

## Review Article

### A systematic literature review on determinants of COVID-19 vaccine acceptance globally

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#### Abstract

**Background:** More than dozens of vaccines have been approved by World Health Organization (WHO) against the coronavirus disease 2019 (COVID-19). Determinants of vaccine acceptance are significant for the success of mass vaccination and to minimize the spread of the disease. However, there is no comprehensive evidence on the determinants of vaccine acceptance globally. The aim of this review was to provide an up-to-date evidence on determinants of COVID-19 vaccine acceptance globally.

**Methods:** This systematic review was performed based on the preferred reporting items for systematic reviews and meta-analysis (PRISMA) standards. All published and unpublished search was performed in PubMed, EMBASE, Scopus, Google Scholar and Google on October 30, 2021. Studies that were published in peer-reviewed journals, explicitly describing the determinants of COVID-19 vaccine uptake in various global settings, and studies published in English language were included. Three reviewers independently assessed search results, extracted data, assessed the quality of articles included. Narrative review was undertaken to summarize and report the evidences.

**Results:** A total of Sixty-five studies from 24 countries met the inclusion criteria. According to the findings of this systematic study, a number of variables influenced how well the COVID-19 immunization was received by different communities around the world. This systematic review showed that vaccine acceptance varies among countries. The percentage of vaccine acceptance ranges from 21% in Egypt to 97% in Ecuador. The main factors influencing vaccination acceptability were divided into three categories. The first theme is knowledge, attitude, and perception as behavioral determinants. The second theme is socio-demographic factors: residency, educational attainment, and population age. The third theme is communication related factors: media exposure and information source.

**Conclusion:** Strategies for improving vaccine uptake and mass vaccination should focuses on improving COVID-19 vaccine health education that will improve the knowledge and awareness of the population towards the vaccine. Comprehensive health education, vaccine promotion, training and awareness creation packages have to be done using various mass media outlets to reach large segment of the population.

**Keywords:** COVID-19, Determinants, Vaccine

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#### Introduction

The global pandemic, coronavirus disease 2019, has resulted in an economic, social and societal crisis globally, and has become a major public health threat for the world (1). Emerging of coronavirus disease 2019 which is a severe and disastrous communicable disease caused by severe acute respiratory syndrome coronavirus-2 (SARS COV-2), which is mainly transmitted from human to human through respiratory droplet (2). Coronavirus disease 2019 is increasing throughout the world at alarming rate, declared formally as pandemic and public health emergency of international

concern (PHEIC) by the WHO (3). As on 12<sup>th</sup> October 2021, Global prevalence of COVID-19 data available on WHO dashboard revealed that 237,655,302 confirmed cases and 4,846,981 deaths (4).

Different approaches were used to tackle the transmission of COVID-19 pandemic applied at individual, environmental and community level, such as hand sanitation, face mask, social distancing, washing objects and surfaces, limiting access to schools, universities, community meeting places, public transport and other places where people meet together (5).

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Immunization is the best cost-effective mechanism in the public health domain than other preventive and protective mechanisms. The global community has recognized the value of immunization to prevent, reduce and control large numbers of infectious diseases and several chronic diseases caused by infectious agents. Immunization is a vital tool for controlling the pandemic when combined with effective testing, treatment and existing prevention measures. COVID-19 vaccinations are the most operational means to minimize and reduce the burden of the pandemic (6). Vaccine development began in numerous research hubs, governments and pharmaceutical companies as shortly epidemics emerged (7). High immunization coverage may be required to stop, reduce and control the COVID-19 pandemic. Globally a total of 6,364,021,792 vaccine doses have been dispensed since the emerging pandemic to stop this public health crisis (4).

Evidence suggested that the majority of participants agreed to take the vaccine with concern of the safety and effectiveness. Vaccine acceptance ranges from 55% to 90% Russia to China respectively, and it was associated with trust in the health information provided from the government concerning the vaccine. In Africa, the acceptance for the COVID-19 vaccine ranges from 65.2 % to 81.6%, Nigeria to South Africa, respectively (8).

In the mindset of the Pandemic crisis, the implementation of COVID-19 vaccines was a spark of hope. Though, having access to the vaccine program, and successfully implementing a mass vaccination campaign is another (9,10).

Furthermore, there are some uncertainties concerning some features of the COVID-19 vaccine, such as: Uncertainty on the long-term security and the need for regular reformulation amid evidence of SARS-CoV-2 evolution and the appearance of hereditary variants (10,11). Beside their importance and efficiency in tackling the pandemic and other infectious disease, individuals raise fears and misunderstandings regarding vaccination programs for different diseases (12,13).

Vaccination program policies play an unconditional role for vaccinating the target population in a given country. Some vaccination policies focus on health promotion, others give emphasis for enrollment of the vaccine (14,15). To reduce the burden of the coronavirus disease 2019 disease and to lessen the socio-economic impact on the population, governments applied various preventive methods and enrolled COVID-19 vaccine for high-risk population at the first stage, currently vaccinating the entire population at large.

To ascertain the scope of this problem, the current systematic literature review aimed to assess the determinants of COVID-19 vaccine acceptance throughout the world in different population groups, which can provide an initial insight on comprehensive determinants COVID-19 vaccine acceptance for further investigation and implementations of strategies.

## Methods

This systematic review was performed based on the preferred reporting items for systematic reviews and meta-analysis (PRISMA) standard(1). A method of systematic review was selected to permit a vigorous and reproducible method to makeup an analytical synthesis of the accessible and present evidence.

## Research question

What are the determinants of COVID-19 vaccine acceptance globally?

## Search strategy and data sources

Databases such as PubMed/MEDLINE, EMBASE, Google Scholar, the WHO library, African journals, and Ethiopian online health journals were also searched for all published studies. Using the Google search engine, we also try to search gray literature. Those papers that pointed at the determinants of vaccine acceptance were eligible for inclusion in this review. HAG and DDA searched studies in databases. **Key terms:** The search terms that were used were: determinants, COVID-19, and vaccine. Boolean operators “AND” and “OR” were applied to integrate search terms.

In this systematic review we have used the following search terms:

((“determinants” [MeSH Terms] OR “determinants” [All Fields] OR “barriers” OR “barrie\*” OR “challen\*” OR “factors” OR “factors affecting”) AND (“COVID 19 Vaccines” OR “Vaccines, COVID-19” OR “COVID-19 Virus Vaccines” OR “COVID 19 Virus Vaccines” OR “Vaccines, COVID-19 Virus” OR “Virus Vaccines COVID-19” OR “COVID-19 Virus Vaccine” OR “COVID 19 Virus Vaccine” OR “Vaccine, COVID-19 Virus” OR “Virus Vaccine, COVID-19” OR “COVID19 Virus Vaccines” OR “Vaccines, COVID19 Virus” OR “Virus Vaccines, COVID19” OR “COVID19 Virus Vaccine” OR “Vaccine, COVID19 Virus” OR “Virus Vaccine, COVID19” OR “COVID19 Vaccines” OR “Vaccines, COVID19”, “COVID19 Vaccine”, “Vaccine, COVID19”, “SARS-CoV-2 Vaccines”, “SARS CoV 2 Vaccines” OR “Vaccines, SARS-CoV-2” OR “SARS-CoV-2 Vaccine” OR “SARS CoV 2 Vac-

cine" OR "Vaccine, SARS-CoV-2" OR "SARS2 Vaccines" OR "Vaccines, SARS2" OR "SARS2 Vaccine" OR "Vaccine, SARS2" OR "Coronavirus Disease 2019 Vaccines" OR "Coronavirus Disease 2019 Vaccine" OR "Coronavirus Disease 2019 Virus Vaccine" OR "Coronavirus Disease 2019 Virus Vaccines" OR "Coronavirus Disease-19 Vaccines" OR "Coronavirus Disease 19 Vaccines" OR "Vaccines, Coronavirus Disease-19" OR "Coronavirus Disease-19 Vaccine" OR "Coronavirus Disease 19 Vaccine" OR "Vaccine, Coronavirus Disease-19" OR "COVID 19 Vaccine" OR "Vaccine, COVID 19" OR "2019-nCoV Vaccine" OR "2019 nCoV Vaccine" OR "Vaccine, 2019-nCoV" OR "2019 Novel Coronavirus Vaccines" OR "2019 Novel Coronavirus Vaccine" OR "2019-nCoV Vaccines" OR "2019 nCoV Vaccines" OR "Vaccines, 2019-nCoV" OR "COVID-19 Vaccine" OR "Vaccine, COVID-19" OR "SARS Coronavirus 2 Vaccines") AND ("Vaccine\*" OR "vaccination\*" OR "immunization\*").

### Eligibility criteria

Inclusion criteria for this literature review were: Articles published in English language; peer reviewed articles indexed in PubMed; articles on general population, healthcare workers, students, patients; publications that assess determinants of COVID-19 vaccine acceptance, and the exclusion criteria for this review were publications with no abstracts, letters to editors, unpublished manuscripts, and non-English publications.

### Study selection and data extraction

Data was analyzed using descriptive methods, and qualitative analysis was performed. Items included in this review were; study setting, data collection method, sample size, and prevalence.

In this review, the major outcome was the determinants of vaccine acceptance, which were reported within the original studies. Articles retrieved from online databases were exported to Endnote version 8. Duplicates were managed and findings were exported to Excel. By using search terms titles and abstracts were retrieved and screened for inclusion criteria. Then, those who satisfied the criteria undergo for full text review and extraction. Preferred Reporting Item for Systematic Review and Meta-Analysis (PRISMA) flowchart was used.

### Quality assessment

Quality evaluation was done by following the Newcastle-Ottawa Scale (NOS) measures to include in this review. This tool has ten points in the three domains of modified NOS parts for observational studies. The studies which have scored  $\geq 5$  points were included

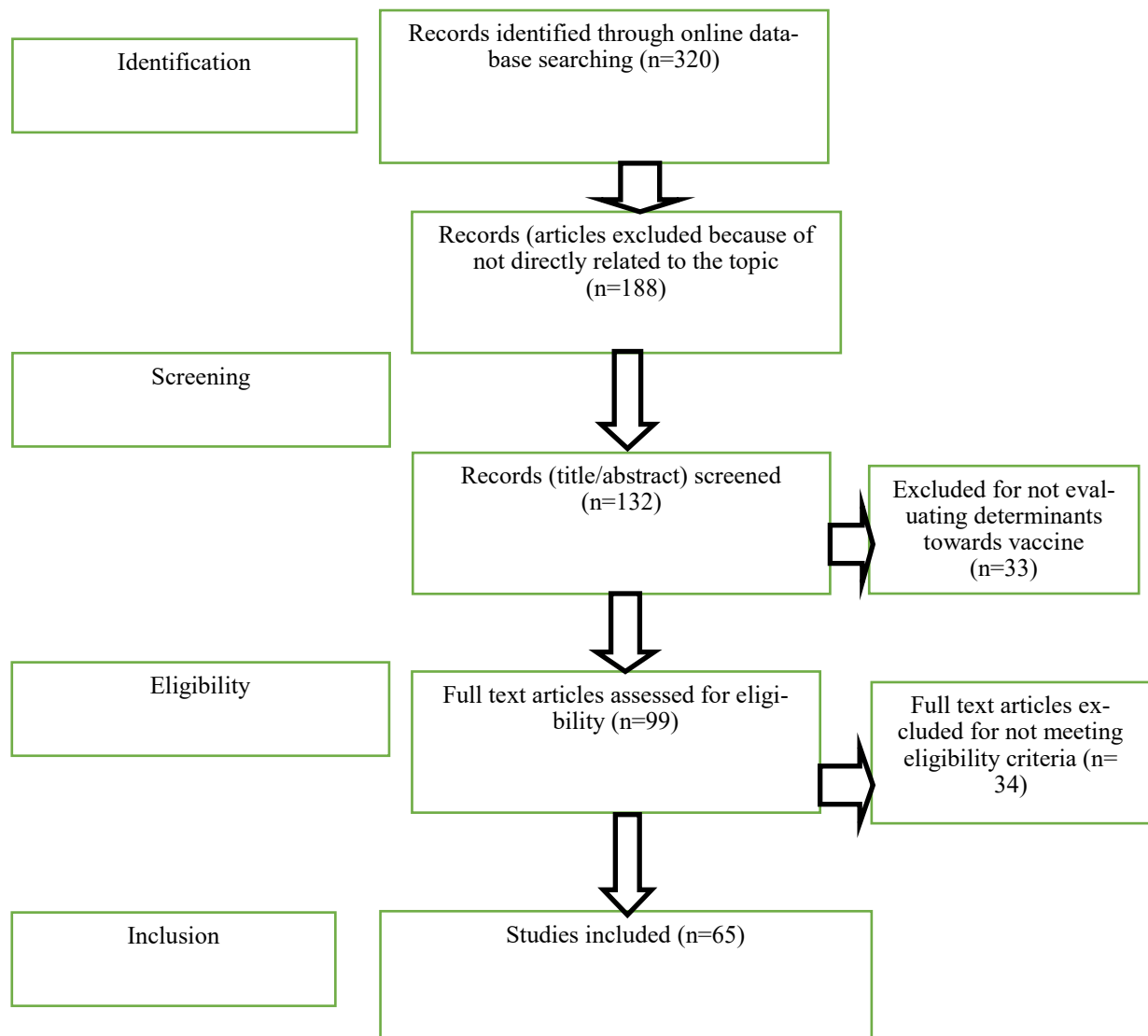
## Results

### Search results

320 articles were identified and retrieved from different online databases: PubMed/MEDLINE, EMBASE, Google scholar, African Journals, and World health organization libraries. From 320 articles assessed, 188 articles excluded because of not directly related to the topic of interest. Thirty-four studies were excluded after reviewing of the full text because the articles were not related to topic of interest and 33 articles were duplicated. Finally, 65 studies meet the eligibility criteria and included in this review (Figure 1).

### Characteristics of articles included in this review

Findings incorporated in this systematic review on the determinants of COVID-19 vaccine acceptance were published up to October 30, 2021, in various peer reviewed international journals. Sixty-five (65) studies were included in this systematic review. Based on the design of the study, 63 articles were cross-sectional and two were mixed (quantitative and qualitative). Thirty eight percent of the articles included in this systematic review were conducted in Ethiopia.



**Figure 1:** PRISMA flow chart of the study selection process on the determinants of COVID-19 vaccine acceptance

**Table 1:** Characteristics of articles included in this systematic review on the determinants of COVID-19 vaccine acceptance.

Author	Year of publication	Sample size	Sampling technique	Study design	Country	Vaccine Acceptance	Key findings
Mesele M (2)	2021	415	Simple random sampling	cross-sectional study	Ethiopia	45.5%	Sex, educational, mass media, received any vaccination during child hood, family members diagnosed with COVID-19, friends diagnosed with COVID-19, respondents tested for COVID-19
Mesele M (3)	2021	425	e-Survey	cross-sectional	Ethiopia	24.2%	knowledge, educational level, access to mass media, Residency and awareness towards vaccination
Simegnew et.al (4)	2021	301	Simple random sampling	cross-sectional study	Ethiopia	54.8%	educational, perceived benefit, barrier and cues to action
Birhan et.al(5)	2021	423	simple random sampling	cross-sectional study	Ethiopia		Knowledge, family practicing COVID-19 prevention, being a health science student.
Ahmed et.al(6)	2021	423	Survey/NA	Cross-sectional study	Ethiopia		Attitude, knowledge, Perception, and age.
Angelo et.al(7)	2021	405	Simple random sampling	Cross sectional study	Ethiopia	48.4%	attitude, professionals with a history of chronic ill-ness, good preventive practices
Seboka et.al(8)	2021	1160	Survey	Cross sectional	Ethiopia	64.66%	perceived susceptibility and perceived benefits
Oyekale A.S(9)	2021	2178	Survey	Cross sectional	Ethiopia	92.33	Having work, age, engagement with non-farm businesses and residence
Belsti et al(10)	2021	1184	Online survey	Cross sectional	Ethiopia	31.4%	female, age, marriage, residence, occupations, job, religion, educational

<b>Mose A, Yeshaneh A(11)</b>	<b>2021</b>	<b>396</b>	<b>systematic random sampling</b>	<b>Cross sectional study</b>	<b>Ethiopia</b>	<b>70.9%</b>	<b>age, educational, knowledge, and practice towards COVID-19 and its preventive measures</b>
Berihun et al (12)	2021	416	consecutive sampling	cross-sectional study	Ethiopia	59.4%	diagnosed with COVID-19, knowledge, and attitude
Ahmed et.al (13)	2021	423	simple random sampling	cross-sectional study	Ethiopia	95.6%	Education, age, working experience, marriage, risk level, and gender
Zewude B, Belachew A(14)	2021	384	probability proportionate to size sampling	cross-sectional survey	Ethiopia	61.6%	having children, previous interaction with infected, perception of severe illness, and experience of receiving the first round of vaccine
Shitu et al(15)	2021	302	stratified simple random sampling	cross-sectional study	Ethiopia	40.8%	male, being a private school teacher, perceived susceptibility, seriousness and benefit of the vaccine
Abebe et al (16)	2021	501	multistage sampling	cross-sectional	Ethiopia	62.6%	Age, educational status, having a chronic disease and knowledge
Alle YF, Oumer KE(17)	2021	327	Survey	cross-sectional	Ethiopia	42.3%	Age and profession
Hai-lemariam et al (18)	2021	423	simple random sampling	cross-sectional	Ethiopia	31.3%	Educational status, residency, compliant with coronavirus disease 2019 guidelines, and perception towards vaccine
Nguyen LH ,et al.(19)	2021	651	Online survey	cross-sectional	Vietnam	60.4%	Income, having children, perceived risk
Banik. R .et al. (20)	2021	894	Survey	cross-sectional	Bangladesh	65.5%	age, male, education, residency, health status, positivity towards COVID-19 vaccination
Stuckelberger, S.et al (21)	2021	1551	Survey	Cross sectional	Switzerland	29.7 % pregnant and 38.6% breast-feeding women	age, education, history of influenza vaccination, being in their third trimester of pregnancy
DiGenaro.F, et al (22)	2021	1723	Survey	Cross sectional	Italy	67%	age, close contact with high-risk groups and received flu vaccination previously

<b>Ra- bi.R ,etal. (23)</b>	<b>2021</b>	<b>639</b>	<b>Survey</b>	<b>Cross- section</b>	<b>Pales- tine</b>	<b>40%</b>	<b>age, knowledge about the vaccine, worry about side effects, worry about injec- tion, natural immunity preference, media misrep- resentation and getting COVID-19 from the vac- cine</b>
Wang. K ,et al (24)	2020	806	Online survey	Cross section	China	40%	those in private sector, with chronic disease, meeting with suspected or confirmed patients, accepted influenza vaccination
Luk .TT,et al. (25)	2020	1501	simple random sampling	cross- section- al	China	45.3%	Vaccine efficacy, knowledge, perceived risk, Alcohol drink
Rezende RP, et al (26)	2021	1000	Survey	cross- section- al	Brazil	81.9%	concurrent chronic disease, hydroxychloroquine use, and recent corticosteroid
Wang C,et al.(27)	2021	8742	Survey	cross- section- al	China	67.1	Males, aged , educated, rural residence and in the vaccine- priority groups
Salmon DA ,et al (28)	2020	2525	Panel Survey	cross- section- al	US	50%	men, Age, Bachelor's degree or higher and Democrats
Kuter .BJ ,et al(29)	2020	12034	Survey	cross- section- al	Phila- delphi a	63.7%	ager, male, educated, up-to- date on vaccinations
Wong MCS ,et al(30)	2020	1200	Simple Random Tele- phone interview	Survey	China	37.2%	perceived severity and bene- fits of the vaccine, cues to action, health outcomes, and trust in vaccine manufactur- er
Sarasty.O ,et al(31)	2020	1050	Online	Survey	Ecu- ador	97%	Income, employment, proba- bility of needing hospitaliza- tion, residence
Bell.S , et al(32)	2020	1252	Online survey	Mixed	Eng- land	55.8% for themselves & 48.2% for chil- dren	Income, vaccine safety and efficacy
Detoc.M, et al(33)	2020	3656	Online survey	Cross section- al	Franc e	77.6%	age, gender, fear about COVID-19, and perceived risk
Reiter.PL, et al(34)	2020	2006	Online survey	Cross section- al	US	69%	Health care recommend vac- cination, political leaning, perceived infection, per- ceived effectiveness of vac- cine

<b>Berg MB, Lin L (35)</b>	<b>2020</b>	<b>350</b>	<b>Quota sam- pling</b>	<b>cross section- al</b>	<b>US</b>	<b>70.6%</b>	<b>attitudes, norms, and trust in the vaccine approval</b>
Zürcher. K, et al (36)	2020	3793	Web based survey	cross sectional	Swit- zerland	39.8%	age and vaccinated for influ- enza
Kaur A, et al(37)	2021	520	Online sur- vey	cross sectional	India	63%	working in COVID duties
Yurttas B,et al(38)	2021	732	Web based survey	cross- sectional	Turkey	29.6%	male, age, working in a hos- pital, not having COVID-19 infection
Mondal P, et al(39)	2020	2978	Survey	cross- sectional	US	81.1%	education, ethnicity and age
Maraqqa. B, et al(40)	2021	1159	Online sur- vey	cross- sectional	Pales- tine	37.8%	males, younger ages, physi- cians, HCWs at non- governmental settings, those who previously received the influenza vaccine, good COVID-19 related knowledge
Malik A, et al(41)	2021	5,237	Online sur- vey	cross- sectional	Paki- stan	70.2%	age, sex, education, taking direct care of patients, and previous COVID-19 infec- tion
Mahmud S, et al(42)	2021	605	Online sur- vey	cross- sectional	Bangla- desh	61.16%	age, gender, residency, level of education, income, per- ceived risk, previous vac- cination experience, knowledge
Paul A, et al(43)	2021	4175	Online sur- vey and in- depth inter- view	Mixed study	Bangla- desh	60.5%	Education, believe on effec- tiveness of vaccine, knowledge
Mohamed NA, et al (44)	2020	1406	Online sur- vey	Cross sectional	Malay- sia	64.5%	age, education levels and female.
Nikolovski J, et al(45)	2020	9106	Online sur- vey	Cross sectional	US	91.3%	gender, race, education, and income
Qin W, et al(46)	2020	1188	Simple ran- dom	Cross sectional	China	79.41%	Age, perceived high risk
El-Elimat T, et al(47)	2020	3100	convenience sampling	Cross sectional	Jordan	37.4%	Males, those who took the seasonal influenza vaccine participants



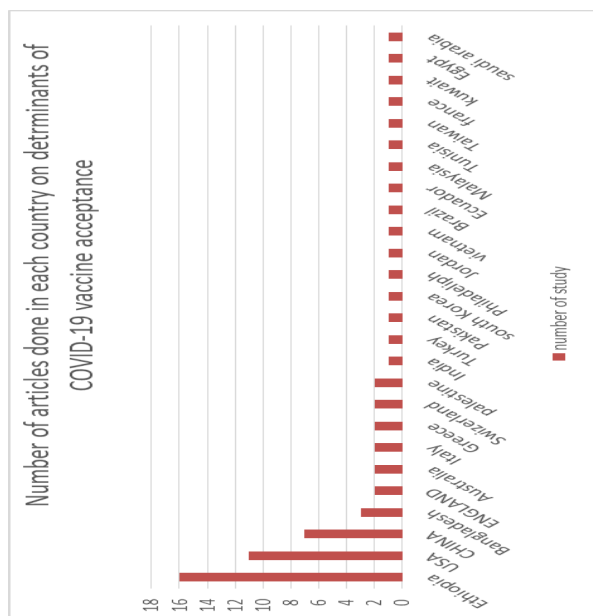
<b>Edwards B, et al(48)</b>	<b>2020</b>	<b>3000</b>	<b>Online survey</b>	<b>Cross section</b>	<b>Australia</b>	<b>59%</b>	<b>household income, level of social distancing, used the COVID-Safe App, confidence in their government</b>
Attwell K, et al(49)	2020	1316	Online survey	Cross sectional	Australia	65%	Perceived severity, trust on information, previous vaccine for influenza
Lin Y, et al (50)	2020	3541	Web based online	Cross sectional	China	83.5%	Perceived benefit, perceived efficacy and side effects as perceived barrier
Kefi HE, et al (51)	2020	398	Simple random	Cross sectional	Tunisia	58%	worries on side effects
Abuown A, et al(52)	2021	514	Email	Survey	London	59%	Age, ethnicity, management staff of hospital
Jiang N, et al (53)	2021	1512	convenience sampling	cross-sectional	China	84.38%	gender, education, family members' vaccination status and side effects experienced after receiving other vaccines
Ehde DM, et al(54)	2020	486	Online survey	cross-sectional	US	66%	education, perceived risk, and trust in information source
Scherer AM, et al(55)	2021	1022	nonprobability-based Internet panel survey	cross-sectional	US	27.6%	Having information on COVID-19 vaccine safety
Tsai FJ,et al (56)	2020	1020		cross-sectional	Taiwan	52.7%	Age, education, perceived risk perception, previous vaccination history
Fotiadis K ,et al (57)	2021	1456			Greece	77.7%	Fears of safety, lack of information on vaccination, education and experience
Mohammed K, et al(58)	2020	521	Online survey	cross-sectional	Saudi Arabia	52%	received influenza vaccination in the past, high levels of concern about contracting COVID-19, believed in mandatory vaccination, male, education
Fares S ,et al (59)	2021	385	Online survey	Cross sectional	Egypt	21%	safety and effectiveness of vaccine.
Choi SH ,et al (60)	2021	226	Online survey	Cross sectional	South Korea	76.5%	confidence in the safety of COVID-19 vaccines

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<b>Mascarenhas AK, et al(61)</b>	<b>2020</b>	<b>248</b>	<b>Online survey</b>	<b>Cross sectional</b>	<b>USA</b>	<b>56%</b>	<b>believing health experts, worries about side effects, and assenting vaccine mandates</b>
Pataka A, et al (62)	2020	656	Online survey	Cross sectional	Greece	71.1 %	Being parenthood, being a physician and treating confirmed/suspected COVID-19 patients
Stern MF, et al(63)	2020	5110		Survey	US	44.9 %	Vaccine efficacy, trust of health care information
Caban-Martinez AJ, et al (64)	2021	3169	Online survey	Cross sectional	US	48.2 %	age, ethnicity, education, married, of current rank firefighter/EMS
Alqudeimat Y, et al(65)	2021	2368	Web based survey	Cross sectional	Kuwait	53.1 %	Male, history of influenza vaccine, perceived risk of infection
La Vecchia C, et al(66)	2020	1055	Survey	Cross sectional	Italy	53.7 %	Age, professional, managers and teacher
Baack BN, et al(67)	2021	2726	Online survey	Panel survey	US	51.8 %	Age, vaccine efficacy, income, Health insurance, educational status

### Number of study reports based on country

In this systematic review, the number of articles conducted in Ethiopia, USA and China were sixteen, eleven and six, respectively (Figure 2).



**Figure 2:** Number of articles done in each country on determinants of COVID-19 vaccine acceptance worldwide (n=65)

### Determinants of COVID-19 vaccine acceptance

As shown in (Table 1), 65 studies which were done among different populations were incorporated in to the current analysis. This review identified the following determinants for the acceptance of the vaccine; knowledge, attitude, mass media exposure, residency, educational status, perceived benefit, perceived efficacy, perceived barrier, perceived risk, perceived safety, perceived severity, cues to action, age, income, having children, income, previously received an influenza vaccine, marital status, sex. Family members have been diagnosed with COVID-19, respondents tested, being a health worker and individual perceived risk, worry concerning side effects, fear of injection, immunity preference, encountering with suspected or confirmed COVID-19 patients, concurrent malignancy, recent corticosteroid use, health outcomes, and reliance in health system or vaccine company, employment status, occupations, good preventive practices, level of social distancing, used COVID-Safe App, confident in their state government, working experience, earlier contact with someone infected one, perception toward COVID-19 vaccine, perceived risk of COVID-19 infection, being a health science student, subjective norms, and confidence in the vaccine authorization.

## Key themes of determinants of COVID-19 vaccine acceptance

In this comprehensive systematic literature review we found that 65 articles reported a number of determinants towards COVID-19 vaccine acceptance in different population of the globe. Majority of determinants were behavioral: knowledge, attitude, perceived benefit, perceived efficacy and Previous vaccination of influenza and sociodemographic determinants: age, sex, residency, educational status and Communication related determinants mainly access to mass media and trusted source of information (Table 2).

Table 2: Key determinants of COVID-19 vaccine acceptance according to reported studies worldwide (n=65)

Key determinants	No. of Studies
Behavioral determinants	22
Knowledge	
Attitude	
Perception	
Perceived ease of use, Perceived barrier, Perceived benefit, Perceived efficacy, Perceived risk, Perceived safety, Cues to action, Subjective norm, Previous vaccination of influenza, Having chronic disease, Good preventive practice	
Self-confidence on vaccine	
Sociodemographic determinants	34
Sex	
Age	
Educational status	
Residency, Income, Having children, Marital status, occupation, Work experience, Ethnicity	
Communication related determinants	9
Mass media access	
Trust on source of information	
Media misrepresentation	
Getting enough information on vaccine	

## Discussion

Currently, there are dozens of vaccines that are under implementation and development to tackle the social, economic and health impact of individuals towards the pandemic globally. To do this, determinants to accept the vaccine had to be explored from different population category perspective in different parts of the globe.

This systematic review showed the determinants of COVID-19 vaccine acceptance globally, as there is no comprehensive evidence that represent the global on the context of determinants of vaccine acceptance.

This systematic review included all articles conducted on the vaccine acceptance and its determinants. This is because understanding various determinants helps to design effective mechanism to create awareness on the vaccine and significant determinants towards the vaccine acceptance in the world. During this, 65 articles from different groups the population were included. The findings of the present systematic review revealed that there were a number of determinants which hinder the utilization of COVID-19 vaccine in the world. According to this systematic review the major determinants were categorized in to three major themes namely: behavioral, socio-demographic and communication related.

Concerning the behavioral determinants, from the total 65 articles included in this systematic review, 22 studies have pointed out behavioral determinants play major role in shifting vaccine acceptance in the study population. From 22 studies pointed behavioral determinants 10 of them stressed on knowledge impacts the acceptance level of the population (3,5,6,11,12,16,23,25,40,43). Some of the studies showed that attitude (6,7,12,16), perception (6,14), and perceived ease of use (4,8) as major contributing determinants for the acceptance. This might be due to that knowledge/awareness plays vital role due to that knowing the advantage of vaccine enforces individuals to take the vaccine than their counter parts. Indeed, the knowledge level of individuals affect their decision on the vaccination and day to day activities. Favorable attitude has also effect on acceptance of the vaccine for the pandemic. Perception has also impact on the acceptance of the vaccine, this might be due to that individual need to have insight about the vaccine before immunization. Similarly, perceived benefit and ease of use has an impact of the acceptance of the vaccine, this might be due to that the vaccine has an advantage for protecting /keep them healthy.

Another major theme was socio-demographic determinants, studies have reported that sex (2,10,13),age (6,9-11,13,17),educational status (2-4,10,11,13,18), residency (3,9,10,18), occupation (10,17) as determinants for the acceptance of the vaccine for COVID-19. This might be due to the fact that educational status plays important role in diverting the decision of individuals, vaccine acceptance needs understanding of the advantages of immunization specifically during pandemic.

Similarly, residency has an effect on the vaccine acceptance, those individuals in remote area may not get enough information regarding the pandemic and the available vaccines for tackling the spread and impact of the disease in general.

Location affects vaccination adoption; people living in distant areas might not receive enough information

about the pandemic and the immunizations that are available to stop its spread and lessen its effects generally.

Access to mass media and communication-related characteristic were previously identified as a key factor in vaccine acceptance (16,17). This may be because the general public receives timely information from the mass media about the pandemic's present state, the vaccinations that are available, the value of immunization, and related issues. Trust in the information source was another element in this category that contributed to the acceptance of the COVID-19 vaccine (69,75,77). This may be because the audiences' decision to use the vaccination depends on the accuracy and timeliness of the information sources. The acceptability of vaccines was also significantly influenced by media misrepresentation.

Access to mass media, a communication-related characteristic, was previously identified as a key factor in vaccine acceptance (2,3). This may be because the general public receives timely information from the mass media about the pandemic's present state, the vaccinations that are available, the value of immunization, and related issues. Trust in the information source was another element in this category that contributed to the acceptance of the COVID-19 vaccine (55,61,63). This may be because the audiences' decision to use the vaccination depends on the accuracy and timeliness of the information sources. The acceptability of vaccines was also significantly influenced by media misrepresentation (23), this might be due to that information has to be provided to understand the aim of the vaccination, advantages of having vaccine, and to improve the knowledge of the population on the vaccine.

### **Conclusion**

This systematic review has focused on the vital determinants towards vaccination for health policy makers, non-governmental organization in health care, health facilities, health professionals, researchers and for the population in general. It has identified key factors that influence vaccine adoption and the achievement of national and international health organization targets. This comprehensive review revealed that behavioral, sociodemographic, and communication-related characteristics as the main factors. To vaccinate the largest possible population, these factors require prompt intervention. To this end, health offices, facilities, and medical personnel must develop health communication programs that specifically target both rural and urban citizens across the nation.

Based on the most recent data, it is essential to deliver timely information across a variety of media venues. The vaccine must also be administered quickly since it is a crucial method for halting the spread and minimizing the effects of the pandemic in the population.

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### **Abbreviations**

COVID-19, coronavirus disease 2019; WHO, World Health Organization; PRISMA, Preferred Reporting Item for Systematic Review and Meta-Analyses;

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