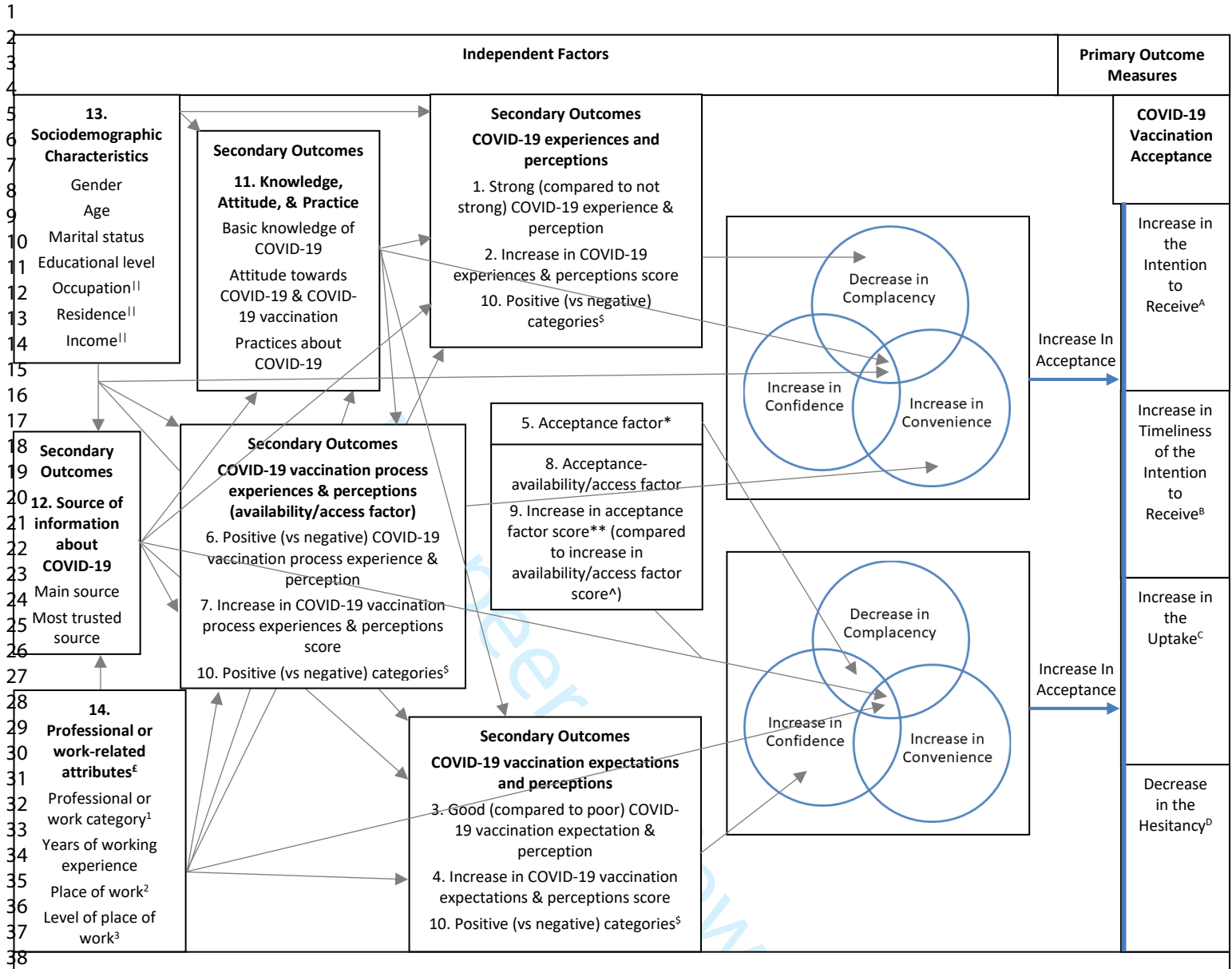
824 Figure 2: Summary of study profile

## 825 **Supplemental files**

826 Supplementary file 1: COVID-19 Vaccination Questionnaire\_Community Members

827 Supplementary file 2: COVID-19 Vaccination Questionnaire\_Health Workers

828 Supplementary file 3: FGD Guide\_Community Members and Health Workers



**Figure 1: Study conceptual framework**

<sup>A</sup>Measured as the proportion of participants who intended to receive covid-19 vaccination. <sup>B</sup>Measured as the time (in days) the participants, who intended to receive covid-19 vaccination, intended to take before they go and receive the COVID-19 vaccination (increase in timeliness means decrease in the intended days to vaccination). <sup>C</sup>Measured as the proportion of participants who had received covid-19 vaccination (including those who had completed the doses and those who had not). <sup>D</sup>Measured as the proportion of participants who had not received covid-19 vaccination due only to non-acceptance factor (perceptions that the vaccination was not important, vaccine was not safe, vaccine was not effective etc) rather than real or perceived non-availability (non-access) factor (ignorance of vaccination availability, long distance to place of vaccination, vaccine stock-out etc) or both. <sup>5</sup>As depicted in table 1. \*COVID-19 risk-COVID-19 vaccination benefit perception or disease risk-remedy benefit perception (DR-RB or DRRB perception)). \*\*Increase in COVID-19 risk-COVID-19 vaccination benefit perceptions score or DR-RB perception score. <sup>^</sup>Increase in COVID-19 vaccination process experience & perception score. <sup>||</sup>Among only community members. <sup>f</sup>Among only health workers. <sup>1</sup>Clinical and non-clinical. <sup>2</sup>Public and private. <sup>3</sup>Primary, secondary, and tertiary.



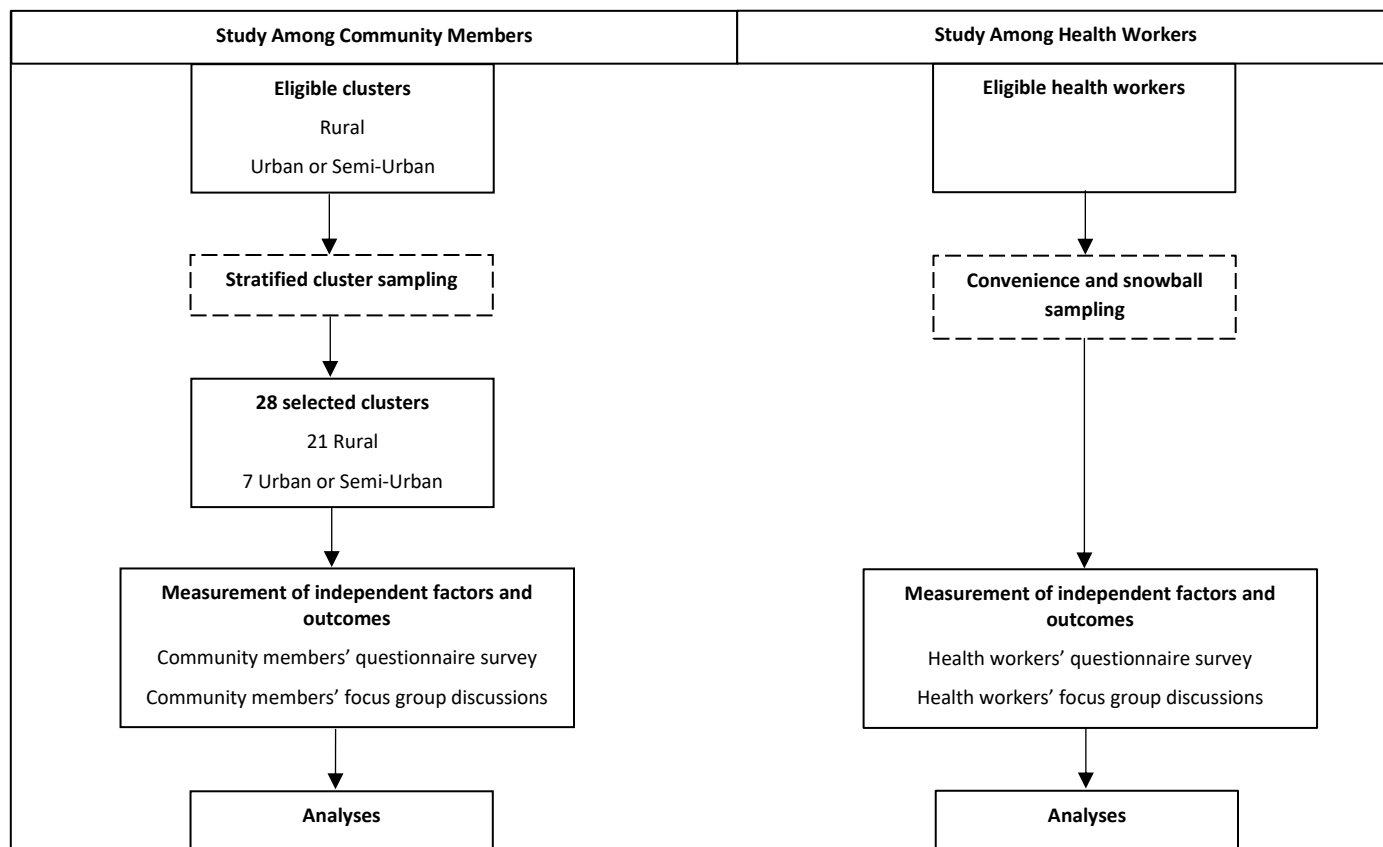


Figure 2: Summary of study profile

Review only

## COVID-19 AND COVID-19 VACCINATION QUESTIONNAIRE FOR COMMUNITY MEMBERS

**NOTE:** Only Household Members Aged 15 years and Above Who Give Verbal Consent (or Assent) are Eligible to Participate in this Survey.

**Identification – Section 1**

1. Cluster ID Number: \_\_\_\_\_
2. Household ID Number (last 3 digits of household number): \_\_\_\_\_
3. Participant (Respondent) ID Number: \_\_\_\_\_
4. GPS
5. Date of interview (Year/Month/Day)

**Sociodemographic Characteristics – Section 2**

6. What is your Gender?
  1. Male
  2. Female
7. Age in years: How old were you during your last birthday? Number: \_\_\_\_\_
8. What is your Marital Status? **Probe:**
  1. Married
  2. Separated/Divorced
  3. Widowed
  4. Never married (Single)
9. What is your Educational Level? **Probe:**
  1. No formal education
  2. Some primary
  3. Completed primary
  4. Some secondary
  5. Completed secondary
  6. NCE/Diploma (ND, OND) (Tertiary)
  7. HND/First Degree (Tertiary)
  8. Masters/PHD/Other Equivalent (Tertiary)

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3 10. What is your Main Occupation? **NOTE: Record the most suitable option:**  
4

- 5 1. Farmer  
6 2. Trader  
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8 3. Other-self-employment  
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10 4. Private paid work  
11 5. Government paid work  
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13 6. Housewife  
14  
15 7. Student  
16  
17 8. Apprentice  
18  
19 9. Youth service (Corper)  
20  
21 10. None

22 11. What is your Usual Monthly Income in NGN from all sources including remittances and “pocket  
23 money” if any? **Probe:**

- |    |                       |                        |                          |
|----|-----------------------|------------------------|--------------------------|
| 24 | 25 1. No income       | 26 7. 101,000–120,000  | 27 13. 221,000–240,000   |
| 28 | 29 2. 20,000 and less | 30 8. 121,000–140,000  | 31 14. 241,000–260,000   |
| 32 | 33 3. 21,000–40,000   | 34 9. 141,000–160,000  | 35 15. 261,000–280,000   |
| 36 | 37 4. 41,000–60,000   | 38 10. 161,000–180,000 | 39 16. 281,000–300,000   |
| 40 | 41 5. 61,000–80,000   | 42 11. 181,000–200,000 | 43 17. More than 300,000 |
| 44 | 45 6. 81,000–100,000  | 46 12. 201,000–220,000 |                          |

47 **COVID-19 Vaccination Acceptance – Section 3**

48 12. Have you received COVID-19 vaccination?

- 49 1. Yes  
50 2. No

51 **NOTE: No. 13–27 is for those who have received COVID-19 vaccination:**

52 13. Which of the COVID-19 vaccination doses have you received? **Probe:**

- 53 1. First dose only  
54 2. Second dose only  
55 3. Second dose plus Booster

56 14. If no. 13 above is 1: Why have you not received the second dose of COVID-19 vaccination? **NOTE:**

57 **Multiple responses: Probe for respondent to select all that apply:**

- 58 1. No vaccine when you went (stock-out)  
59 2. No vaccinator when you went (health facility not Closed)  
60

3. Health facility was closed when you went
4. Place of vaccination was too far
5. You were too busy
6. You were ill and did not go for the remaining dose
7. You were ill, went but was not given the remaining dose
8. You had serious side effects from the first dose
9. The time for the second dose has not reached
10. Other (specify below)

15. If no. 14 above includes 10: Other reason, please specify. Phrase: \_\_\_\_\_

16. If no. 13 above is 2: Why have you not received a booster dose of COVID-19 vaccination? **NOTE:**

**Multiple responses: Probe for respondent to select all that apply:**

1. You are not aware of booster dose
2. You do not need booster dose (it is not important)
3. No vaccine when you went (stock-out)
4. No vaccinator when you went (health facility not Closed)
5. Health facility was closed when you went
6. Place of vaccination was too far
7. You were too busy
8. You were ill and did not go for the booster dose
9. You were ill, went but was not given the booster dose
10. You had serious side effects from the second dose
11. The time for a booster dose has not reached
12. Other (specify below)

17. If no. 16 above includes 12: Other reason, please specify. Phrase: \_\_\_\_\_

18. Regarding your experiences and perceptions before the day you received the first dose of COVID-19 vaccination: How often did you hear that COVID-19 vaccination was available for you to go and receive? **Probe:**

1. You heard about it many times before the day you received it
2. You heard about it few times (or once) before the day you received it
3. Not sure about it
4. You did not hear about it before the day you received it
5. You did not hear about it at all before the day you received it

19. Regarding your experiences and perceptions before the day you received the first dose of COVID-19 vaccination: Did you know any place or health facility where they gave COVID-19 vaccination? **Probe:**

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1. Yes, a place that was very close
  2. Yes, a place that was close
  3. Yes, a place that was far
  4. Yes, a place that was very far
  5. No, you did not know any place before the day you received COVID-19 vaccination

20. If no. 19 above is 1 or 2 or 3 or 4: Regarding your experiences and perceptions before the day you received the first dose of COVID-19 vaccination: How frequently were they giving COVID-19 vaccination at that place you mentioned above? **Probe:**

1. Daily or two/three times a week
2. Once a week
3. Once every two weeks/every month
4. No fixed time (not regular)
5. You did not know how frequently they were giving COVID-19 vaccination before the day you received it

21. If no. 19 above is 1 or 2 or 3 or 4: Regarding your experiences and perceptions before the day you received the first dose of COVID-19 vaccination: How was the queue (waiting time) at the place of vaccination that you mentioned above?

1. There was usually no queue (very short waiting time)
2. There was usually short queue (short waiting time)
3. You did not know what the queue (waiting time) was
4. There was usually long queue (long waiting time)
5. There was usually very long queue (very long waiting time)

22. If no. 19 above is 1 or 2 or 3 or 4: Regarding your expectations and perceptions before the day you received the first dose of COVID-19 vaccination: How caring (or kind/friendly) were the health workers at the place of vaccination that you mentioned above? **Probe:**

1. They were very caring
2. They were caring
3. Not sure whether they were caring or not
4. They were not caring
5. They were not caring at all

23. Regarding your expectations and perceptions before the day you received the first dose of COVID-19 vaccination: How important did you think it was for you to receive COVID-19 vaccination? **Probe:**

1. It was very important
2. It was important

3. Not sure whether it was important or not
4. It was not important
5. It was not important at all

24. **Regarding your expectations and perceptions before the day you received the first dose of COVID-19**

**vaccination:** How fearful were you that you might have severe or very serious side-effect if you received COVID-19 vaccination? **Probe:**

1. You were not fearful at all
2. You were not fearful
3. Not sure about it
4. You were a little fearful
5. You were very fearful

25. **Regarding your expectations and perceptions before the day you received the first dose of COVID-19**

**vaccination:** What protection did you think COVID-19 vaccination would give you if you received it?

**Probe:**

1. Full or complete protection from COVID-19
2. Partial or incomplete protection from COVID-19
3. You were not sure about it
4. No protection from COVID-19
5. No protection at all from COVID-19

26. **Regarding your expectations and perceptions before the day you received the first dose of COVID-19**

**vaccination:** How did you trust the health workers who gave COVID-19 vaccination?

1. You trusted them very much
2. You trusted them
3. Not sure about it
4. You did not trust them
5. You did not trust them at all

27. **Regarding your expectations and perceptions before the day you received the first dose of COVID-19**

**vaccination:** How did you trust the federal and state governments who made the COVID-19 vaccination available for people to receive? **Probe:**

1. You trusted them very much
2. You trusted them
3. Not sure about it
4. You did not trust them
5. You did not trust them at all

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3 **NOTE: No. 28–43 is for those who have not received COVID-19 vaccination:**

4 28. Have you ever heard that COVID-19 vaccination is available for you to go and receive? **Probe:**

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6 1. Yes, you heard about it many times  
7  
8 2. Yes, you heard about it few times (or once)  
9  
10 3. Not sure  
11  
12 4. No, you have not heard about it  
13  
14 5. No, you have not heard about it at all

15 29. Do you know any place or health facility where they give COVID-19 vaccination? **Probe:**

- 16  
17 1. Yes, a place that is very close  
18  
19 2. Yes, a place that is close  
20  
21 3. Yes, a place that is far  
22  
23 4. Yes, a place that is very far  
24  
25 5. No, you do not know any place

26 30. If no. 29 above is 1 or 2 or 3 or 4: How frequently do they give COVID-19 vaccination at that place  
27 you mentioned above? **Probe:**

- 28  
29 1. Daily or two/three times a week  
30  
31 2. Once a week  
32  
33 3. Once every two weeks/every month  
34  
35 4. No fixed time (not regular)  
36  
37 5. Do not know

38 31. If no. 29 above is 1 or 2 or 3 or 4: How is the queue (waiting time) at the place of vaccination that  
39 you mentioned above? **Probe:**

- 40  
41 1. There is usually no queue (very short waiting time)  
42  
43 2. There is usually short queue (short waiting time)  
44  
45 3. Do not know  
46  
47 4. There is usually long queue (long waiting time)  
48  
49 5. There is usually very long queue (very long waiting time)

50 32. If no. 29 above is 1 or 2 or 3 or 4: How caring (or kind/friendly) are the health workers at the place  
51 of vaccination that you mentioned above? **Probe:**

- 52  
53 1. They are very caring  
54  
55 2. They are caring  
56  
57 3. You are not sure about it  
58  
59 4. They are not caring  
60  
5. They are not caring at all

1  
2  
3 33. If no. 12 above is 2 & no. 7 above is  $\geq 18$ : Why have you not received COVID-19 vaccination? **NOTE:**

4  
5 **Multiple responses: Probe for respondent to select all that apply:**

- 6 1. You do not need the vaccine (it is not important)
- 7
- 8 2. You think the vaccine is not safe (you think it is harmful)
- 9
- 10 3. You think the vaccine is not effective
- 11
- 12 4. You have been hearing bad stories about the vaccine
- 13
- 14 5. The vaccine is new and/or you want others to take it first
- 15
- 16 6. You do not know the place and/or time of vaccination
- 17
- 18 7. Place of vaccination is too far
- 19
- 20 8. You have been too busy
- 21
- 22 9. You have been ill and did not go for vaccination
- 23
- 24 10. You have been ill, went but was not given vaccination
- 25
- 26 11. Long waiting time (long queue)
- 27
- 28 12. No vaccine (stock-out) when you went
- 29
- 30 13. No vaccinator (health facility not closed) when you went
- 31
- 32 14. Health facility was closed when you went
- 33
- 34 15. You are not aware of it
- 35
- 36 16. Other (specify below)

37 34. If no. 33 above includes 16: Other reason, please specify. Phrase: \_\_\_\_\_

38 35. How important is it for you to receive COVID-19 vaccination? **Probe:**

- 39 1. Very important for me to receive it
- 40 2. Important for me to receive it
- 41 3. Not sure about it
- 42 4. Not important for me to receive it
- 43 5. Not important at all for me to receive it

44 36. How fearful are you that you may have severe or very serious side-effect if you receive COVID-19 vaccination? **Probe:**

- 45 1. Not fearful at all
- 46 2. Not fearful
- 47 3. Not sure about it
- 48 4. A little fearful
- 49 5. Very fearful

50 37. What protection will COVID-19 vaccination give you if you receive it? **Probe:**

- 51 1. Full or complete protection from COVID-19
- 52
- 53
- 54
- 55
- 56
- 57
- 58
- 59
- 60



1  
2  
3 2. Partial or incomplete protection from COVID-19

4  
5 3. Not sure about it

6  
7 4. No protection from COVID-19

8  
9 5. No protection at all from COVID-19

10 38. How do you trust the health workers who give COVID-19 vaccination? **Probe:**

11  
12 1. You trust them very much

13  
14 2. You trust them

15  
16 3. Not sure about it

17  
18 4. You do not trust them

19  
20 5. You do not trust them at all

21 39. How do you trust the federal and state governments who made the COVID-19 vaccination  
22 available for people to receive? **Probe:**

23  
24 1. You trust them very much

25  
26 2. You trust them

27  
28 3. Not sure about it

29  
30 4. You do not trust them

31  
32 5. You do not trust them at all

33 40. Do you intend (or plan) to receive COVID-19 vaccination that is available for you to receive?

34 **Probe:**

35  
36 1. Yes, you will surely go and receive the vaccination

37  
38 2. Yes, you think you will go and receive the vaccination

39  
40 3. Not sure about it

41  
42 4. No, you think you will not go and receive the vaccination

43  
44 5. No, you will surely not go and receive the vaccination

45 **NOTE: If 3 or 4 or 5: Skip to no. 35**

46 41. If no. 40 above is 1 or 2: How long will it take before you go and receive the COVID-19 vaccination?

47 Number (in days): \_\_\_\_\_ **NOTE: Record Response in DAYS (Convert Weeks, Months, and Years to**  
48 **DAYS). NOTE: Record "2000" for "do not know"**

49  
50  
51 42. If no. 40 above is 3 or 4 or 5: What is/are the reasons why you do not intend (or plan) to receive  
52 COVID-19 vaccination or are not sure about it? **NOTE: Multiple responses: Probe for respondent to select**  
53 **all that apply:**

54  
55  
56 1. You do not need the vaccine (it is not important)

57  
58 2. You think the vaccine is not safe (I think it is harmful)

59  
60 3. You think the vaccine is not effective

4. You have been hearing bad stories about the vaccine
5. The vaccine is new and/or I want others to take it first
6. You do not know the place and/or time of vaccination
7. Place of vaccination is too far
8. Other reason (specify below)

43. If no. 42 above includes 8: Other reason, please specify. Phrase: \_\_\_\_\_

**NOTE: No. 44–51 is for all**

44. Do you have a child or children? 1=Yes 2=No. If 2: Skip to 52

45. How important is it for your child or children to receive COVID-19 vaccination if it is available for them to receive? **Probe:**

1. Very important for them to receive it
2. Important for them to receive it
3. Not sure about it
4. Not important for them to receive it
5. Not important at all for them to receive it

46. How fearful are you that your child/children may have severe or very serious side-effect if they receive COVID-19 vaccination that is available for them to receive? **Probe:**

1. Not fearful at all
2. Not fearful
3. Not sure about it
4. A little fearful
5. Very fearful

47. What protection will COVID-19 vaccination give your child or children if they receive the one that is available for them to receive? **Probe:**

1. It will give them full or complete protection from COVID-19
2. It will give them partial or incomplete protection from COVID-19
3. Not sure about it
4. It will give them no protection from COVID-19
5. It will give them no protection at all from COVID-19

48. Do you intend (or plan) for your child or children to receive COVID-19 vaccination if it is available for them to receive at [NAME OF CATCHMENT HEALTH FACILITY]?

1. Yes, you will surely take your child or children to receive the vaccination

2. Yes, you think you will take your child or children to receive the vaccination
3. Not sure about it
4. No, you think you will not take your child or children to receive the vaccination
5. No, you will surely not take your child or children to receive the vaccination

**NOTE: If 3 or 4 or 5: Skip to 50**

49. If no. 48 above is 1 or 2: How long will it take before you take your child or children to receive the COVID-19 vaccination if it is available for them to receive at [NAME OF CATCHMENT HEALTH FACILITY]? Number (in days): \_\_\_\_\_ **NOTE: Record Response in DAYS (Convert Weeks, Months, and Years to DAYS)**

50. If no. 48 above is 3 or 4 or 5: What is/are the reasons why you do not intend (or plan) for your child or children to receive the COVID-19 vaccination if it is available for them to receive at [NAME OF CATCHMENT HEALTH FACILITY] or are not sure about it? **NOTE: Multiple responses: Probe for respondent to select all that apply:**

1. The child/children do not need the vaccine (it is not important)
2. You think the vaccine is not safe (I think it is harmful)
3. You think the vaccine is not effective
4. You have been hearing bad stories about the vaccine
5. The vaccine is new and/or You want others to take it first
6. Other reason (specify below)

51. If no. 49 above includes 6: Other reason, please specify. Phrase: \_\_\_\_\_

#### COVID-19 Experiences and Perceptions – Section 4

**NOTE: No. 52–63 is for those who have received COVID-19 vaccination:**

52. Regarding your experiences and perceptions before the day you received the first dose of COVID-19 vaccination: How fearful were you about getting COVID-19? **Probe:**

1. You were very fearful
2. You were a little fearful
3. Not sure about it
4. You were not fearful
5. You were not fearful at all

53. Regarding your experiences and perceptions before the day you received the first dose of COVID-19 vaccination: Was it possible for someone like you to get COVID-19? **Probe:**

1. It was highly possible

2. It was a bit possible
3. Not sure about it
4. It was not possible
5. It was not possible at all

54. Regarding your experiences and perceptions before the day you received the first dose of COVID-19

vaccination: Was it possible for someone like you to get severe or very serious COVID-19? **Probe:**

1. It was highly possible
2. It was a bit possible
3. Not sure about it
4. It was not possible
5. It was not possible at all

55. Regarding your experiences and perceptions before the day you received the first dose of COVID-19

vaccination: Did you ever have COVID-19 before you received the vaccination? **Probe:**

1. Yes, you were sure
2. Yes, you thought so
3. Not sure about it
4. No, you thought so
5. No, you were sure

56. If no. 55 above is 1 or 2: Regarding your experiences and perceptions before the day you received the

first dose of COVID-19 vaccination: Did you ever have severe or very serious COVID-19 before you received the vaccination? **Probe:**

1. Yes, it was very serious
2. Yes, it was a bit serious
3. Not sure about it
4. No, it was not serious
5. No, it was not serious at all

57. Regarding your experiences and perceptions before the day you received the first dose of COVID-19

vaccination: Did you know any person who had COVID-19 before you received the vaccination?

**Probe:**

1. Yes, you knew a very close person
2. Yes, you knew a close person
3. Yes, you only knew a distant person
4. Yes, you only knew a very distant person
5. No, you did not know any person

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58. If no. 57 above is 1 or 2 or 3 or 4: Regarding your experiences and perceptions before the day you received the first dose of COVID-19 vaccination: Did you know any person who had severe or very serious COVID-19 before you received the vaccination? **Probe:**

1. Yes, you knew a very close person
2. Yes, you knew a close person
3. Yes, you only knew a distant person
4. Yes, you only knew a very distant person
5. No, you did not know any person

59. If no. 57 above is 1 or 2 or 3 or 4: Regarding your experiences and perceptions before the day you received the COVID-19 vaccination: Did you know any person who died from COVID-19 before you received the vaccination? **Probe:**

1. Yes, you knew a very close person
2. Yes, you knew a close person
3. Yes, you only knew a distant person
4. Yes, you only knew a very distant person
5. No, you did not know any person

60. Regarding your experiences and perceptions before the day you received the first dose of COVID-19 vaccination: What were your sources of information about COVID-19? **NOTE: Multiple responses: Probe for respondent to select all that apply:**

1. Family members/Relatives/Friends
  2. Health care providers/Health workers
  3. Television
  4. Radio
  5. Prints (Newspaper/Magazine)
  6. WhatsApp
  7. Facebook
  8. Internet sites
  9. Bulk SMS/Text messages (e.g from Nigerian CDC, NPHCDA, Bank etc)
  10. Workplace (Place of work)
  11. Place of worship/Religious forums
  12. Other (specify below)
- } Interpersonal
- } Traditional media
- } Internet and social media
- } Internet, social media, & SMS
- } Interpersonal

61. If no. 60 above includes 12: Please specify the other source. Word or Phrase: \_\_\_\_\_

62. If more than one sources given in no. 60 above: Which of the sources was your main source? **NOTE: Probe: Select the one mentioned: 1–12 above**

1  
2  
3 63. If more than one sources given in no. 60 above: Which of the sources did you trust most? **NOTE:**

4  
5 **Probe:** Select the one mentioned: 1–12 above

6  
7  
8 **NOTE: No. 64–75 is for those who have not received COVID-19 vaccination:**

9  
10 64. How fearful are you about getting COVID-19? **Probe:**

- 11 1. Very fearful
- 12 2. A little fearful
- 13 3. Not sure about it
- 14 4. Not fearful
- 15 5. Not fearful at all

16  
17  
18  
19  
20 65. Is it possible for someone like you to get COVID-19? **Probe:**

- 21 1. Highly possible
- 22 2. A bit possible
- 23 3. Not sure about it
- 24 4. Not possible
- 25 5. Not possible at all

26  
27  
28  
29  
30 66. Is it possible for someone like you to get severe or very serious COVID-19? **Probe:**

- 31 1. Highly possible
- 32 2. A bit possible
- 33 3. Not sure about it
- 34 4. Not possible
- 35 5. Not possible at all

36  
37  
38  
39  
40 67. Have you ever had COVID-19? **Probe:**

- 41 1. Yes, you are sure
- 42 2. Yes, you think so
- 43 3. Not sure about it
- 44 4. No, you think so
- 45 5. No, you are sure

46  
47  
48  
49  
50 68. If no 67 above is 1 or 2: Have you ever had severe or very serious COVID-19? **Probe:**

- 51 1. Yes, it was very serious
- 52 2. Yes, it was a bit serious
- 53 3. Not sure about it
- 54 4. No, it was not serious
- 55 5. No, it was not serious at all

69. Do you know any person who have had COVID-19? **Probe:**

1. Yes, you know a very close person
2. Yes, you know a close person
3. Yes, you only know a distant person
4. Yes, you only know a very distant person
5. No, you do not know any person

70. If no. 69 above is 1 or 2 or 3 or 4: Do you know any person who have had severe or very serious COVID-19? **Probe:**

1. Yes, you know a very close person
2. Yes, you know a close person
3. Yes, you only know a distant person
4. Yes, you only know a very distant person
5. No, you do not know any person

71. If no. 69 above is 1 or 2 or 3 or 4: Do you know any person who have died from COVID-19? **Probe:**

1. Yes, you know a very close person
2. Yes, you know a close person
3. Yes, you only know a distant person
4. Yes, you only know a very distant person
5. No, you do not know any person

72. What are your sources of information about COVID-19? **NOTE: Multiple responses: Probe for respondent to select all that apply:**

1. Family members/Relatives/Friends
  2. Health care providers/Health workers
  3. Television
  4. Radio
  5. Prints (Newspaper/Magazine)
  6. WhatsApp
  7. Facebook
  8. Internet sites
  9. Bulk SMS/Text messages (e.g from Nigerian CDC, NPHCDA, Bank etc)
  10. Workplace (Place of work)
  11. Place of worship/Religious forums
  12. Other (specify below)
- } Interpersonal
- } Traditional media
- } Internet and social media
- } Internet, social media, & SMS
- } Interpersonal

73. If no. 72 above includes 12: Please specify the other source. Word or Phrase: \_\_\_\_\_

1  
2  
3 74. If more than one sources given in no. 72 above: Which of the sources is your main source? **NOTE:**

4  
5 **Probe: Select the one mentioned: 1–12 above**

6  
7 75. If more than one sources given in no. 72 above: Which of the sources do you trust most? **NOTE:**

8  
9 **Probe: Select the one mentioned: 1–12 above**

10  
11  
12  
13 **Basic Knowledge of COVID-19 – Section 5**

14  
15 76. What is COVID-19? **Probe:**

- 16  
17 1. A new disease (caused by a new micro-organism)
- 18 2. An old disease (caused by an old micro-organism)
- 19  
20 99. Do not know

21  
22 77. How do people get COVID-19? **Probe:**

- 23  
24 1. By staying close to infected persons when they cough or sneezes
- 25 2. From bat
- 26 3. From rat
- 27 4. From spiritual attack
- 28 5. Other (specify below)
- 29  
30 99. Do not know

31  
32 78. If no. 77 above is 5: Please specify how people get COVID-19. Word or Phrase: \_\_\_\_\_

33  
34 79. When somebody gets COVID-19, how long does it usually take before the person starts to show  
35 symptoms? **Probe:**

- 36  
37 1. 2–14 days (within 2 weeks)
- 38 2. 2–4 weeks
- 39 3. >4 weeks
- 40  
41 99. Do not know

42  
43 80. What are the symptoms of COVID-19 (symptoms that someone with COVID-19 can have)? **NOTE:**

44  
45 **Multiple responses: Probe for respondent to select all that apply:**

- 46  
47 1. Fever
- 48 2. Cough
- 49 3. Tiredness
- 50 4. Body aches and pains
- 51 5. Sore throat
- 52 6. Difficulty breathing or shortness of breath
- 53 7. Chest pain
- 54  
55  
56  
57  
58  
59  
60



- 1
- 2
- 3 8. Headache
- 4
- 5 9. Loss of taste or smell
- 6
- 7 10. Diarrhoea
- 8
- 9 11. Nausea or vomiting
- 10
- 11 12. other (specify below)
- 12
- 13 99. Do not know

14 **81. If no. 80 above includes 12:** Please specify the other symptom. Word or Phrase:\_\_\_\_\_

15 **82. Can people also have COVID-19 without showing any symptoms?**

- 16 1. Yes
- 17
- 18 2. No
- 19
- 20 99. Do Not Know
- 21
- 22

23 **83. Who are more at risk of having severe COVID-19? NOTE: Multiple responses: Probe for respondent**

24 **to select all that apply:**

- 25 1. Children
- 26
- 27 2. Younger adults
- 28
- 29 3. Elderly people
- 30
- 31 4. Slim people
- 32
- 33 5. Obese people
- 34
- 35 6. People with chronic illness
- 36
- 37 7. People who smoke
- 38
- 39 8. Pregnant women
- 40
- 41 99. Do not know

42 **84. Is there a laboratory test to diagnose COVID-19?**

- 43 1. Yes
- 44
- 45 2. No
- 46
- 47 99. Do not know. **If 2 OR 99: Skip to 87**

48 **85. If no. 84 above is 1:** Where is laboratory test to diagnose COVID-19 done in Ebonyi state? **NOTE:**

49 **Multiple responses: Probe for respondent to select all that apply:**

- 50
- 51 1. AEFUTHA
- 52
- 53 2. General hospitals
- 54
- 55 3. PHC centres
- 56
- 57 4. Missionary hospitals
- 58
- 59 5. Private hospitals
- 60
- 60 6. Private laboratory

1  
2  
3 7. Other (specify below)

4  
5 99. Do not know

6  
7 86. If no. 85 above includes 7: Please specify the other place lab test for COVID-19 is done in Ebonyi  
8 state. Word or Phrase: \_\_\_\_\_

9  
10 87. Are there treatments for COVID-19?

11 1. Yes

12 2. No

13 99. Do Not Know

14  
15 88. Are there vaccines for COVID-19?

16 1. Yes

17 2. No

18 99. Do Not Know

19  
20 89. If no. 88 above is 1: Do you know any place where one can go and receive COVID-19 vaccination in  
21 Ebonyi state?

22 1. Yes

23 2. No

24  
25 90. What are the ways to avoid/prevent getting COVID-19? **NOTE: Multiple responses: Probe for**  
26 **respondent to select all that apply:**

27 1. Avoiding crowd (large group of people)

28 2. Maintaining at least 1–2 metre distance away from people coughing or sneezing

29 3. Wearing of face mask in public places (especially indoor public places)

30 4. Frequent hands washing with soap and water

31 5. Frequent hand cleaning with alcoholic sanitisers

32 6. Avoiding touching of face (eyes, nose, & mouth) when one is in public places

33 7. COVID-19 vaccination

34 8. Taking chloroquine

35 9. Use of herbs or roots (“Agbo”)

36 10. Use of ginger or garlic

37 11. Taking hot drinks or “ogogoro”

38 12. Other (specify below)

39 99. Do Not Know

40  
41 91. If no. 90 above includes 12: Please specify other way to avoid getting COVID-19. Word or Phrase: \_\_\_\_\_

## Attitude Towards COVID-19 and COVID-19 Vaccination – Section 6

**NOTE: Tell the respondents you will make statements and for each statement, they should: Strongly Disagree, Disagree, Say if they are Not Sure/Do Not Know, Agree, or Strongly Agree.**

92. COVID-19 is real. **Probe:**

1. Strongly Disagree
2. Disagree
3. Not Sure
4. Agree
5. Strongly Agree

93. COVID-19 a serious illness that can kill.

94. Everybody is susceptible to COVID-19 infection (it is possible for anybody to get COVID-19).

95. The risk of getting COVID-19 can be reduced by avoiding crowd (large group of people).

96. The risk of getting COVID-19 can be reduced by maintaining at least 1–2 metre distance away from people coughing or sneezing

97. The risk of getting COVID-19 can be reduced if everybody covers the mouth and nose (with handkerchief or bent elbow) when coughing or sneezing

98. The risk of getting COVID-19 can be reduced by wearing face mask when going out to public places (especially indoor public places).

99. The risk of getting COVID-19 can be reduced by washing hands with soap and water frequently (e.g before touching the face, before eating).

100. The risk of getting COVID-19 can be reduced by cleaning hands with alcoholic sanitisers frequently.

101. Chloroquine is an effective treatment (prevention) for COVID-19.

102. Herbs and roots (“Agbo”) are effective treatments (prevention) for COVID-19.

103. Ginger and garlic are effective treatments (prevention) for COVID-19.

104. Hot drinks or “ogogoro” are effective treatments (prevention) for COVID-19

105. COVID-19 vaccines are safe for people to receive

106. The risk of COVID-19 can be reduced by receiving COVID-19 vaccination

107. Everybody should receive COVID-19 vaccination that is recommended by the government

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### Practices about COVID-19 – Section 7

108. Since the COVID-19 pandemic started spreading in Ebonyi state (since 2020 till now), which of the following have you Ever Practiced because you wanted to Avoid or Prevent transmission of

COVID-19? **NOTE: Multiple responses: Probe for respondent to select all that apply:**

1. Avoiding crowd (large group of people)
2. Maintaining at least 1–2 metre distance away from people coughing or sneezing
3. Wearing of a face mask when going out to public places (especially indoor public places)
4. Frequent hand washing with soap and water
5. Frequent hand cleaning with alcoholic sanitisers
6. Avoiding touching your face (eyes, nose, mouth) when you are in public places
7. Covering your mouth and nose (with handkerchief or your bent elbow) when coughing or sneezing
8. Use of bleach/Jik or spirit/alcohol to clean surfaces that people touch frequently such as door handles, table tops etc
9. None of the above was ever practiced

109. Among those that you have ever practiced, which ones have you Been Practicing in the Last Two Weeks because you want to Avoid or Prevent transmission of COVID-19? **NOTE: Multiple**

**responses: Probe for respondent to select all that apply:**

1. Avoiding crowd (large group of people)
2. Maintaining at least 1–2 metre distance away from people coughing or sneezing
3. Wearing of a face mask when going out to public places (especially indoor public places)
4. Frequent hand washing with soap and water
5. Frequent hand cleaning with alcoholic sanitisers
6. Avoiding touching your face (eyes, nose, mouth) when you are in public places
7. Covering your mouth and nose (with handkerchief or your bent elbow) when coughing or sneezing
8. Use of bleach/Jik or spirit/alcohol to clean surfaces that people touch frequently such as door handles, table tops etc
9. None of the above was practiced in the last two weeks

110. Since the COVID-19 pandemic started spreading in Ebonyi state (since 2020 till now), which of the following have you Ever Practiced because you wanted to Treat or Prevent COVID-19? **NOTE:**

**Multiple responses: Probe for respondent to select all that apply:**

1. Taking chloroquine
2. Using herbs or roots (“Agbo”)

3. Using ginger or garlic
4. Using hot drinks or “ogogoro”
5. None of the above was ever practiced

111. Among those that you have ever practiced, which ones have you Been Practicing in the Last Two Weeks because you want to Treat or Prevent COVID-19? **NOTE: Multiple responses: Probe for respondent to select all that apply:**

1. Taking chloroquine
2. Using herbs or roots (“Agbo”)
3. Using ginger or garlic
4. Using hot drinks or “ogogoro”
5. None of the above was practiced in the last two weeks

## COVID-19 AND COVID-19 VACCINATION QUESTIONNAIRE FOR HEALTH WORKERS

**NOTE: All health workers (both clinical and non-clinical) working or living in Ebonyi state who give consent are eligible to participate in this survey.**

**Sociodemographic Characteristics**

1. What is your Gender?

1. Male
2. Female

2. Age in years: How old were you during your last birthday? Number: \_\_\_\_\_

3. What is your Marital Status?

1. Married
2. Separated/Divorced
3. Widowed
4. Never married (Single)

4. What is your Educational Level?

1. No formal education
2. Some primary
3. Completed primary
4. Some secondary
5. Completed secondary
6. NCE/Diploma (ND, OND) (Tertiary)
7. HND/First Degree (Tertiary)
8. Masters/PHD/Other Equivalent (Tertiary)

5. What is your Category or Cadre?

1. non-Clinical staff
2. PMV
3. Health attendant
4. JCHEW
5. CHEW
6. CHO
7. Nurse/Midwife
8. Medical laboratory technologist

- 1
- 2
- 3 9. Medical laboratory scientist
- 4 10. Pharmacy technician
- 5 11. Pharmacist
- 6 12. House officer
- 7 13. Medical officer
- 8 14. Medical doctor in specialist training (Resident doctor)
- 9 15. Specialist medical doctor (Fellow)
- 10 16. Other (specify below)

16  
17 6. If no. 5 above is 16: Please specify your Category or Cadre. Word or Phrase: \_\_\_\_\_

18  
19 7. How many years of working experience do you have? NOTE: Use "0" for less than one year. Number: \_\_\_\_\_

20  
21 8. Where is your current primary place of work?

- 22 1. PMV
- 23 2. PHC centre
- 24 3. Private laboratory
- 25 4. Private pharmacy
- 26 5. Private hospital/clinic
- 27 6. Missionary hospital
- 28 7. General hospital
- 29 8. NOFIC
- 30 9. AEFUTHA
- 31 10. Other (specify below)

32  
33  
34  
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36  
37  
38  
39 9. If no. 8 above is 10: Please specify your current primary place of work. Word or Phrase: \_\_\_\_\_

#### 40 41 42 43 **COVID-19 Vaccination Acceptance**

44  
45 10. Have you received COVID-19 vaccination?

- 46 1. Yes
- 47 2. No

48  
49  
50 **NOTE: No. 11–25 is for those who have received COVID-19 vaccination:**

51 11. Which of the COVID-19 vaccination doses have you received?

- 52 1. First dose only
- 53 2. Second dose only
- 54 3. Second dose plus Booster

55  
56  
57  
58  
59 12. If no. 11 above is 1: Why have you not received the second dose of COVID-19 vaccination?

1  
2  
3 **NOTE: select all that apply:**  
4

- 5 1. No vaccine when you went (stock-out)
- 6 2. No vaccinator when you went (health facility not Closed)
- 7 3. Health facility was closed when you went
- 8 4. Place of vaccination was too far
- 9 5. You were too busy
- 10 6. You were ill and did not go for the remaining dose
- 11 7. You were ill, went but was not given the remaining dose
- 12 8. You had serious side effects from the first dose
- 13 9. The time for the second dose has not reached
- 14 10. Other (specify below)

15  
16  
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19  
20  
21 13. If no. 12 above includes 10: Other reason, please specify. Phrase: \_\_\_\_\_  
22

23  
24 14. If no. 11 above is 2: Why have you not received a booster dose of COVID-19 vaccination?  
25

26 **NOTE: select all that apply:**

- 27 1. You are not aware of booster dose
- 28 2. You do not need booster dose (it is not important)
- 29 3. No vaccine when you went (stock-out)
- 30 4. No vaccinator when you went (health facility not Closed)
- 31 5. Health facility was closed when you went
- 32 6. Place of vaccination was too far
- 33 7. You were too busy
- 34 8. You were ill and did not go for the booster dose
- 35 9. You were ill, went but was not given the booster dose
- 36 10. You had serious side effects from the second dose
- 37 11. The time for a booster dose has not reached
- 38 12. Other (specify below)

39  
40  
41  
42  
43  
44  
45  
46  
47 15. If no. 14 above includes 12: Other reason, please specify. Phrase: \_\_\_\_\_  
48  
49

50  
51 **NOTE: No. 16–25 is about your experiences and perceptions before the day you received the first dose of**  
52 **COVID-19 vaccination:**

53  
54 16. How often did you hear that COVID-19 vaccination was available for you to go and receive?

- 55 1. You heard about it many times before the day you received it
- 56 2. You heard about it few times (or once) before the day you received it
- 57 3. Not sure



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4. You did not hear about it before the day you received it
  5. You did not hear about it at all before the day you received it

17. Did you know any place or health facility where they gave COVID-19 vaccination?

1. Yes, a place that was very close
2. Yes, a place that was close
3. Yes, a place that was far
4. Yes, a place that was too far
5. No, you did not know any place before the day you received COVID-19 vaccination

18. If no. 17 above is 1 or 2 or 3 or 4: How frequently were they giving COVID-19 vaccination at that place you mentioned above?

1. Daily or two/three times a week
2. Once a week
3. Once every two weeks/every month
4. No fixed time (not regular)
5. You did not know how frequently they were giving COVID-19 vaccination before the day you received it

19. If no. 17 above is 1 or 2 or 3 or 4: How was the queue (waiting time) at the place of vaccination that you mentioned above?

1. There was usually no queue (very short waiting time)
2. There was usually short queue (short waiting time)
3. You did not know what the queue (waiting time) was
4. There was usually long queue (long waiting time)
5. There was usually very long queue (very long waiting time)

20. If no. 17 above is 1 or 2 or 3 or 4: How caring (or kind/friendly) were the health workers at the place of vaccination that you mentioned above?

1. They were very caring
2. They were caring
3. Not sure whether they were caring or not
4. They were not caring
5. They were not caring at all

21. How important did you think it was for you to receive COVID-19 vaccination?

1. It was very important
2. It was important

3. Not sure whether it was important or not
4. It was not important
5. It was not important at all

22. How fearful were you that you might have severe or very serious side-effect if you received COVID-19 vaccination?

1. You were not fearful at all
2. You were not fearful
3. Not sure about it
4. You were a little fearful
5. You were very fearful

23. What protection did you think COVID-19 vaccination would give you if you received it?

1. Full or complete protection from COVID-19
2. Partial or incomplete protection from COVID-19
3. You were not sure about it
4. No protection from COVID-19
5. No protection at all from COVID-19

24. How did you trust the health workers who gave COVID-19 vaccination?

1. You trusted them very much
2. You trusted them
3. Not sure about it
4. You did not trust them
5. You did not trust them at all

25. How did you trust the federal and state governments who made the COVID-19 vaccination available for people to receive?

1. You trusted them very much
2. You trusted them
3. Not sure about it
4. You did not trust them
5. You did not trust them at all

**NOTE: No. 26–41 is for those who have not received COVID-19 vaccination:**

26. Have you ever heard that COVID-19 vaccination is available for you to go and receive?

1. Yes, you heard about it many times
2. Yes, you heard about it few times (or once)

3. Not sure
4. No, you have not heard about it
5. No, you have not heard about it at all

27. Do you know any place or health facility where they give COVID-19 vaccination?

1. Yes, a place that is very close
2. Yes, a place that is close
3. Yes, a place that is far
4. Yes, a place that is very far
5. No, you do not know any place

28. If no. 27 above is 1 or 2 or 3 or 4: How frequently do they give COVID-19 vaccination at that place you mentioned above?

1. Daily or two/three times a week
2. Once a week
3. Once every two weeks/every month
4. No fixed time (not regular)
5. Do not know

29. If no. 27 above is 1 or 2 or 3 or 4: How is the queue (waiting time) at the place of vaccination that you mentioned above?

1. There is usually no queue (very short waiting time)
2. There is usually short queue (short waiting time)
3. Do not know
4. There is usually long queue (long waiting time)
5. There is usually very long queue (very long waiting time)

30. If no. 27 above is 1 or 2 or 3 or 4: How caring (or kind/friendly) are the health workers at the place of vaccination that you mentioned above?

1. They are very caring
2. They are caring
3. You are not sure about it
4. They are not caring
5. They are not caring at all

31. If no. 10 above is 2 & no. 2 above is  $\geq 18$ : Why have you not received COVID-19 vaccination? **NOTE:**

**Select all that apply:**

1. You do not need the vaccine (it is not important)
2. You think the vaccine is not safe (you think it is harmful)

3. You think the vaccine is not effective
4. You have been hearing bad stories about the vaccine
5. The vaccine is new and/or you want others to take it first
6. You do not know the place and/or time of vaccination
7. Place of vaccination is too far
8. You have been too busy
9. You have been ill and did not go for vaccination
10. You have been ill, went but was not given vaccination
11. Long waiting time (long queue)
12. No vaccine (stock-out) when you went
13. No vaccinator (health facility not Closed) when you went
14. Health facility was closed when you went
15. You are not aware of it
16. Other (specify below)

32. If no. 31 above includes 16: Other reason, please specify. Phrase: \_\_\_\_\_

33. How important is it for you to receive COVID-19 vaccination?

1. Very important for me to receive it
2. Important for me to receive it
3. Not sure about it
4. Not important for me to receive it
5. Not important at all for me to receive it

34. How fearful are you that you may have severe or very serious side-effect if you receive COVID-19 vaccination?

1. Not fearful at all
2. Not fearful
3. Not sure about it
4. A little fearful
5. Very fearful

35. What protection will COVID-19 vaccination give you if you receive it?

1. Full or complete protection from COVID-19
2. Partial or incomplete protection from COVID-19
3. Not sure about it
4. No protection from COVID-19
5. No protection at all from COVID-19

1  
2  
3 36. How do you trust the health workers who give COVID-19 vaccination?  
4

- 5 1. You trust them very much  
6 2. You trust them  
7 3. Not sure about it  
8 4. You do not trust them  
9 5. You do not trust them at all  
10  
11  
12

13 37. How do you trust the federal and state governments who made the COVID-19 vaccination  
14 available for people to receive?  
15

- 16 1. You trust them very much  
17 2. You trust them  
18 3. Not sure about it  
19 4. You do not trust them  
20 5. You do not trust them at all  
21  
22  
23  
24

25 38. Do you intend (or plan) to receive COVID-19 vaccination that is available for you to receive?  
26

- 27 1. Yes, you will surely go and receive the vaccination  
28 2. Yes, you think you will go and receive the vaccination  
29 3. Not sure about it  
30 4. No, you think you will not go and receive the vaccination  
31 5. No, you will surely not go and receive the vaccination  
32  
33  
34

35 **NOTE: If 3 or 4 or 5: Skip to no. 40**  
36

37 39. If no. 38 above is 1 or 2: How many DAYS or WEEKS or MONTHS or YEARS will it take before you go  
38 and receive the COVID-19 vaccination? Number plus Word: \_\_\_\_\_  
39  
40

41 40. If no. 38 above is 3 or 4 or 5: What is/are the reasons why you do not intend (or plan) to receive  
42 COVID-19 vaccination? **NOTE: Select all that apply:**  
43

- 44 1. You do not need the vaccine (it is not important)  
45 2. You think the vaccine is not safe (I think it is harmful)  
46 3. You think the vaccine is not effective  
47 4. You have been hearing bad stories about the vaccine  
48 5. The vaccine is new and/or I want others to take it first  
49 6. You do not know the place and/or time of vaccination  
50 7. Place of vaccination is too far  
51 8. Other reason (specify below)  
52  
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57

58 41. If no. 40 above includes 8: Other reason, please specify. Phrase: \_\_\_\_\_  
59  
60

## COVID-19 Experiences and Perceptions

NOTE: No. 42–53 is for those who have received COVID-19 vaccination:

NOTE: No. 42–53 is about your experiences and perceptions before the day you received the first dose of COVID-19 vaccination:

42. How fearful were you about getting COVID-19?

1. You were very fearful
2. You were a little fearful
3. Not sure about it
4. You were not fearful
5. You were not fearful at all

43. Was it possible for someone like you to get COVID-19?

1. It was highly possible
2. It was a bit possible
3. Not sure about it
4. It was not possible
5. It was not possible at all

44. Was it possible for someone like you to get severe or very serious COVID-19?

1. It was highly possible
2. It was a bit possible
3. Not sure about it
4. It was not possible
5. It was not possible at all

45. Did you ever have COVID-19 before you received the vaccination?

1. Yes, you were sure
2. Yes, you thought so
3. Not sure about it
4. No, you thought so
5. No, you were sure

46. If no. 45 above is 1 or 2: Did you ever have severe or very serious COVID-19 before you received the vaccination?

1. Yes, it was very serious
2. Yes, it was a bit serious
3. Not sure about it
4. No, it was not serious

1  
2  
3 5. No, it was not serious at all  
4

5 47. Did you know any person who had COVID-19 before you received the vaccination?  
6

- 7 1. Yes, you knew a very close person  
8  
9 2. Yes, you knew a close person  
10  
11 3. Yes, you only knew a distant person  
12  
13 4. Yes, you only knew a very distant person  
14  
15 5. No, you did not know any person

16 48. If no. 47 above is 1 or 2 or 3 or 4: Did you know any person who had severe or very serious COVID-  
17 19 before you received the vaccination?  
18

- 19 1. Yes, you knew a very close person  
20  
21 2. Yes, you knew a close person  
22  
23 3. Yes, you only knew a distant person  
24  
25 4. Yes, you only knew a very distant person  
26  
27 5. No, you did not know any person

28 49. If no. 47 above is 1 or 2 or 3 or 4: Did you know any person who died from COVID-19 before you  
29 received the vaccination?  
30

- 31 1. Yes, you knew a very close person  
32  
33 2. Yes, you knew a close person  
34  
35 3. Yes, you only knew a distant person  
36  
37 4. Yes, you only knew a very distant person  
38  
39 5. No, you did not know any person

40 50. What were your sources of information about COVID-19? **NOTE: Select all that apply:**

- 41 1. Family members/Relatives/Friends  
42 2. Other health workers } Interpersonal  
43  
44 3. Television  
45 4. Radio } Traditional media  
46 5. Prints (Newspaper/Magazine)  
47  
48 6. WhatsApp  
49 7. Facebook } Internet and social media  
50 8. Internet sites } Internet, social media, & SMS  
51  
52 9. Bulk SMS/Text messages (e.g from Nigerian CDC, NPHCDA, Bank etc)  
53  
54 10. Workplace (Place of work)  
55 11. Place of worship/Religious forums } Interpersonal  
56  
57 12. Other (specify below)  
58  
59  
60

1  
2  
3 51. If no. 50 above includes 12: Please specify the other source. Word or Phrase: \_\_\_\_\_  
4

5 52. If more than one sources given in no. 50 above: Which of the sources was your main source?  
6

7 53. If more than one sources given in no. 50 above: Which of the sources did you trust most?  
8  
9

10  
11 **NOTE: No. 54–65 is for those who have not received COVID-19 vaccination:**  
12

13 54. How fearful are you about getting COVID-19?

- 14 1. Very fearful
- 15 2. A little fearful
- 16 3. Not sure about it
- 17 4. Not fearful
- 18 5. Not fearful at all

19  
20  
21  
22 55. Is it possible for someone like you to get COVID-19?

- 23 1. Highly possible
- 24 2. A bit possible
- 25 3. Not sure about it
- 26 4. Not possible
- 27 5. Not possible at all

28  
29  
30  
31  
32 56. Is it possible for someone like you to get severe or very serious COVID-19?

- 33 1. Highly possible
- 34 2. A bit possible
- 35 3. Not sure about it
- 36 4. Not possible
- 37 5. Not possible at all

38  
39  
40  
41  
42 57. Have you ever had COVID-19?

- 43 1. Yes, you are sure
- 44 2. Yes, you think so
- 45 3. Not sure about it
- 46 4. No, you think so
- 47 5. No, you are sure

48  
49  
50  
51  
52 58. If no. 57 above is 1 or 2: Have you ever had severe or very serious COVID-19?

- 53 1. Yes, it was very serious
- 54 2. Yes, it was a bit serious
- 55 3. Not sure about it



4. No, it was not serious
5. No, it was not serious at all

59. Do you know any person who have had COVID-19?

1. Yes, you know a very close person
2. Yes, you know a close person
3. Yes, you only know a distant person
4. Yes, you only know a very distant person
5. No, you do not know any person

60. If no. 59 above is 1 or 2 or 3 or 4: Do you know any person who have had severe or very serious COVID-19?

1. Yes, you know a very close person
2. Yes, you know a close person
3. Yes, you only know a distant person
4. Yes, you only know a very distant person
5. No, you do not know any person

61. If no 59 above is 1 or 2 or 3 or 4: Do you know any persons who have died from COVID-19?

1. Yes, you know a very close person
2. Yes, you know a close person
3. Yes, you only know a distant person
4. Yes, you only know a very distant person
5. No, you do not know any person

62. What are your sources of information about COVID-19? **NOTE: Select all that apply:**

1. Family members/Relatives/Friends
  2. Other health workers
  3. Television
  4. Radio
  5. Prints (Newspaper/Magazine)
  6. WhatsApp
  7. Facebook
  8. Internet sites
  9. Bulk SMS/Text messages (e.g from Nigerian CDC, NPHCDA, Bank etc)
  10. Workplace (Place of work)
  11. Place of worship/Religious forums
  12. Other (specify below)
- } Interpersonal
- } Traditional media
- } Internet and social media
- } Internet, social media, & SMS
- } Interpersonal

1  
2  
3 63. If no. 62 above includes 12: Please specify the other source. Word or Phrase: \_\_\_\_\_  
4

5 64. If more than one sources given in no. 62 above: Which of the sources is your main source?  
6

7 65. If more than one sources given in no. 62 above: Which of the sources do you trust most?  
8  
9

10  
11  
12 **Basic Knowledge of COVID-19**  
13

14 66. What is COVID-19?

- 15 1. A new type of coronavirus disease  
16  
17 2. An old type of coronavirus disease  
18  
19 99. Do not know  
20

21 67. How do people get COVID-19?

- 22  
23 1. By staying close to infected persons when they cough or sneezes  
24  
25 2. From bat  
26  
27 3. From rat  
28  
29 4. From spiritual attack  
30  
31 5. Other (specify below)  
32 99. Do not know

33 68. If no. 67 above is 5: Please specify how people get COVID-19. Word or Phrase: \_\_\_\_\_  
34

35 69. When somebody gets COVID-19, how long does it usually take before the person starts to show  
36 symptoms?  
37

- 38 1. 2–14 days (within 2 weeks)  
39  
40 2. 2–4 weeks  
41  
42 3. >4 weeks  
43  
44 99. Do not know  
45

46 70. What are the symptoms of COVID-19? **NOTE: Select all that apply:**

- 47 1. Fever  
48  
49 2. Cough  
50  
51 3. Tiredness  
52  
53 4. Body aches and pains  
54  
55 5. Sore throat  
56  
57 6. Difficulty breathing or shortness of breath  
58  
59 7. Chest pain  
60  
8. Headache

9. Loss of taste or smell
10. Diarrhoea
11. Nausea or vomiting
12. other (specify below)
99. Do not know

71. If no. 70 above includes 12: Please specify the other symptom. Word or Phrase:\_\_\_\_\_

72. Can people also have COVID-19 without showing any symptoms?

1. Yes
2. No
99. Do Not Know

73. Who are more at risk of having severe COVID-19? **NOTE: Select all that apply:**

1. Children
2. Younger adults
3. Elderly people
4. Slim people
5. Obese people
6. People with chronic illness
7. People who smoke
8. Pregnant women
99. Do not know

74. Is there a laboratory test to diagnose COVID-19?

1. Yes
2. No
99. Do not know. If 2 OR 99: Skip to 77

75. Where is laboratory test to diagnose COVID-19 done in Ebonyi state? **NOTE: Select all that apply:**

1. AEFUTHA
2. General hospitals
3. PHC centres
4. Missionary hospitals
5. Private hospitals
6. Private laboratory
7. Other (specify below)
99. Do not know

1  
2  
3 76. If no. 75 above includes 7: Please specify the other place lab test for COVID-19 is done in Ebonyi  
4 state. Word or Phrase: \_\_\_\_\_  
5  
6

7 77. Are there treatments for COVID-19?

- 8 1. Yes  
9  
10 2. No  
11  
12 99. Do Not Know  
13

14 78. Are there vaccines for COVID-19?

- 15 1. Yes  
16  
17 2. No  
18  
19 99. Do Not Know  
20

21 79. If no. 78 above is 1: Do you know any place where one can go and receive COVID-19 vaccination in  
22 Ebonyi state?  
23

- 24 1. Yes  
25  
26 2. No  
27

28 80. What are the ways to avoid/prevent getting COVID-19? **NOTE: Select all that apply:**  
29

- 30 1. Avoiding crowd (large group of people)  
31 2. Maintaining at least 1–2 metre distance away from people coughing or sneezing  
32 3. Wearing of face mask in public places (especially indoor public places)  
33 4. Frequent hands washing with soap and water  
34 5. Frequent hand cleaning with alcoholic sanitisers  
35 6. Avoiding touching of face (eyes, nose, & mouth) when one is in public places  
36 7. COVID-19 vaccination  
37 8. Taking chloroquine  
38 9. Use of herbs or roots (“Agbo”)  
39 10. Use of ginger or garlic  
40 11. Taking hot drinks or “ogogoro”  
41 12. Other (specify below)  
42 99. Do Not Know  
43  
44  
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46  
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51 81. If no. 80 above includes 12: Please specify other way. Word or Phrase: \_\_\_\_\_  
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### Attitude Towards COVID-19 and COVID-19 Vaccination

**NOTE: For each of the statements below, take one option whether you: Strongly Disagree, Disagree, Not Sure/Do Not Know, Agree, or Strongly Agree.**

82. COVID-19 is real.

1. Strongly Disagree
2. Disagree
3. Not Sure
4. Agree
5. Strongly Agree

83. COVID-19 a serious illness that can kill.

84. Everybody is susceptible to COVID-19 infection (Anybody can get COVID-19).

85. The risk of getting COVID-19 can be reduced by avoiding crowd (large group of people).

86. The risk of getting COVID-19 can be reduced by maintaining at least 1–2 metre distance away from people coughing or sneezing

87. The risk of getting COVID-19 can be reduced if everybody covers the mouth and nose (with handkerchief or bent elbow) when coughing or sneezing

88. The risk of getting COVID-19 can be reduced by wearing face mask when going out to public places (especially indoor public places).

89. The risk of getting COVID-19 can be reduced by washing hands with soap and water frequently (e.g before touching the face, before eating).

90. The risk of getting COVID-19 can be reduced by cleaning hands with alcoholic sanitisers frequently.

91. Chloroquine is an effective treatment (prevention) for COVID-19.

92. Herbs and roots (“Agbo”) are effective treatments (prevention) for COVID-19.

93. Ginger and garlic are effective treatments (prevention) for COVID-19.

94. Hot drinks or “ogogoro” are effective treatments (prevention) for COVID-19

95. COVID-19 vaccines are safe for people to receive

96. The risk of COVID-19 can be reduced by receiving COVID-19 vaccination

97. Everybody should receive COVID-19 vaccination that is recommended by the government

**Practices about COVID-19**

98. Since the COVID-19 pandemic started spreading in Ebonyi state (since 2020 till now), which of the following have you Ever Practiced because you wanted to Avoid or Prevent transmission of

COVID-19? **NOTE: Select all that apply:**

1. Avoiding crowd (large group of people)
2. Maintaining at least 1–2 metre distance away from people coughing or sneezing
3. Wearing of a face mask when going out to public places (especially indoor public places)
4. Frequent hand washing with soap and water
5. Frequent hand cleaning with alcoholic sanitisers
6. Avoiding touching your face (eyes, nose, mouth) when you are in public places
7. Covering your mouth and nose (with handkerchief or your bent elbow) when coughing or sneezing
8. Use of bleach/Jik or spirit/alcohol to clean surfaces that people touch frequently such as door handles, table tops etc
9. None of the above was ever practiced

99. Among those that you have ever practiced, which ones have you Been Practicing in the Last Two Weeks because you want to Avoid or Prevent transmission of COVID-19? **NOTE: Select all that apply:**

1. Avoiding crowd (large group of people)
2. Maintaining at least 1–2 metre distance away from people coughing or sneezing
3. Wearing of a face mask when going out to public places (especially indoor public places)
4. Frequent hand washing with soap and water
5. Frequent hand cleaning with alcoholic sanitisers
6. Avoiding touching your face (eyes, nose, mouth) when you are in public places
7. Covering your mouth and nose (with handkerchief or your bent elbow) when coughing or sneezing
8. Use of bleach/Jik or spirit/alcohol to clean surfaces that people touch frequently such as door handles, table tops etc
9. None of the above was practiced in the last two weeks

100. Since the COVID-19 pandemic started spreading in Ebonyi state (since 2020 till now), which of the following have you Ever Practiced because you wanted to Treat or Prevent COVID-19? **NOTE:**

**Select all that apply:**

1. Taking chloroquine
2. Using herbs or roots (“Agbo”)
3. Using ginger or garlic
4. Using hot drinks or “ogogoro”
5. None of the above was ever practiced

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2  
3 101. Among those that you have ever practiced, which ones have you Been Practicing in the Last  
4 Two Weeks because you want to Treat or Prevent COVID-19? **NOTE: Select all that apply:**  
5

- 6 1. Taking chloroquine
- 7
- 8 2. Using herbs or roots (“Agbo”)
- 9
- 10 3. Using ginger or garlic
- 11
- 12 4. Using hot drinks or “ogogoro”
- 13
- 14 5. None of the above was practiced in the last two weeks
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For peer review only

## FGD Guide for FGD with Community Members

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3  
4 Q1. What is COVID-19?

5 **Prompts:**

- 6 1. Is COVID-19 real or not?  
7  
8 2. Is COVID-19 a new disease or an old disease?  
9  
10 3. Is COVID-19 a serious disease that can kill?

11 **Probe:** their views on cause, transmission, symptoms, diagnosis, treatment, and prevention of  
12 COVID-19

13 **Prompt:** Are there vaccines for COVID-19?  
14

15  
16  
17 Q2. What are your views about COVID-19 vaccine/vaccination and the vaccination process?

18 **Probe:** safety, effectiveness, universal COVID-19 vaccination, and vaccination process

19  
20  
21 Q3. Some people have received COVID-19 vaccination but others have not received. What are the  
22 things that make people to receive or not to received COVID-19 vaccination?

23 **Prompt:** Why have some people not received COVID-19 vaccination?

24  
25 Why have some people not received COVID-19 vaccination that *is available close to them*?

26  
27  
28  
29 Q4. Among the people that currently have not received COVID-19 vaccination, some intend or plan  
30 to receive it but others do not intend or plan to receive it.

31  
32 What are the things that make people to plan to receive or to plan not to received COVID-19  
33 vaccination?

34  
35 **Prompt:** Why do some people say they will not receive COVID-19 vaccination?  
36

37  
38  
39 Q5. Among the people that say they will receive COVID-19 vaccination, some say they will go and  
40 receive it after some days, some say after some weeks, some say after some months, others say  
41 after some years.

42  
43 What are the things that determines how long it takes before people go and receive COVID-19  
44 vaccination?  
45

46  
47 **Prompt:** What will make some people go and receive the COVID-19 vaccination earlier and  
48 others to go later?  
49

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51  
52 Q6. What do you think should be done so that people who have not received COVID-19 vaccination  
53 will go and receive or start planning to receive it?

54  
55 **Prompt:** How can people be made to accept COVID-19 vaccination? Probe: Role of government,  
56 health workers etc.  
57

58  
59 *Thank you very much for your time and views.*  
60



## FGD Guide for FGD with Health Workers

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4 Q1. What is COVID-19?

5 **Prompts:**

- 6 1. Is COVID-19 real or not?  
7  
8 2. Is COVID-19 a new disease or an old disease?  
9  
10 3. Is COVID-19 a serious disease that can kill?

11 **Probe:** their views on cause, transmission, symptoms, diagnosis, treatment, and prevention of  
12 COVID-19

13 **Prompt:** Are there vaccines for COVID-19?  
14

15  
16  
17 Q2. What are your views about COVID-19 vaccine/vaccination and the vaccination process?

18 **Probe:** safety, effectiveness, universal COVID-19 vaccination, and vaccination process

19  
20  
21 Q3. Some health workers have received COVID-19 vaccination but others have not received. What  
22 are the things that make health workers to receive or not to received COVID-19 vaccination?

23 **Prompt:** Why have some health workers not received COVID-19 vaccination?

24 Why have some health workers not received COVID-19 vaccination that is *available close*  
25 *to them?*  
26  
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29  
30 Q4. Among the health workers that currently have not received COVID-19 vaccination, some intend  
31 or plan to receive it but others do not intend or plan to receive it.

32  
33 What are the things that make health workers to plan to receive or to plan not to received  
34 COVID-19 vaccination?  
35

36 **Prompt:** Why do some health workers say they will not receive COVID-19 vaccination?  
37  
38

39  
40 Q5. Among the health workers that say they will receive COVID-19 vaccination, some say they will go  
41 and receive it after some days, some say after some weeks, some say after some months, others  
42 say after some years.  
43

44 What are the things that determines how long it takes before health workers go and receive  
45 COVID-19 vaccination?  
46

47 **Prompt:** What will make some health workers go and receive the COVID-19 vaccination earlier  
48 and others to go later?  
49  
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52  
53 Q6. What do you think should be done so that health workers who have not received COVID-19  
54 vaccination will go and receive or start planning to receive it?

55 **Prompt:** How can health workers be made to accept COVID-19 vaccination? **Probe:** Role of  
56 government, other health workers etc.  
57  
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59

60 *Thank you very much for your time and views.*