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Community Perspectives on COVID-19 Vaccines: A Case Study of Low-Income Earners in Oshodi/Isolo Local Government Area, Lagos State, Nigeria

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Abstract

COVID-19 vaccines play a crucial role in reducing illness and death caused by SARS-CoV-2 infection. Despite their availability, disparities in vaccine uptake persist among low-income earners in Nigeria. Community organizations are vital in spreading essential vaccine information, understanding reasons for vaccine hesitancy, and promoting vaccine acceptance among the communities they serve. This study aimed to assess perceptions of COVID-19 vaccines among low-income communities in Oshodi/Isolo Local Government Area, Lagos State, Nigeria. Using a descriptive cross-sectional study design, data were collected from consenting adults via structured questionnaires with closed-ended questions. A total of 651 respondents participated, with the majority from Ejigbo (36.1%), followed by Isolo (33.9%), and Oshodi (30.0%). Most respondents were aged 18-45 years, and nearly equal numbers of males and females participated. Respondents' perceptions of COVID-19 vaccines were assessed through eight questions. Overall, perceptions were positive, with Ejigbo showing slightly higher perception scores compared to Isolo and Oshodi. Trust in the scientists who developed these vaccines likely contributed to this positive perception. While citizens were willing to receive COVID-19 vaccines, distrust in government programs and religious beliefs could hinder vaccination efforts. Targeted educational initiatives are necessary to address misconceptions, particularly in communities where religious beliefs strongly influence health decisions. Rebuilding trust between the government and citizens is crucial for achieving higher vaccination rates against COVID-19.

Keywords: *Community perspectives, COVID-19 vaccines, Low-income earners, Vaccine hesitancy.*

Introduction

The global impact of the deadly Coronavirus disease (COVID-19), caused by the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), has prompted widespread concern and necessitated urgent public health measures. The World Health Organization (WHO) declared the outbreak a pandemic on March 11, 2020, affecting 223 countries and resulting in over 104.37 million confirmed cases and 22.71 million deaths globally as at February 6, 2021 [1-3]. Notably, the Americas and Europe have experienced higher incidence rates compared to South-East Asia, Africa, and the Western Pacific [3].

In Nigeria, between January 2020 and November 8th, 2021, WHO recorded 212,765 confirmed cases, resulting in 2,906 deaths [4-5]. Despite global efforts, Nigeria lagged in achieving the goal of fully vaccinating 10% of its population by September 30, 2021, with only 1.7% fully vaccinated and 1.3% partially vaccinated by November 25th, 2021 [6-7].

The World Health Assembly's global aim of fully vaccinating 10% of each country's population by September 30, 2021, met success

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in over 90% of high-income countries, but Nigeria struggled to catch up [8]. With only minimal progress in increasing vaccination rates, the situation is crucially relevant for public health scholars and practitioners. Despite the recognized importance of COVID-19 vaccination, scholars are turning to understand the public's willingness, perceptions, and attitudes toward the vaccine [9].

However, in Nigeria, limited research exists on the public's willingness to receive the COVID-19 vaccine, despite context-specific factors influencing vaccine rejection [10-12]. Experts argue that the COVID-19 vaccine is essential for effectively controlling the pandemic [13, 14]. Consequently, public health researchers have shifted their focus to determining the willingness of individuals in their respective countries to accept the COVID-19 vaccination and identifying the key factors influencing acceptance among the general population [15-20]. Historical data on vaccine administration frequently indicated a low acceptance rate [21].

Addressing this gap, this study focuses on the Awareness, Attitude, and Perception of Low-Income Earners towards the uptake of COVID-19 vaccines in the Oshodi/Isolo Local Government Area, Lagos State, Nigeria. Low-income earners represent a demographic group that often faces unique challenges in accessing healthcare services and information, making it imperative to understand their perspectives on COVID-19 vaccination. Understanding these factors is crucial for developing effective interventions, strategies, or programs to enhance vaccine acceptability.

The Oshodi/Isolo Local Government Area, situated in Lagos State, Nigeria, is characterized by its diverse population, including a significant number of low-income earners. Lagos State has been one of the region’s most severely impacted by the COVID-19 pandemic in Nigeria, underscoring the urgency of understanding the dynamics of vaccine acceptance within this local community.

This study aims to contribute valuable insights into Nigerians' attitudes and perceptions about the COVID-19 vaccine, potentially guiding health professionals, public health consultants, and local authorities in developing targeted interventions. The findings may inform effective strategies to promote vaccine acceptability not only in Lagos but also across Nigeria and globally. The study's rejection of the null hypothesis, linking socio-demographic characteristics to awareness, attitudes and perceptions, underscores the importance of considering diverse factors. By addressing these gaps in research, the study aims to shed light on Nigerians' perspectives on COVID-19 vaccination, contributing to the broader understanding of vaccine acceptance.

This paper presents the methodology, findings, and recommendations from a comprehensive study aimed at shedding light on the awareness levels, attitudes, and perceptions of low-income earners in Oshodi/Isolo towards COVID-19 vaccines. By gaining insights into the factors that influence their decision-making regarding vaccination, we aim to inform targeted strategies and interventions to enhance vaccine uptake in this crucial demographic group. Understanding their perspectives is vital for achieving not only individual protection but also community-wide immunity, thereby contributing to the broader public health effort to control the spread of COVID-19 in Lagos State and beyond.

Materials and Methods

Ethical Consideration

Participants provided written online consent [22]. By not requesting names and making sure that all entries were made into a single Microsoft Excel file that was only accessible to the data analyst, confidentiality and data protection were put in place.

Study Area, Design, and Population

The study was conducted in Oshodi/Isolo Local Government in Lagos State, Nigeria, the

Local Government which subdivided into three Local Council Development Areas (LCDAs). The LCDAs are Oshodi, Isolo, and Ejigbo, which have high numbers of low-income earners with an adult population of 621,509. A descriptive cross-sectional study design was used involving adults (≥18 years of age) residing in the three LCDAs as at the time of this study. The inclusion criteria were Participants should fall within the low-income category, typically defined by specific income thresholds or socioeconomic indicators. This criterion ensures that the study focuses on the target population of interest. Those that did not give consent were excluded from the study. The study was conducted within three weeks from January 2023 to February 2023[22].

Sample Size Determination and Sampling Technique

For the quantitative part of the research, the sample size of 635 was determined using the formulae to estimate proportions as described by Fisher's formula for descriptive studies at standard normal variate corresponding to a 95% confidence interval. A multistage sampling technique was used in selecting the respondents. The total number of low-income earners from the selected study area (comprising health workers, artisans, etc.) out of which the desired sample size was selected.

Study Instruments and Data Collection

Qualitative interview guides (unstructured questionnaires) were designed using the literature review results and comprising open-ended questions with the study participants.

These guides were put on an online JotForm Application for ease of collection of responses (JotForm App was used to collect the responses online for the in-depth interview. JotForm enables one to create online forms, collect responses directly in emails and create fillable PDF forms.). The forms were distributed to identified low-income earner.

According to the sample size determination, a total of 635 questionnaires were administered for the quantitative study. These were shared among the 3 LCDAs.

An approved standardized questionnaire was used to elicit information from randomly selected respondents. The questionnaire was used to quantify the demographic characteristics, the awareness and knowledge, attitudes, and practices of low-income earners to covid-19 vaccine. This survey involved the use of smart phones that had CSEntry downloaded and installed on them. The software called CSpro (Census and survey Processing system) for Laptop/desktop and an App CSEntry (Phone App) was developed by United States Census Bureau and ICF international. The CSPro was downloaded as a user-friendly and easy to use software for data entry, editing, manipulation, tabulation dissemination, thematic and Global Positioning System (GPS) mapping [23].

Statistical Analysis

The survey data obtained from field activities and stored in the cloud server were cleaned and edited and then read into SPSS version 25.0 for analysis. Chi-squared tests and descriptive analysis were employed for the evaluation of association between demographic characteristics and awareness/knowledge, attitude, and perception of low-income earners towards covid-19 vaccine intake. Univariate statistics were employed to describe the study sample and vaccine collection sources that were collected. Further, possible association at bivariate level was established using Chi square test statistic. Cross tabulations were used to test the hypothesis related to the variables used at a 0.05 significance level.

Results

The structured questionnaires designed was programmed into an online JotForm Application for ease of collection of responses (JotForm App was used to collect the responses online for the in-depth interview). A total of 651 respondents

consented and responded to the online questionnaire [22].

Demographic Profiles of the Study Participants

Table 1 provides information on the social-demographic characteristics of the study respondents. The largest number of respondents were from Ejigbo (36.1%), followed by Isolo (33.9%), and Oshodi (30.0%). Most respondents were in the age range of 18-25 years (18.1%), 26-35 years (30.9%) and 36-45 years (26.6%). Just about half of the respondents were males (49.5%), while female respondents accounted for 50.5% of the total sample. Most respondents were Christians (64.1%), followed by Muslims (31.2%), while traditional religion and no religion were only 2.2% and 2.6% of respondents, respectively. Majority of the respondents are businessmen and women (41.6%) followed by Traders 17.2%, and Technician/Artisan accounted for 13.5%. About 76% respondents earn less than 50,000 while 21% respondents earn between ₦50,000.00 and ₦99,000.00 and less than 4% of the respondents earn above ₦ 100,000. Finally, half of the respondents (50.2%) had completed only secondary education, while 27.6% had attained tertiary education. The number of respondents with no formal education was low (8.8%), and only a small percentage had completed primary education (13.4%).

Table 1. Social-demographic Parameters of the Study Respondents

Variables	Parameters	Frequency (n = 651)	Percentage
Location	Ejigbo	235	36.1
	Isolo	221	33.9
	Oshodi	195	30.0
Age	18 – 25 years	118	18.1
	26 – 35 years	201	30.9
	36 – 45 years	173	26.6
	46 – 55 years	96	14.7
	56 and above	63	9.7
Sex	Female	329	50.5
	Male	322	49.5
Religion	Christianity	417	64.1
	Islam	203	31.2
	Traditional	14	2.2
	No Religion	17	2.6
Marital Status	Single	220	33.8
	Married	368	56.5
	Divorced/Widowed	63	9.7

Educational Attainment	No formal Education	57	8.8
	Primary Only	87	13.4
	Secondary Only	327	50.2
	Tertiary Education	180	27.6
Occupation	Health Worker	11	1.7
	Teacher	16	2.5
	Technical/Artisan/Hand Work	88	13.5
	Engineer	31	4.8
	Businessman/Woman	271	41.6
	Unemployed	27	4.1
	Student	53	8.1
	Retiree	10	1.5
	Trader	112	17.2
	Transporter	17	2.6
	Security Work	11	1.7
	Others	4	0.6
Monthly Income	<N50,000	491	75.4
	N50,000 – N99,000	137	21.0
	N100,000 and above	23	3.5

Knowledge of Respondents on COVID-19 Vaccine

Respondents' knowledge of illness and COVID-19 was evaluated using five questions, including “Do you have any medical issue in the last 12 months?”, “If yes to Q9, what was the issue?”, “Have you travelled out of Nigeria in the last 12 months?”, “ Do you have a chronic condition(s)?” and “If Yes to Q12, kindly state the kind of chronic condition(s)”. Positive answers (Yes) were scored one mark, and No was scored a zero. Respondents that scored 2 of 3 marks were considered knowledgeable, while those who scored less were considered non-knowledgeable.

The percentage of respondents who had medical issues in the last 12 months varies across the three locations. The highest proportion of respondents who had medical issues in the last 12 months was from Oshodi (19.7%, n = 128), followed by Ejigbo (13.1%, n = 85), and Isolo (10.3%, n = 67). The chi-square value of 59.58 and p-value less than 0.001 indicates a statistically significant association between the location and number respondents that had medicals in the last 12 months. The data suggest that respondents in the surveyed local

government in Nigeria had medical issues in the last 12 months, with a significant difference in medical issues (Figure 1).

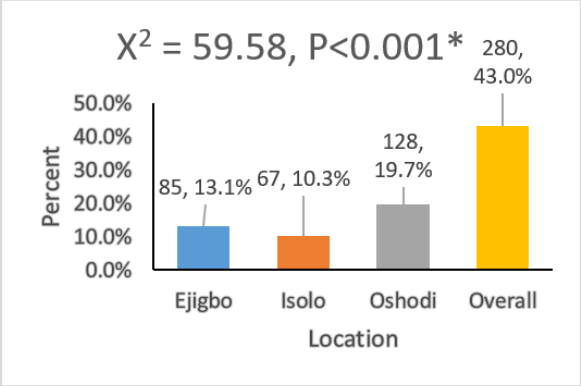

Figure 1. Number of Medical Issues Recorded in the Last 12 Months.

Figure 2 shows the frequency and percentage of frequently medical issues in the last 12 months. The data show that Malaria was the most reported medical condition in the last 12 months, representing 48.2% of all cases. Other conditions reported are headache (23.2%), typhoid (16.8%). Also mentioned were 'others' (7.5%), general body pain and difficulty in breathing at 3.9% and 0.4%, respectively.

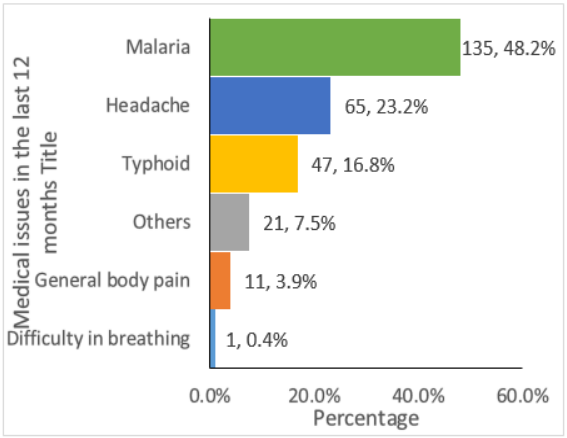

Figure 2. Medical Issues in the Last 12 months.

Respondents' Perception of COVID-19 Vaccine

Respondents' perceptions of COVID-19 vaccine were evaluated with eight Lickert scale questions from strongly disagree to strongly agree. These are: "I believe vaccines are effective at preventing diseases", " There is no need to get the vaccine once recovered from COVID-19", "I trust scientists would have develop safe COVID-19 vaccines", "I trust scientists would have developed effective COVID-19 vaccines", "I trust the Government to ensure that COVID-19 vaccines are safe", "COVID-19 vaccines developed for Europe and America are safer than the vaccine developed for Nigeria", "The short period of COVID-19 vaccine development is worrisome", and "I don't believe in the existence of COVID-19". Overall score of 1 = Strongly disagree, 2 = disagree, 3 = Do not know, 4 = Agree, and 5 = Strongly agree. A means comparison was performed on the variables, and the results are presented in Table 2.

The mean scores for all questions vary significantly (p-value <0.001) between the locations. Respondents in Ejigbo generally have

higher positive perceptions about vaccines being effetive and safe at preenting diseases than Isolo and Oshodi. Regarding believing vaccines at preventing diseases: All participants in Ejigbo (4.06±1.23), Isolo (3.86±0.94) and Oshodi (3.54±1.15) respondents show relatively agreement opinions towards covid-19 vaccines preventing diseases.

Regarding whether there is no need to get the vaccine once recovered from covid-19: respondents from Isolo (3.17±1.26) and Oshodi (3.17±1.04) are relatively neutral while those from Ejigbo (3.52±1.60) disagree that there is need to get the vaccine even when recovered from covid-19.

All the participantsacross the three locations Ejigbo (3.80±1.25), Isolo (3.81±0.86) and Oshodi (3.60±1.11) strongly agreed that they trust scientists would have develop safe covid-19 vaccines and all the participants in Ejigbo (3.87±1.28), Isolo (3.81±0.85) and Oshodi (3.59±1.11) strongly agree that they trust scientists would have developed effective covid-19 vaccines. While Isolo (3.48±1.17) and Oshodi (3.79±1.31) strongly agree that they trust the government to ensure that covid-19 vaccines are safe, respondents from Ejigbo (3.12±1.51) were relatively neutral.

On considering covid-19 vaccines developed for Europe and America are safer than the vaccine developed for Nigeria: respondents from Ejigbo (2.76±1.60), as well as those from Oshodi (3.01±1.05), show a neural agreement with this statement than respondents from Isolo (2.18±1.17) who agree with the statement. The statement 'The short period of covid-19 vaccine development is worrisome: Ejigbo (3.44±1.48) and Isolo (3.50±0.86) agreed with the statement while Oshodi (3.13±1.07) was neutral. Lastly, regarding 'I don't believe in the existence of covid-19': Ejigbo (3.61±1.62), and Isolo (3.71±1.15) disagreed with the statement. On the contrary, those from Oshodi expressed weaker disagreement levels (3.38±1.48) concerning the existence of covid-19.

Overall, when considering all aspects together, Ejigbo (3.52±0.77) have a more positive perception of covid-19 vaccines compared to Isolo (3.45±0.53) and Oshodi (3.40±0.78).

Table 2. Respondents' Perception of Covid-19 Vaccines

Perception	**Location (Mean±SD)**				
	Ejigbo	**Isolo**	**Oshodi**	**Total**	**P-value**
I believe vaccines are effective at preventing diseases.	4.06±1.23[b]	3.86±0.94[b]	3.54±1.15	3.84±1.13	**<0.001***
There is no need to get the vaccine once recovered from COVID-19.	**3.52±1.60**	**3.17±1.26[a]**	**3.17±1.04[a]**	**3.30±1.35**	**.006**
I trust scientists would have develop safe COVID-19 vaccines.	3.80±1.25[a]	3.81±0.86[a]	3.60±1.11	3.74±1.10	**.089**
I trust scientists would have	3.87±1.28	3.81±0.85[b]	3.59±1.11[b]	3.77±1.10	**.027**

developed effective COVID-19 vaccines.					
I trust the Government to ensure that COVID-19 vaccines are safe	3.12±1.51	3.48±1.17	3.79±1.31	3.44±1.37	**<.001**
COVID-19 vaccines developed for Europe and America are safer than the vaccine developed for Nigeria.	**2.76±1.60[b]**	**2.18±1.17**	**3.01±1.05[b]**	**2.64±1.35**	**<.001**
The short period of COVID-19 vaccine development is worrisome.	3.44±1.48[b]	3.50±0.86[b]	3.13±1.07	3.37±1.19	**.003**
I don't believe in the existence of COVID-19	**3.61±1.62[a,b]**	**3.79±1.15[b]**	**3.38±1.48[a]**	**3.60±1.43**	**.015**
Overall perception	**3.52±0.77**	**3.45±0.53**	**3.40±0.78**	**3.46±0.70**	**.192**

The mean of locations with the same superscript alphabets are not significantly different at P<0.05; *The mean difference is significant at the 0.05 level.

Discussion

COVID-19 pose a considerable threat to the health and economic aspects of all population. It is a global problem all over developing and developed countries, affecting 223 countries, and resulting in over 104.37 million confirmed cases and 22.71 million deaths globally as of February 6, 2021[1]. In Nigeria, between January 2020 and November 8th, 2021, the WHO recorded 212,765 confirmed cases, resulting in 2,906 deaths [2,3]. Despite global efforts, Nigeria lagged in achieving the goal of fully vaccinating 10% of its population by September 30, 2021, with only 1.7% fully vaccinated and 1.3% partially vaccinated by November 25th, 2021 [4,6].

This section discusses the findings from the result of this study, compares the findings with other studies and provides recommendations.

Respondents' Knowledge of Covid-19 Vaccines Uptake

In this study, awareness/knowledge is significantly associated with age, gender, religion, marital status, education, ethnicity, and income. This study's findings show that the highest proportion of Respondents with good knowledge about covid-19 vaccines uptake was from Oshodi (40.1%), followed by Ejigbo (34.1%), and while Isolo has the least proportion

(25.8%). This study also found that the percentage of Respondents with good knowledge of covid-19 vaccine uptake in the local government was slightly below average (48.2%).

This shows that five out of ten Respondents in this study have good knowledge about covid-19 vaccine uptake. This shows that about five out of ten respondents in this study have good knowledge about covide-19 vaccine uptake

This finding aligns with similar studies conducted in Bangladesh, which also showed no significant disparities between genders in terms of knowledge regarding COVID-19 [24, 25].

Respondents' Perception of Covid-19 Vaccines Uptake

This study's findings also reveal that most Respondents have a positive perception of covid-19 vaccines uptake. The possible justification for the Respondents' positive perception of covid-19 vaccine in this study may be because of respondents trust in scientist development of vaccines.

Conclusion

The study indicates that although most respondents are aware of the availability of COVID-19 vaccines, there is a lack of comprehensive understanding about covid-19 vaccines within the local government. Moreover, approximately half of the respondents demonstrate a satisfactory level of good knowledge regarding COVID-19 vaccine uptake. Additionally, respondents exhibit a favorable attitude towards the uptake of COVID-19 vaccines.

Furthermore, the study delves into the reasons behind the reluctance or hesitancy towards COVID-19 vaccine uptake. It elucidates the significance that religious beliefs hold for the public in their decision-making process regarding vaccination. These findings underscore the need for targeted educational initiatives to address misconceptions and concerns surrounding COVID-19 vaccines, particularly within communities where religious beliefs strongly influence health-related decisions.

References

[1] Pal M., Berhanu G., Desalegn C., Kandi V., 2020, Severe acute respiratory syndrome Coronavirus-2 (SARS-CoV 2): an update. Cureus. https://doi.org/10.7759/cureus.7423.

[2] Cucinotta D., Vanelli M., 2020, WHO declares COVID-19 a pandemic. Acta biomedical Atenei Parm, 91: 157–60.

[3] World Health Organization, 2021, WHO Coronavirus Disease (COVID-19) Dashboard, https://covid19.who.int/?gclid=EAIaIQobChMI2p622Oe6wIVxJrVCh0DJgDvEAAYASAAEgIeFfD_BwE.

[4] World Health Organization (WHO), 2022,WHO Coronavirus (COVID-19) Dashboard.

[5] NCDC. COVID-19 NIGERIA. Accessed 7th January 2022.

[6] World Population Review. Nigeria Population 2022 (Live). Accessed 7th January 2022

[7] NPHCDA. Welcome Message from the ED/CEO. Accessed 7th January 2022.

[8] Our World in Data, 2022, Coronavirus Pandemic (COVID-19). Accessed 7th January 2022.

[9] Wang J, Jing R, Lai X, Zhang H, Lyu Y, Knoll MD et al., 2022, Acceptance of COVID-19 Vaccination during the COVID-19 Pandemic in China. Vaccines (Basel), 8(3), 482.

[10] World Health Organization (WHO)., 2020 Behavioural considerations for acceptance and uptake of COVID-19 vaccines: WHO technical advisory group on behavioural insights and sciences for health, meeting report, 15 October. Accessed 7th January 2022.

[11] MacDonald N. E., 2015, Vaccine hesitancy: Definition, scope and determinants. Vaccine. 33(34), 4161-4164.

[12] Larson H. J., Jarrett C., Eckersberger E., Smith D. M. D., 2014, Paterson P. Understanding vaccine hesitancy around vaccines and vaccination from a

global perspective: A systematic review of published literature, 2007-2012. Vaccine. 32(19),a 2150-2159.

[13] Wang J., Jing R., Lai X., Zhang H., Lyu Y., Knoll M. D. et al., 2020, Acceptance of COVID-19 Vaccination during the COVID-19 Pandemic in China. Vaccines (Basel). 8(3), 482.

[14] Ferdous M. Z., Islam M. S., Sikder M. T., Mosaddek A. S. M., Zegarra-Valdivia J. A., Gozal D., 2020, Knowledge, attitude, and practice regarding COVID-19 outbreak in Bangladesh: an online-based cross-sectional study. PLoS One. 15(10), e0239254. https://doi.org/10.1371/journal.pone.0239254.

[15] Graffigna G., Palamenghi L., Boccia S., Barello S., 2020, Relationship between Citizens´ Health Engagement and Intention to Take the COVID-19 Vaccine in Italy: A Mediation Analysis. Vaccines (Basel). 8(4), 576.

[16] Pogue K., Jensen J. L., Stancil C. K., Ferguson D. G., Hughes S. J., Mello E. J. et al., 2020, Influences on Attitudes Regarding Potential COVID-19 Vaccination in the United States. Vaccines (Basel). 8(4), 582.

[17] Head K. J., Kasting M. L., Sturm L. A., Hartsock J. A., Zimet G. D., 2020, A National Survey Assessing SARSCoV-2 Vaccination Intentions: Implications for Future Public Health Communication Efforts. Science Communication. 42(5), 698-723.

[18] Sherman S. M., Smith L. E., Sim J., Amlôt R., Cutts M., Dasch H. et al., 2021, COVID-19 vaccination intention in the UK: results from the COVID-19 vaccination acceptability study (CoVAccS), a nationally representative cross-sectional survey. Hum Vaccin Immunother. 17 (6), 1612-1621.

[19] Reiter P. L., Pennell M. L., Katz M. L., 2020 Acceptability of a COVID-19 vaccine among adults in the United States: How many people would get vaccinated? Vaccine. 38(42), 6500-6507.

[20] Biasio L. R., Bonaccorsi G., Lorini C., Pecorelli S., 2021, Assessing COVID-19 vaccine literacy: a preliminary online survey. Hum Vaccin Immunother. 17 (5), 1304-1312.

[21] Eastwood K., Durrheim D. N., Jones A., Butler M., 2010, Acceptance of pandemic (H1N1) 2009 influenza vaccination by the Australian public. Med J Aust. 192 (1): 33-36.

[22] Bruce N., et al., 2008, Quantitative research methods for health research: a practical interactive guide to epidemiology and statistics. Chichester, UK: Wiley

[23] CSPro (2023) Census and Survey Processing System (CSPro) Online Available https://www.census.gov/data/software/cspro.html (Accessed July 2023)

[24] Banik R., Rahman M., Sikder M. T., Rahman Q. M., Pranta M. U. R., 2021, Knowledge, attitudes, and practices related to the COVID-19 pandemic among Bangladeshi youth: a web-based cross-sectional analysis. J Public Health (Bangkok). https://doi.org/10.1007/s10389-020-01432-7.

[25] Hossain M. A., Jahid M. I. K., Hossain K. M. A, Walton L. M., Uddin Z., Haque M. O., et al., 2020, Knowledge, attitudes, and fear of COVID-19 during the rapid rise period in Bangladesh. PLoS One. 15(9), e0239646. https://doi.org/10.1371/journal.pone.0239646.