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Original Article

Vaccine Acceptance among Adults in Jalingo

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Keywords: *Adults, Age, Acceptance, COVID-19 Vaccine, Factors, Gender, Influence, Vaccine Acceptance.*

ABSTRACT

Vaccine acceptance is crucial to containing the most raging viral infections ravaging the world today. The COVID-19 vaccine is not an exception to this. COVID-19 vaccine acceptance is an issue of great concern all over the world, Nigeria inclusive; considering the manner the disease, COVID-19 ravaged the world, crumbled economies, and almost overwhelmed the healthcare delivery of every country. A cross-sectional study was adopted to determine the acceptance of the COVID-19 vaccine among adults aged 18-55 in Jalingo. The study was carried out among 420 Jalingo adult residents between June and November 2022. The pretested questionnaires were self-administered and collected on the spot. The results revealed that 61.1% of the adults in Jalingo accepted the COVID-19 vaccine. However, 61(33%) and 98(41.7%) of the male and female respondents, respectively, accepted it. While 13(68.40%),6(50%), 39(50.60%) and 101(32.40%) respondents of the age groups 46-55, 36-45, 26-35 and 18-25, respectively, accepted the vaccine, 11(78.60%) secondary school leavers, 4 (44.4%) and 68(33.20%) tertiary and primary school leavers accepted the vaccine. In the same vein, 76(39.60%) of the respondents who had no formal education (NFE) accepted the vaccine. However, factors like giving incentives, making the vaccine compulsory, providing substantial information on the vaccine, and making health professionals recommend it can influence the acceptance of the vaccine. The acceptance of the COVID-19 vaccine among adults in Jalingo was moderate. However, this acceptance rate can be improved upon if the encouraging factors are detected and efficiently utilised.

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INTRODUCTION

COVID-19 is very much around with us. The approved and recommended vaccines against it is also available. Yet some people will not avail themselves of the opportunity. A lot of factors contribute to this. They include the level of education, fear of needles, negative beliefs based on myths, e.g., that vaccination of women leads to infertility, misinformation, mistrust in the health care professional or health care system, the role of influential leaders, costs; geographic barriers and concerns about vaccine safety. While some of these factors are barriers to vaccine acceptance, others are promoters. In some cases, a particular factor (such as level of education) can be a promoter as well as a barrier to vaccine acceptance depending on the area or setting (WHO, 2015).

Why Don't People Embrace Vaccination? Do They Know What Vaccine is and the Purpose

A vaccine is any preparation that is used to stimulate the body's immune response against diseases. Vaccines are usually administered through needle injections, but some can be administered by mouth or sprayed into the nose (CDC, 2021).

There are several types of vaccines; they are inactivated vaccines, live-attenuated vaccines, messenger RNA (mRNA) vaccines, Subunit, recombinant, polysaccharide, and conjugate vaccines, toxoid vaccines and Viral vector vaccines (US Department of Health and Human Services, 2022). Some of the methods are used in the production of COVID-19 vaccines. For instance, mRNA vaccines make proteins in order to trigger an immune response. It has the advantage of shorter manufacturing times and no risk of causing disease in the person getting vaccinated. mRNA vaccines can be used to protect against COVID-19(US Department of Health and Human Services, 2022). Viral vector vaccines use a modified version of a different virus as a vector to deliver protection. Several different viruses have been used as vectors, including influenza, vesicular stomatitis virus (VSV), measles virus, and adenovirus, which causes the common cold. Adenovirus is one of the viral vectors used in some COVID-19 vaccines being studied in clinical trials. Viral vector vaccines are used to protect against COVID-19(US Department of Health and Human Services, 2022). Viral vector-based vaccines use a harmless virus to smuggle the instructions for making antigens from the disease-causing virus into cells, triggering protective immunity against it (VIPER Group COVID-19 Vaccine Tracker Team, 2022).

Viral vector has an advantage over most conventional vaccines by not containing the antigens but rather using the body's own cells to produce them. The vaccine mimics what happens during natural infection with certain pathogens - especially viruses. This has the advantage of triggering a strong cellular immune response by T cells as well as the production of antibodies by B cells. The virus itself is harmless, and by getting the cells only to produce antigens, the body can mount an immune response safely without developing disease (VaccinesWork, 2020).

Nevertheless, in recent years, vaccine development using ribonucleic acid (RNA) has become the most promising and studied approach to producing safe and effective new vaccines. During the COVID-19 pandemic, the use of mRNA as a vaccine became more relevant; two out of the four most widely applied vaccines against COVID-19 in the world are based on this platform (Machado *et al*., 2021).

Seven COVID-19 vaccines have been approved for use in Nigeria as of December 2, 2022. They

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include Moderna Spikevax and Pfizer/BioNTech Comirnaty. The remaining 5 utilised a non-replicating viral vector, and they include Janssen (Johnson & Johnson) Jcovden, Oxford/AstraZeneca Vaxzevria, Serum Institute of India Covishield (Oxford/ AstraZeneca formulation) and Sinopharm (Beijing) Covilo (VIPER Group COVID-19 Vaccine Tracker Team, 2022)

Vaccines pass a lot of steps before being approved for use to ensure they are safe. Despite the safety of COVID-19 vaccines approved and made available by the appropriate authorities, a lot of people still view the vaccines with different kinds of attitudes. Some welcomed it with open arms, some reluctant concerning it, while some outrightly rejected attitudes. A study by James *et al*. (2022). Sixty-point two per cent (60.2%) (n = 201) of respondents showed positive attitudes with a mean of (13.96±2.97) towards the vaccine (James *et al*., 2022). Also, in a review study by Ackah *et al*. (2022), the vaccine acceptance rate ranged from 6.9 to 97.9% (Ackah *et al*., 2022). On the other hand, among clinical practitioners, the COVID-19 vaccine was accepted by 84.4 per cent of those polled, and 86.1 per cent said they would recommend it to others (Abay *et al*., 2022). Therefore, this study aimed to determine the acceptance of the COVID-19 vaccine among adults in Jalingo as well as the influencing factors.

METHODOLOGY

Study Design

This community-based cross-sectional design was carried out between June and November 2022. It utilised a self-structured questionnaire designed to get information on the acceptance of the COVID-19 vaccine among adults aged 18-55 years in Jalingo and the factors that influence the acceptance. The respondents comprised only the adults who were residents of Jalingo and were willing to participate. The research instrument (questionnaire) also contained information on the demographic characteristics of the participants. The research instrument was administered by hand and collected in the same spot after it had been filled/attended to.

Collection Tool

The questionnaire was used. It contained two sections. Section "A" contained information on the demographic characteristics of the participants, while section "B" contained information that will help to determine the acceptance of the COVID-19 vaccine among adults as well as the factors that influence it. The research instrument was scaled 3-1, designated as "YES", "MAYBE' and "NO", respectively. The reliability of the questionnaire was obtained using the Cronbach Alpha method, and a pretest was done to determine its validity.

Sample and Sampling Technique

The study adopted a simple random sampling technique. The sample size was obtained using the Taro Yamane method of sample size determination.

$$n = \frac{N}{1+N(e^2)}$$

Where n = sample size, N = Population, e = error (0.05)

Therefore

$$n = \frac{N187,500}{1+187,500(0.05^2)} = 399.14$$

However, 5% of the sample size was added to account for potential non-responses or attrition. Hence the study was conducted among 420 adults.

Data Collection

A pilot study was carried out by administering the questionnaire to 20 of the participants. The questionnaire was self-administered and collected on the spot after the participants had provided the needed information. The reliability test was done, and Cronbach Alpha Reliability of 0.8 was obtained, and since no major correction was done on the questionnaire, the result of the pilot study was added to that of the main study. Just like in the pilot study, the questionnaire was administered by hand by the researchers in a one-

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to-one interaction with the respondents. The participants were given some time to respond to the items posed on the questionnaire, after which it was collected back by the researchers. This continued until the 420 participants' target sample size was obtained.

Data Analysis

Filled questionnaires were individually analysed and scored using the predetermined scores of '3' depicting 'YES', '2'- 'MAY BE and 'NO' graded '1'. The total score of each respondent was obtained by calculating the sum of the scores of the responses as graded. High scores, such as 70% and above, was regarded as "accepted/high acceptance", while 50% to 69% were regarded as Moderate and < 50% was regarded as rejection/Low acceptance. Then, the total number of individuals with high acceptance was used to calculate the acceptance of the COVID-19 vaccine for each category of respondents, while the total number of respondents with moderate and low acceptance/rejection was used to calculate the percentage of moderate acceptance and rejection separately, respectively. However, the total response to each item on the questionnaire by each category of respondents was collated and used to determine the factors that influence vaccine acceptance. The data obtained were analysed using descriptive statistics and presented in frequencies and percentages, while inferences were drawn using Chi-square.

Ethical Clearance/Approval

The first part of the survey instrument had a clear statement to show that participation in the study was completely voluntary and that the consent for study participation was implied by duly signing/submitting the completed form. Forms were filled and submitted anonymously, and confidentiality of the participants' information was ensured during and after the study.

RESULTS

The study comprised 235 (56.0%) female and 185(44.0%) male respondents. Three hundred and twelve (74.3%) participants were in the age group 18-25, 77(18.3%) within 26-35 years, 12(2.9%) within 36-45 and 19(4.5%) were between 46-55 years. However, two hundred and fifty-five (60.7%), 155(36.9%) and 10(2.1%) of the participants were respectively employed, unemployed and students. Nevertheless, 192(45.7%), 205(48.8%), 14(3.3%) and 9(2.1%) of the participants had no formal, primary, secondary, and tertiary education, respectively, as presented in *Table 1*.

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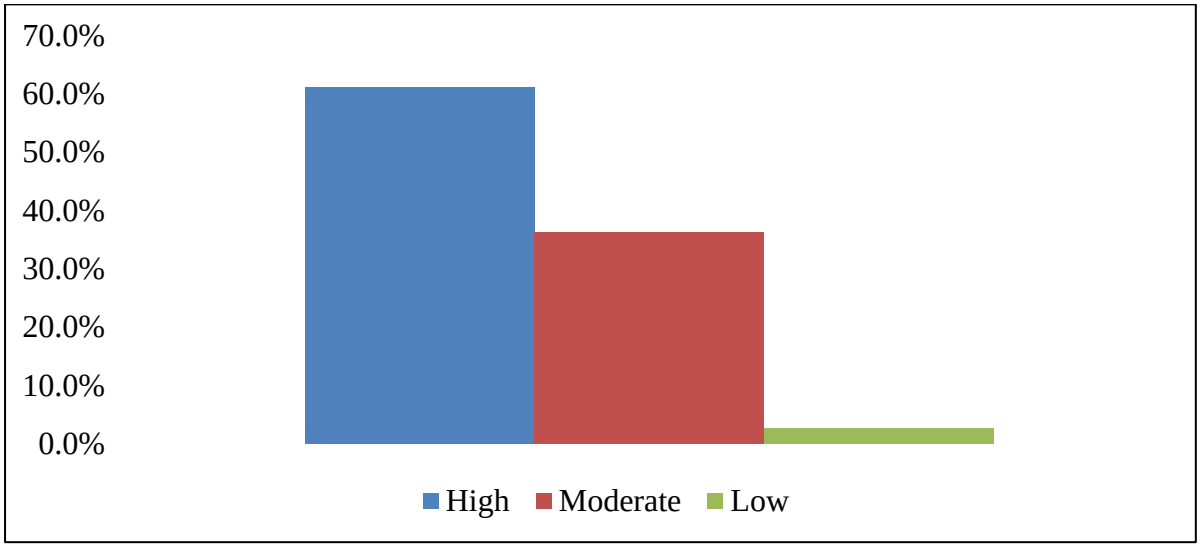
Table 1: Demography of the respondents

Variable	Parameter	Frequency	Percentage
Gender	Male	185	44.0
	Female	235	56.0
	Total	420	100.0
Age	18 - 25 years	312	74.3
	26 - 35 years	77	18.3
	36 - 45 years	12	2.9
	46 - 55 years	19	4.5
	Total	420	100.0
Marital status	Single	29	6.9
	Widowed	175	41.7
	Divorced	208	49.5
	Separated	8	1.9
	Total	420	100.0
Employment status	Employed	255	60.7
	Unemployed	155	36.9
	Student	10	2.4
	Total	420	100.0
Highest Educational Qualification	None	192	45.7
	Primary	205	48.8
	Secondary	14	3.3
	Tertiary	9	2.1
	Total	420	100.0

The study on the acceptance of the COVID-19 vaccine among adult residents in Jalingo revealed that 61.1% of the adults accepted the Covid-19 vaccine, while 36.2% had an intermediate/moderate acceptance and 2.7% rejected the vaccine, as presented in *Figure 1*.

Figure 1: Covid-19 vaccine acceptance among adults in Jalingo



Ninety-seven (52.4%) males and 117(49.8%) females will accept the vaccine if given incentives. Meanwhile, 80(43.2%) males and 112(47.7%) females will accept the vaccine if it is made compulsory. On the other hand, 105(56.8%) males and 85(36.2%) females will accept the vaccine if given substantial information on the vaccine, while 114(61.6%) males and 90(38.3%) females will be eager to take the vaccine if recommended by healthcare professionals as presented in *Table 2*.

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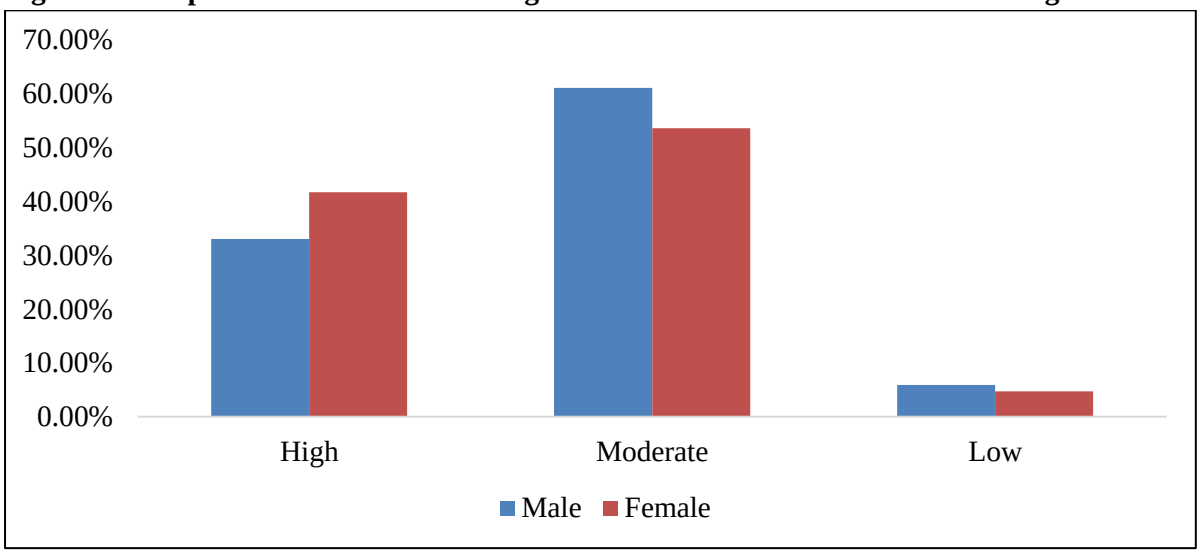
Table 2: Factors that influence the Acceptance of COVID-19 Vaccine among Male and Female Adults in Jalingo

Items	Gender	Freq (Percent)			P-value
		Yes	No	Maybe	
Are you willing to accept COVID-19 Vaccine	Male Female	61(33%) 93(41.7%)	113(61.1%) 126(53.6%)	11(5.9%) 11(4.7%)	0.181
Are you willing to accept COVID-19 Vaccine if the government provides incentives	Male Female	97(52.4) 117(49.8%)	84(45.4) 115(48.9%)	4(2.2%) 3(1.3%)	0.637
Will you accept the COVID-19 vaccine if the government makes	Male Female	80(43.2%) 112(47.7%)	91(49.2%) 107(45.5%)	14(7.6%) 16(6.8%)	0.664
Will you pay for COVID-19 Vaccine if need be	Male Female	113(61.1%) 119(50.6%)	67(36.2%) 109(46.4%)	5(2.7) 7(3.0)	0.099
If offered COVID-19 Vaccine with substantial information on the vaccine, will you accept it	Male Female	105(56.8%) 85(36.2%)	71(38.4%) 141(60%)	9(4.9%) 9(3.8%)	0.000
Are you willing to take COVID-19 Vaccine if a healthcare provider recommends it	Male Female	114(61.6%) 90(38.3%)	61(33%) 136(52.9%)	10(5.4%) 9(3.8%)	0.000
If the vaccine is provided at no financial cost, I will accept it	Male Female	70(37.8%) 92(39.1%)	102(55.1%) 134(57%)	13(7%) 9(3.8%)	0.344
Despite the fact that the COVID-19 vaccine is new, I will accept it once it is made available	Male Female	100(54.1%) 81(34.5%)	73(39.5%) 138(58.7%)	12(6.5%) 16(6.8%)	0.000
Are you willing to accept COVID-19 Vaccine regardless of fears of potential adverse effects	Male Female	61(33%) 98(41.7%)	113(61.1%) 128(54.5%)	11(5.9%) 9(3.8%)	0.146

The acceptance of the COVID-19 vaccine among male and female adults in Jalingo showed that 61(33%) and 98(41.7%) of the male and female respondents, respectively, accepted the vaccine. However, 11(5.9%) males and 11 (4.7%) females rejected the vaccine, as presented in *Figure 2*.

Figure 2: Acceptance of COVID-19 among male and female adult residents in Jalingo



The study on the factors influencing the acceptance of COVID-19 revealed that 114(46.2%), 47(61%), 10(83.3%) and 13(68.4%) respondents aged 18-25, 26-35, 36-45 and 46-55 respectively would accept the vaccine if given incentives. Meanwhile, 124(39.7%), 49(63.6%),

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7(58.3%), and 12(63.2%), respectively, aged 18-25, 26-35, 36-45 and 46-55, stated that they would accept the vaccine if it becomes compulsory. Nevertheless, 151(48.4%), 67(87%), 7(58.3%), and 7(36.8%) aged 18-25,26-35,36-45 and 46-55 stated their wish to accept the vaccine if asked to pay when they observed the need for it. On the other hand, 106(34%), 43(55.8%), 4(33.3%) and 9(47.4%) aged respectively 18-25, 26-35, 36-45, 46-55 agreed to accept the vaccine if it is given free. Meanwhile, 127(40.7%), 47(61%), 7(58.3%), and 9(47.4%) respondents aged 18-25, 26-35, 36-45 and 46-55 stated their willingness to accept the vaccine if given enough substantial information on it as presented in *Table 3*.

Table 3: Factors that influence the acceptance of COVID-19 vaccine among the various age groups

Items	Age	Freq (Percent)			P-value
		Yes	No	Maybe	
Are you willing to accept COVID-19 Vaccine	18-25	101(32.4%)	192(61.5%)	19(6.1%)	0.005
	26-35	39(50.6%)	35(45.5%)	3(3.9%)	
	36-45	6(50%)	6(50%)	0(0%)	
	46-55	13(68.4%)	6(31.6%)	0(0%)	
Are you willing to accept COVID-19 Vaccine if the government provides incentives	18-25	144(46.2%)	162(51.9%)	6(1.9%)	0.035
	26-35	47(61%)	29(37.7%)	1(1.3%)	
	36-45	10(83.3%)	2(16.7%)	0(0%)	
	46-55	13(68.4%)	6(31.6%)	0(0%)	
Will you accept the COVID-19 vaccine if the government makes	18-25	124(39.7%)	162(51.9%)	26(8.3%)	0.005
	26-35	49(63.6%)	25(32.5%)	3(3.9%)	
	36-45	7(58.3%)	4(33.3%)	1(8.3%)	
	46-55	12(63.2%)	7(36.8%)	0(0%)	
Will you pay for COVID-19 Vaccine if need be	18-25	151(48.4%)	151(48.4%)	10(3.2%)	0.000
	26-35	67(87%)	9(11.7%)	1(1.3%)	
	36-45	7(58.3%)	5(41.7%)	0(%)	
	46-55	7(36.8%)	11(57.9%)	1(5.3%)	
If offered the COVID-19 vaccine with substantial information on the vaccine, will you accept it	18-25	127(40.7%)	168(53.8%)	17(5.4%)	0.036
	26-35	47(61.0%)	29(37.7%)	1(1.3%)	
	36-45	7(58.3%)	5(41.7%)	0(0%)	
	46-55	9(47.4%)	10(52.6%)	0(0%)	
Are you willing to take COVID-19 Vaccine if a healthcare provider recommends it	18-25	131(42%)	165(52.9%)	16(5.1%)	0.000
	26-35	55(71.4%)	20(26.0%)	2(2.6%)	
	36-45	10(83.3%)	1(8.3%)	1(8.3%)	
	46-55	8(42.1%)	11(57.9%)	19(4.5%)	
If the vaccine is provided at no financial cost, I will accept it	18-25	106(34%)	189(60.6%)	17(5.4%)	0.024
	26-35	43(55.8%)	30(39%)	4(5.2%)	
	36-45	4(33.3%)	7(58.3%)	1(8.3%)	
	46-55	9(47.4%)	10(52.6%)	0(0%)	
Despite the fact that the COVID-19 vaccine is new, I will accept it once it is made available	18-25	110(35.3%)	180(57.7%)	22(7.1%)	0.000
	26-35	54(70.1%)	20(26%)	3(3.9%)	
	36-45	7(58.3%)	4(33.3%)	1(8.3%)	
	46-55	10(52.6%)	7(36.8%)	2(10.5%)	
Are you willing to accept COVID-19 Vaccine regardless of fears of potential adverse effects	18-25	101(32.4%)	194(62.2%)	17(5.4%)	0.005
	26-35	39(50.6%)	35(45.5%)	3(3.9%)	
	36-45	6(50%)	6(50%)	0(0%)	
	46-55	13(68.4%)	6(31.6%)	0(0%)	

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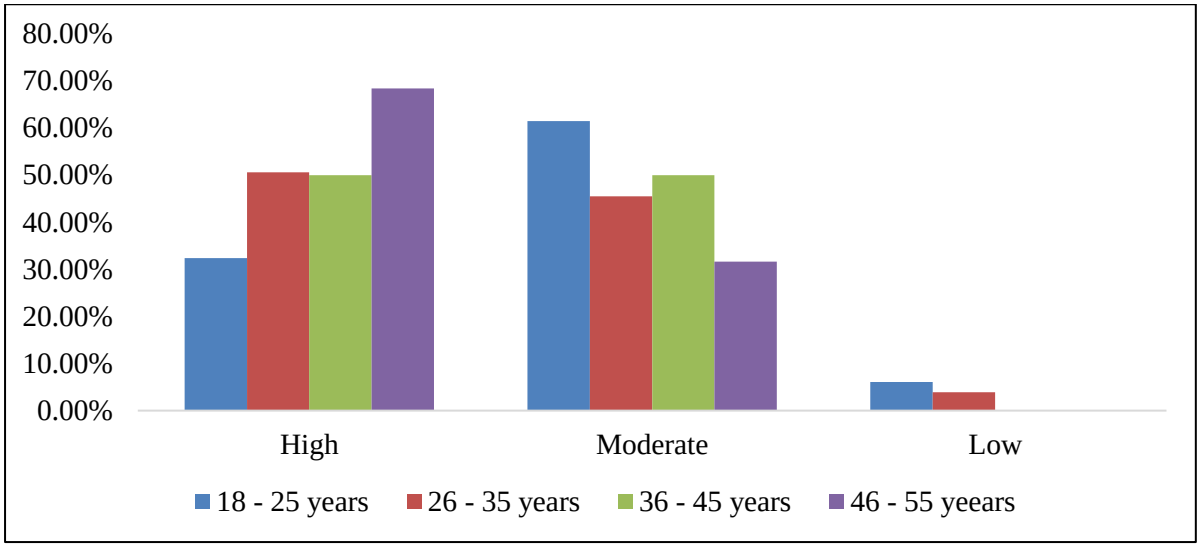
The acceptance of the COVID-19 vaccine revealed that there was high acceptance of the COVID-19 vaccine among 13(68.40%), 6(50%), 39(50.60%) and 101(32.40%) respondents of the age groups 46-55, 36-45, 26-35 and 18-25 respectively. However, 191(61.50%), 35(45.50%), 6(50%) and 6(31.60%) respondents, respectively of the age group "18-25","26-35','36-45' and 46-55 moderately accepted the vaccine as presented in *Figure 3.*

Figure 3: Acceptance of COVID-19 vaccine among various age groups



The study on the factors that influence the acceptance of the vaccine revealed that incentives would make 143(56.1%),65(41.9%) and 6(60%) employed, unemployed and students, respectively, accept the vaccine while making it compulsory will respectively make 140(54.9%), 46(29.7%) and 6(60%) to accept it. Meanwhile, if asked to pay when the need arises, 159(62.4%),70(45.2%) and 3(30%) indicated they would accept the vaccine. Nevertheless, receiving substantial information on the vaccine will motivate 146(57.3%),38(24.5%) and 6(60%) employed, unemployed and students, respectively, to accept the vaccine though 159(62.4%),39(25.2%) and 6(60%) employed, unemployed and students respectively declared that they will accept the vaccine if it is recommended by health workers as presented in *Table 4.*

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Table 4: Factors that influence the Acceptance of the COVID-19 Vaccine among the employed, unemployed and students

Items	Employment Status	Freq (per cent)			P-value
		Yes	No	Maybe	
Are you willing to accept COVID-19 Vaccine	Employed	104(40.8%)	139(54.5%)	12(4.7)	0.001
	Unemployed	50(32.3%)	98(63.2%)	7(4.5%)	
	Student	5(50%)	2(20%)	3(30%)	
Are you willing to accept COVID-19 Vaccine if the government provides incentives	Employed	143(56.1%)	106(41.6%)	6(2.4%)	0.001
	Unemployed	65(41.9%)	90(58.1%)	0(0%)	
	Student	6(60%)	3(30%)	1(10%)	
Will you accept the COVID-19 vaccine if the government makes	Employed	140(54.9%)	102(40%)	13(5.1%)	0.000
	Unemployed	46(29.7%)	96(61.9%)	13(8.4%)	
	Student	6(60%)	0(0%)	4(40%)	
Will you pay for COVID-19 Vaccine if need be	Employed	159(62.4%)	93(36.5%)	3(1.2%)	0.000
	Unemployed	70(45.2%)	80(51.6%)	5(3.2%)	
	Student	3(30%)	3(30%)	4(40%)	
If offered COVID-19 Vaccine with substantial information on the vaccine, will you accept it	Employed	146(57.3%)	105(41.2%)	4(1.6%)	0.000
	Unemployed	38(24.5%)	104(67.1%)	13(8.4%)	
	Student	6(60%)	3(30%)	1(10%)	
Are you willing to take COVID-19 Vaccine if a healthcare provider recommends it	Employed	159(62.4%)	92(36.1%)	4(1.6%)	0.000
	Unemployed	39(25.2%)	102(65.8%)	14(9%)	
	Student	6(60%)	3(30%)	1(10%)	
If the vaccine is provided at no financial cost, I will accept it	Employed	115(45.1%)	132(51.8%)	8(3.1%)	0.000
	Unemployed	42(27.1%)	102(65.8%)	11(7.1%)	
	Student	5(50%)	2(20%)	3(30%)	
Despite the fact that the COVID-19 vaccine is new, I will accept it once it is made available	Employed	141(55.3%)	97(38%)	17(6.7)	0.000
	Unemployed	36(23.2%)	111(71.6%)	8(5.2%)	
	Student	4(40%)	3(30%)	3(30%)	
Are you willing to accept COVID-19 Vaccine regardless of fears of potential adverse effects	Employed	104(40.8%)	141(55.3)	10(3.9)	0.001
	Unemployed	50(32.3%)	98(63.2%)	7(4.5%)	
	Student	5(50%)	2(20%)	3(30%)	

The acceptance of the COVID-19 vaccine revealed that 104(40.80%),50(32.30%) and 5(50%) of the employed, unemployed, and students, respectively, accepted the vaccine. Meanwhile, 139(54.50%),98(63.20%) and 2(20%) of the employed, unemployed, and students, respectively, had moderate acceptance of the COVID-19 vaccine, as presented in *Figure 4*.

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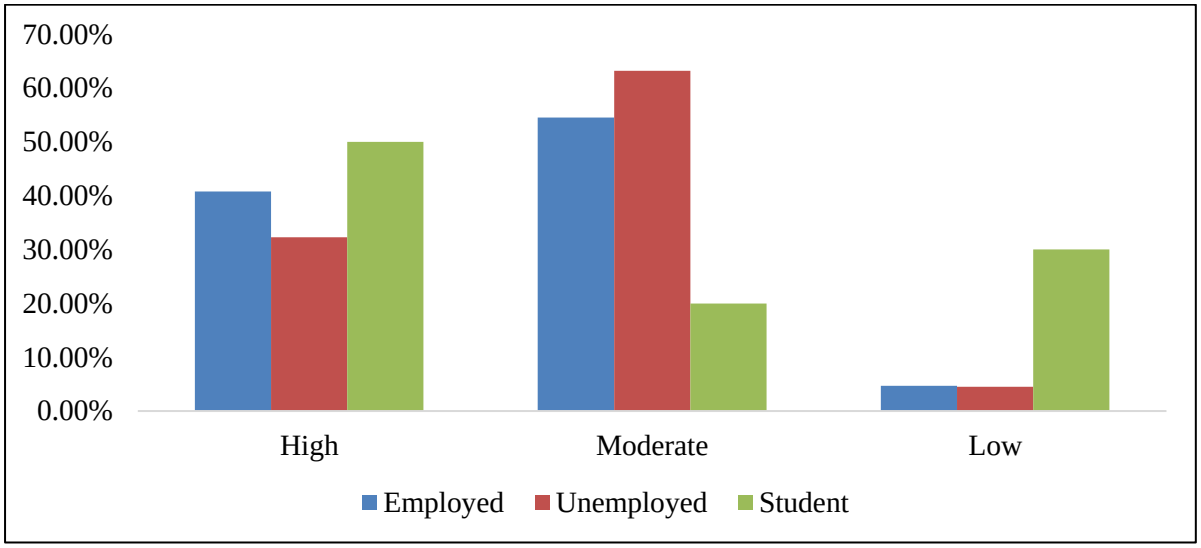
Figure 4: The acceptance of the COVID-19 Vaccine among Adults of various employment statuses in Jalingo



The study on factors influencing the acceptance of the vaccine showed that if incentives are provided, 113(58.9%), 83(40.5%), 10(71.4%), and 8(88.9%) respondents with no formal education (NFE), primary, secondary, and tertiary education respectively stated that they would take the vaccine. However, making the vaccine compulsory will make 104(54.2%), 71(34.6%), 9(64.3%) and 8(88.9%) respondents, respectively, with no formal education (NFE), primary, secondary, and tertiary education, to accept it. If asked to pay for the vaccine if the need arises, 114(59.4%), 108(52.7%), 8(57.1%), and 2(22.2%) respondents of NFL, primary, secondary, and tertiary education levels, respectively, will accept the vaccine. Also, if given substantial information on the vaccine, 113(58.9%), 59(28.8%), 10(71.4%), and 8(88.9%) respondents of NFL, primary, secondary, and tertiary education accept it, as presented in *Table 5*.

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Table 5: Factors Influencing the Acceptance of COVID-19 Vaccine among Adults in Jalingo

Items	Educational Qualification	Freq (percent)			P-value
		Yes	No	Maybe	
Are you willing to accept COVID-19 Vaccine	None	76(9.6%)	11(57.8%)	5(2.6%)	0.000
	Primary	68(33.2%)	126(61.5)	11(5.4%)	
	Secondary	11(78.6%)	2(14.3%)	1(7.1%)	
	Tertiary	4(44.4%)	0(0)	5(55.6%)	
Are you willing to accept COVID-19 Vaccine if the government provides incentives	None	113(58.9%)	76(39.6%)	3(1.6%)	0.002
	Primary	83(40.5%)	118(57.6%)	4(2.0%)	
	Secondary	10(71.4%)	4(28.6%)	0(0%)	
	Tertiary	8(88.9%)	0(0%)	1(11.1)	
Will you accept the COVID-19 vaccine if the government makes	None	104(54.2%)	77(40.1%)	11(5.7%)	0.000
	Primary	71(34.6%)	118(57.6%)	16(7.8%)	
	Secondary	9(64.3%)	3(21.4%)	2(14.3%)	
	Tertiary	8(88.9%)	0(0%)	1(11.1%)	
Will you pay for COVID-19 Vaccine if need be	None	114(59.4%)	76(39.6%)	2(1%)	0.000
	Primary	108(52.7%)	91(44.4%)	6(2.9%)	
	Secondary	8(57.1%)	5(35.7%)	1(7.1)	
	Tertiary	2(22.2%)	4(44.4%)	3(33.3)	
If offered the COVID-19 vaccine with substantial information on the vaccine, will you accept it	None	113(58.9%)	68(35.4)	11(5.7%)	0.000
	Primary	59(28.8%)	140(68.3%)	6(2.9%)	
	Secondary	10(71.4%)	4(28.6%)	0(0%)	
	Tertiary	8(88.9%)	0(0%)	1(11.1%)	
Are you willing to take COVID-19 Vaccine if a healthcare provider recommends it	None	119(62%)	62(32.3%)	11(5.7%)	0.000
	Primary	68(33.2%)	131(63.9%)	6(2.9%)	
	Secondary	9(64.3%)	4(28.6%)	1(7.1%)	
	Tertiary	8(88.9%)	0(0%)	1(11.1%)	
If the vaccine is provided at no financial cost, I will accept it	None	84(43.8%)	102(53.1%)	6(3.1%)	0.000
	Primary	64(31.2%)	131(63.9%)	10(4.9%)	
	Secondary	10(71.4%)	3(21.4%)	1(7.1%)	
	Tertiary	4(44.4%)	0(0%)	5(55.6%)	
Despite the fact that the COVID-19 vaccine is new, I will accept it once it is made available	None	104(54.2%)	81(42.2%)	7(3.6%)	0.000
	Primary	63(30.7%)	126(61.5%)	16(7.8%)	
	Secondary	10(71.4%)	4(28.6%)	0(0%)	
	Tertiary	4(44,4%)	0(0%)	5(55.6%)	
Are you willing to accept COVID-19 Vaccine regardless of fears of potential adverse effects	None	76(39.6%)	111(57.8%)	5(2.6%)	0.000
	Primary	68(33.2%)	126(61.5%)	11(5.4%)	
	Secondary	11(78.6%)	2(14.3%)	1(7.1%)	
	Tertiary	4(44.4%)	2(22.2%)	3(33.3%)	

The acceptance of the vaccine showed that 11(78.60%) secondary school leavers accepted the COVID-19 vaccine, while 4 (44.4%) and 68(33.20%) of the tertiary and primary school leavers also did the same. In the same vein, 76(39.60%) of the respondents who had no formal education (NFE) accepted the vaccine, as presented in *Figure 5*.

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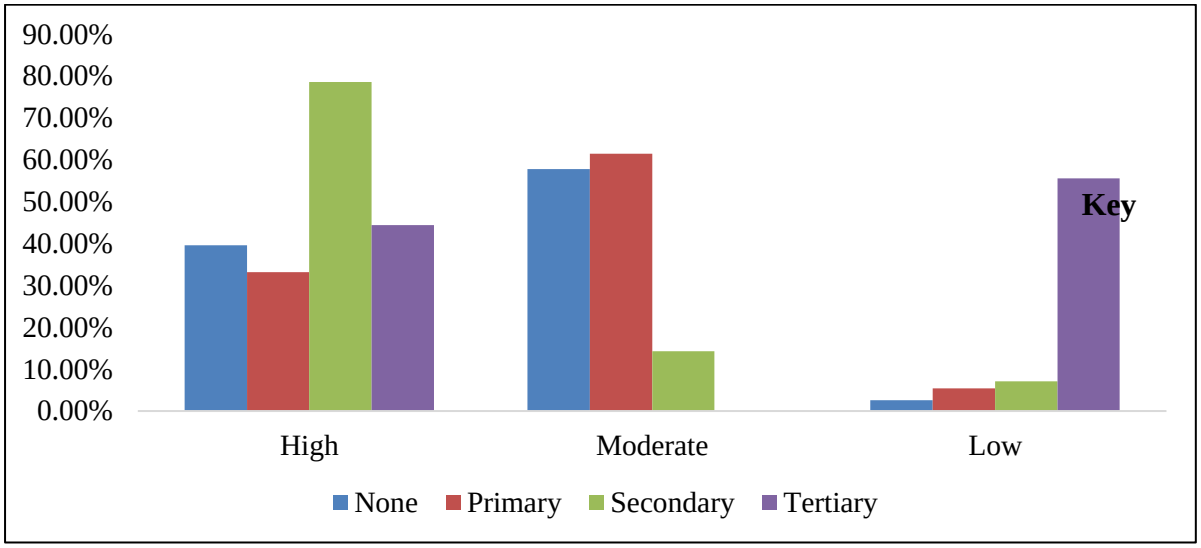
Figure 5: The Acceptance of the COVID-19 Vaccine among Adults of various educational levels in Jalingo



DISCUSSIONS

The study was carried out among 420 adults aged 18-55 who were residents of Jalingo. More women (56.0%) than men (44.0%) constituted the respondents. Almost three-quarters (74.3%) of the respondents were in the age group 18-25. Meanwhile, a little below half (48.8%) of the respondents were primary school leavers, while a handful (2.1%) had tertiary education (*Table 1*).

A good number (61.1%) of the adults in Jalingo accepted the vaccine. The few (2.7%) that had low acceptance/rejected the COVID-19 vaccine were probably because of the way they perceived the vaccine as well as the disease, while 36.2% had moderate acceptance (*Figure I*). The 61.1% acceptance obtained in this study is higher than the 37.4% reported by El-Elimat *et al*. (2021) in a study carried out in Jordan. Also, El-Ghitany *et al.* (2022) reported that the acceptance rate of COVID-19 among healthcare workers (HCWs) was 58.2%.

The acceptance of the COVID-19 vaccine among females was 41.7%, while it was 33.0% among men (*Figure 2*). The acceptance was higher among women because most men, by nature, like to be sure of most things they do before going into it. Moreover, the respondent constituted more women than men. They are represented in the ratio; 56 to 44. However, Zintel *et al.* (2023), in their review paper, reported that a majority (58%) of the papers they reviewed reported men to have higher intentions to get vaccinated against COVID-19. Also, El-Elimat *et al.* (2021) reported that males are more likely to accept COVID-19 vaccine. However, El-Ghitany *et al.* (2022) reported that males represented a higher percentage among the vaccine acceptance group compared to those who refused.

Nevertheless, some factors boosted the willingness of males to accept the vaccine. They include recommendations by healthcare providers and paying for the vaccine if the need arises. However, some other factors, such as giving the vaccine at no financial cost, will reduce the acceptance of the vaccine among men. Meanwhile, more women respondents indicated an interest in accepting the vaccine if the government gives incentives, while they will also be discouraged from taking the vaccine if it is given at no financial cost and when it is being recommended by healthcare workers (*Table 2*).

The acceptance of the COVID-19 vaccine was highest (68.40%) among the age group 46-55, while it was the least (32.40%) among the age group 18-25 (*Figure 3*). The reason was because of their perception towards the vaccine-some of them believed it was the white man's idea to reduce the population of Africans. The findings of this study on the influence of age on the

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acceptance of the COVID-19 vaccine among adults in Jalingo agree with the report of Mustapha *et al*. (2021) that age is an important predictor of COVID-19 vaccine acceptance. Also, El-Elimat *et al.* (2021) reported that age is a factor that influences the acceptance COVID-19 vaccine. Regarding the factors that encourage people of various ages to accept the vaccine, giving incentives by the government as well as respondents paying for the vaccine when the need arises will increase the acceptance of the vaccine among adults aged 18-25. Meanwhile, giving the vaccine at no financial cost as well as making it compulsory, will reduce acceptance. However, the age group 26-35 years will be more willing to accept the vaccine if they pay for it when the need arises. Meanwhile, giving the vaccine at no financial cost will discourage them from accepting the vaccine. Just like the age group 26-35, adults 36-45 will be discouraged from taking the COVID-19 vaccine if offered at no financial cost. Meanwhile, if a healthcare worker recommends it or if the government gives incentives, the acceptance among them will increase. For individuals aged 46-55, giving incentives and making the vaccine compulsory will increase acceptance. However, giving it at no financial cost will discourage them from accepting the vaccine (*Table 3*).

The acceptance of the COVID-19 vaccine was highest (50%) among students and least (32.30%) among the unemployed (*Figure 4*). This study also revealed that though half of the student respondents accepted COVID-19, a little above one-third of them rejected the vaccine (*Figure 4*). This was because they believed they were young and strong and that their body could resist infection. El-Elimat *et al.* (2021), just like in this study, stated that employed participants were less likely to accept the COVID-19 vaccines. Meanwhile, El-Ghitany *et al.* (2022) reported that employment status is a factor that influences the acceptance of the COVID-19 vaccine. However, if the COVID-19 vaccine is recommended by healthcare workers or if asked to pay for it when the need arises, the employed will more likely accept the vaccine. Meanwhile, giving the vaccine at no cost will discourage them from accepting the vaccine. Nevertheless, giving substantial information on the vaccine to the unemployed and the vaccine being recommended by healthcare workers will be a deterrent to their accepting the vaccine while paying for the vaccine when the need arises and giving incentives will encourage them (*Table 4*).

However, the study on the acceptance of COVID-19 among adults of various educational levels in Jalingo revealed that a high percentage (55.60%) of the respondents who had tertiary education rejected the vaccine. This was because they were still observing how those that took the vaccine would react /respond to it. They did not want to be used as “Experimental animals”. Meanwhile, the acceptance of the vaccine was highest (78.60%) among the secondary school leavers, while the least (33.20%) was the primary school leavers (*Figure 5*). Nevertheless, Wu*et al*. (2022), as well as El-Ghitany *et al*. (2022), separately reported that the level of education is also a predictor of the acceptance of the COVID-19 vaccine. However, at various levels of education, different factors encourage and deter them from accepting the vaccine. For instance, however, giving substantial information on the vaccine will increase the acceptance among secondary school leavers but decrease it among primary school leavers. Nevertheless, giving the vaccine at no financial cost will reduce the acceptance across all the groups.

CONCLUSION

The acceptance of the COVID-19 vaccine among adults in Jalingo was moderate. A higher proportion of females than males accepted the vaccine. However, a higher percentage of males than females agreed to accept the vaccine if given enough substantial information on it. However, people aged 45-55 accepted the vaccine more than any other group. They accepted the vaccine regardless of any potential adverse effects. Though half of the student respondents accepted the vaccine, more agreed to accept it if the government gives them incentives, makes it compulsory and if a healthcare provider

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recommends it. Nevertheless, a high percentage of adults with no formal education accepted the COVID-19 vaccine. However, almost all (8/9) of the respondents who had tertiary education agreed to take the COVID-19 vaccine if given enough substantial information on it. Nevertheless, the willingness to accept the vaccine is low among every category of adults if the vaccine is given at no financial cost and if the government makes it compulsory.

Recommendation

The COVID-19 vaccine should not be given to adults at no financial cost and the government should not make it compulsory rather, people should be made to see the need to take the vaccine.

Limitation

There is no available study to compare the factors (raised in this study) influencing the acceptance of COVID-19.

Conflict of Interest

The authors declare no conflict of interest

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