

COVID-19 VACCINE HESITANCY: AN INDIAN PURVIEW

Dissertation submitted to



The IIHMR University, Jaipur

For the partial fulfillment for the award of the degree of

Master of Business Administration (MBA)

In

Hospital and Health Management

By

Madhubala Mundra

Under the Supervision and Guidance of

Dr. Monika Chaudhary

2021

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DECLARATION BY STUDENT

I hereby declare that this dissertation titled '**Covid-19 Vaccine hesitancy: an Indian purview**' is the bonafide record of my original research work. I declare that it has not been submitted to any other university or institution for the award of any degree or diploma.

Information derived from the published or unpublished work of others has been duly acknowledged in the text.

Madhubala Mundra

02/07/2021

CERTIFICATE

This is to certify that dissertation titled ‘**Covid-19 Vaccine hesitancy: an Indian purview**’ is a record of the research work undertaken by **Madhubala Mundra** in partial fulfillment of the requirements for the award of the degree **of MBA (Hospital and Health Management)** from the **IIHMR University, Jaipur** under my guidance and supervision and his/her approach to the research study has been sincere, scientific, and analytical.

Dr. Monika Chaudhary

IIHMR University, Jaipur

Date : 02/07/2021

Dr. Shiv Tripathi

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Date : 02/07/2021

Abstract

Background

At present Covid-19 is a leading cause of death in India. The only hope to mitigate the Covid-19 pandemic is through vaccines. When it comes to vaccine decision making, the continuum between vaccine acceptance and vaccine refusal needs to be addressed. Policymakers need to create strategic vaccine-acceptance messaging to curb vaccine hesitancy and in effect increase vaccine uptake.

Methods

Cross sectional online self administered survey was conducted in June 2021 to understand the key factors responsible for Vaccine hesitancy and assess vaccine attitudes, awareness, preferences and vaccine confidence in domestically made Covid-19 vaccines.

Results

Of 503 participants surveyed, 14.2 percent were unsure whether they wanted to get vaccinated. Compared to Healthcare workers, general public was significantly more likely to be vaccine hesitant. Among the age groups, those belonging to 46-55 and 56 and above were 0.85 and 0.94 times less likely to be vaccine hesitant than their other counterparts. Those who did not know about their current health status i.e. co-morbidities were 4 times more likely to vaccine hesitant than those who knew and had pre-existing health conditions. Those who did not register on CoWIN portal were 8 times more likely to be vaccine hesitant than those who registered.

Conclusions

The finding that younger age group, those who had no pre-existing health conditions or were doubtful and not registering are less likely to be vaccinated, suggests that raising awareness targeting different age groups and levels of concern while addressing doubts regarding suitability of vaccine is the way to go forward. There is need for targeted evidenced based behavior change communication and IEC materials endorsed by healthcare professionals to increase COVID-19 vaccine acceptance.

Keywords: Covid-19, Covid-19 Vaccine, Vaccine Hesitancy, India.

Acknowledgement

. Hereby, I would like to acknowledge everyone who has been instrumental in bringing this dissertation to fruition.

At the onset of my report, I would like to thank the IIHMR University, Jaipur for providing the platform and opportunities to gain knowledge and skills in different aspects of health management.

I express my gratitude and respect to my mentor Dr. Monika Chaudhary, Associate Professor, IIHMR University Jaipur, for the continuous support of my research, for her patience, enthusiasm and immense knowledge.

I would also like to express my gratitude to my family, colleagues, and all the respondents. Thank you for taking out time for me.

I bow to the Almighty and thank them for their grace in me.

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Abbreviations

BCC –Behavioral Change Communication

Covid-19 – Coronavirus Disease 2019

IEC – Information, Education & Communication

KAPA – Knowledge, Attitude, Practice and Awareness

SAGE – Scientific Advisory Group for Emergencies

VH – Vaccine Hesitancy

VPD – Vaccine Preventable Diseases

WHO – World Health Organization

Covid-19 Vaccine hesitancy: an Indian purview

Chapter 1 - Introduction:

Nearly 2 million Covid-19 deaths and over 89 million COVID-19 cases had been confirmed worldwide by the first week of January 2021. With its unprecedented pace and scope it allowed little time to adopt effective and proportional intervention and left us with two public health measures – Non pharmaceutical interventions (NPI) and Pharmaceutical Interventions (PI). While playing a critical role in reducing transmission rates, long term reliance on them can have a negative influence on people's overall well-being, society's functioning, and the economy. A more balanced and targeted approach is required towards lockdowns and mobility restrictions such that the pandemic can be contained whilst running the economy to minimize losses. Vaccines are the only way to mitigate the spread of the pandemic.

From the advent of smallpox vaccine in 1796 to vaccines against Covid-19 in 2021, no human intervention has contributed to global health more than large-scale immunization efforts by means of vaccination. It prevents between 2-3 million deaths per year while being cost/time and life savvy. It is arguably one of the most successful achievements of science; however, this success has always been accompanied by opposition to its practice as evidenced by the current situation worldwide. Immunization and in turn vaccination is a victim of its own success.

Approved via Emergency Use Authorization (EUA) Covid-19 vaccines are being developed far more rapidly than traditional vaccines. But timeliness and availability are not the only factors responsible for vaccine uptake and preventing further spread and development of herd immunity. A vaccine's utility depends on its safety, efficacy, accessibility, mass penetration and utilization. When it comes to vaccine decision making, the continuum between vaccine acceptance and vaccine refusal needs to be addressed. This prompts discussion on vaccination hesitancy.

Identified as the top 10 threats to global health in 2019 by WHO, VH can be defined as “the reluctance or refusal to vaccinate despite availability of vaccines”. An attitude of

ambivalence towards vaccination where a person can, “delay, be reluctant and still accept, or refuse some or all vaccines” (MacDonald; 2015). It is not about anti or pro vaxxers or even simply about acceptance or refusal. Acceptance in itself can be active (informed decision making based on perceived benefits and need) or passive (compliance due to social pressure or recommendations). Even for a population with high uptake the acceptance may be low (in case mandated by government or workplace), or low uptake could mean high acceptance (in case availability, accessibility and affordability are in question). Vaccine hesitancy is the subgroup of people who are unsure about vaccination in general or even one specific vaccine in particular. Its determinants are multi dimensional and context specific – varying from time, place and vaccines. According to WHO, three main factors contribute to VH –

- Fear towards (misconception of vaccines posing risk of infection) / lack of confidence in vaccine,
- Low perception of need for vaccines (underrated disease severity),
- Low availability and trouble accessing vaccine.

For this study we focus on vaccine hesitancy with regards to Covid-19 vaccine. This study attempts to understand the key factors responsible for Vaccine hesitancy and assess vaccine attitudes, awareness, preferences and vaccine confidence in domestically made Covid-19 vaccines.

1.1 - Objective of Study

Research Question

What are the key factors responsible for Vaccine hesitancy in India?

Research Objectives

Broad Objective: To assess the sociodemographic and attitudinal determinants of vaccine hesitancy across a representative sample.

Specific Objectives:

- To determine the key factors responsible for Vaccine hesitancy

- To assess vaccine attitudes, awareness, preferences and vaccine confidence in domestically made Covid-19 vaccines.

1.2 Theoretical Framework

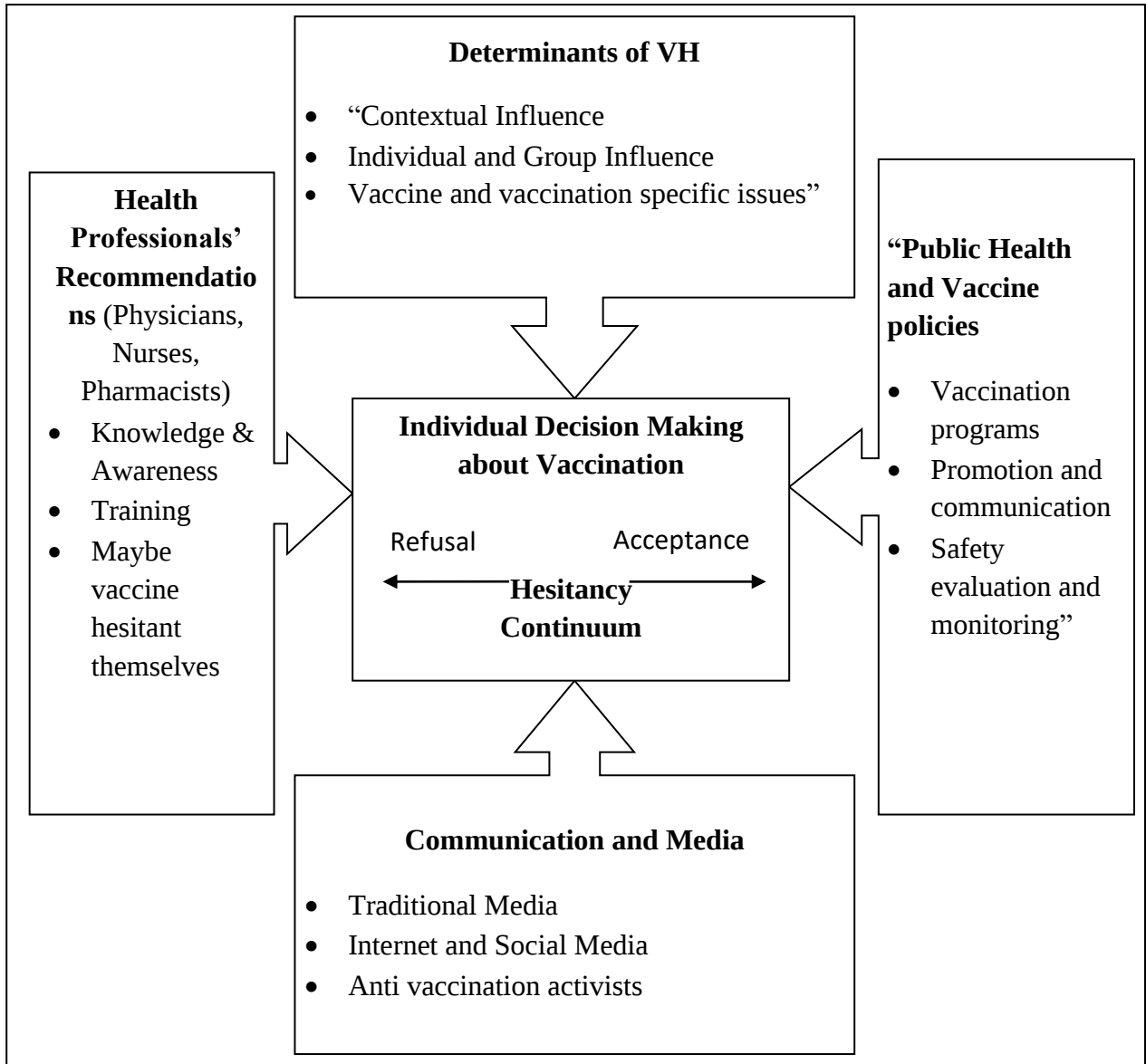


Figure 1.2 – Hesitancy Continuum and factors affecting it.

Source – Adapted from Immunotherapeutics 9:8, 1763-1773; August 2013; Landes Bioscience.

Chapter 2 - Review of Literature

Vaccination reduces both the incidence and prevalence of VPD's (Vaccine Preventable Diseases); however this success has always been accompanied by opposition to its practice as evidenced by the current situation worldwide.

“Globally, as of June 7, 2021 there have been 173,005,553 confirmed cases of Covid-19, including 3,727,605 deaths reported to WHO. As of June 4, 2021, a total of 1,900,955,505 vaccine doses have been administered.”

“In India, from 3 January 2020 to 4:55pm CEST, 7 June 2021, there have been 28,909,975 confirmed cases of COVID-19 with 349,186 deaths, reported to WHO. As of 31 May 2021, a total of 218,358,591 vaccine doses have been administered.”

Despite the huge death toll reticence towards uptake can be observed among the masses. Vaccine Hesitancy is not unique to Covid-19 vaccine. According to the SAGE Working Group, there were widespread issues in 2013 with vaccination uptake for H1N1 and HPV too. There has also been a threefold increase in literature around issues of acceptance and barriers to vaccination.

The question that needs to be answered here is -Why then with previous experience and increased literature, has vaccine hesitancy not been addressed before the distribution of the vaccines?

The answer lies within the trends of previous research; while children's vaccines have remained a steady focal point, divergence has been seen for both adult and adolescent vaccines. Despite evidence of behavioral and attitudinal barriers to vaccination in adults, it has been an understudied and under-researched area in India.

Another reason to the dearth in research regarding Vaccine Hesitancy is its multiple, complex and context specific factors. That they vary across time, place and vaccines themselves is what makes them difficult and unprofitable to study for large populations.

Various models have been made based on experience of various countries, like 3C model by European Commission Report and SAGE group Matrix of determinants of VH. Extensive literature review has been done on the same by Larson et al; 2014.

Apart from the factors mentioned in the models above, there are certain other drivers – like perceived severity of disease and risk and susceptibility towards both, perceived benefits and barriers like concern about safety and efficacy, towards mode of administration (needle pain, fear) or distrust of government and pharmaceutical companies and their agenda. (Dube et al; 2013, Larson et al; 2014, Taddio et al; 2015).

There has also been evidence that Healthcare providers knowledge, endorsement and recommendation of vaccine safety and efficacy is a key stratagem to build confidence in others. Few studies (Kata A; 2012, Kennedy et al; 2011) have shown that negative information regarding vaccines on Internet is correlated to an increase in Vaccine Hesitancy.

Multiple studies (Dror et al; 2020, Ding et al; 2021, Ghazy et al; 2021) have been conducted on Covid-19 vaccine acceptance as well, but these studies assessed acceptance using hypothetical questions when no vaccines had been developed. Now with various vaccines under development and a few emergency approved vaccines afloat, we should have had exceptional uptake not only globally but domestically as well. Since that is not the case, it is crucial to have a thorough awareness of the present situation and the factors that influence VH.

“Understanding how different vaccine attributes affect individual preferences about vaccination may help inform public health authorities about what types of endorsements, incentives, or messages are necessary to achieve broader community uptake.”

For this study we have adapted the 3C model of complacency, convenience and confidence as per our needs.

Chapter 3 – Methods and Materials

3.1 – Study Design

The primary objective of this study is to evaluate the key factors responsible for vaccine hesitancy in India. In order to complete this objective, a mixed methodology was used. A literature review followed by evaluation of primary data sources.

First a literature review was conducted from the internet using Google Scholar, Mendeley, and PubMed databases. The search criterion was limited to literature from 2011-2021 focusing on studies looking at Vaccine Hesitancy and associated factors. Key search terms included were Covid-19, Covid-19 vaccine, Vaccine hesitancy. Both peer-reviewed journals and official government reports were included in this search.

Based on the findings a cross sectional online self administered survey was conducted from June 10 – June 17, 2021. The link to the survey was advertised across social media platforms and was available in both Hindi and English languages. Before participants could proceed to the questionnaire, they had to give their informed consent on the survey site.

Inclusion criteria –

- The respondents are Indian citizens
- At least 18 years old

3.2 – Participants

A total of 516 adults completed the survey (non probability convenience sampling). Out of these 13 sets had missing data and were excluded from further analysis.

3.3 – Study Material

A Predesigned and structured questionnaire was designed to understand the key factors responsible for vaccine hesitancy and assess vaccine acceptance, attitude and awareness. In

addition, the questionnaire was created in such a way that concerns, expectations, preferences and vaccine confidence in domestically made Covid-19 vaccines could be assessed. In order to gather unbiased responses, few questions were inserted to hide the true objective of the survey. Details of the research instrument are given in the appendix.

3.4 – Outcome Measures

The questionnaire design was guided by the SAGE group matrix of hesitancy determinants. These included:

Contextual factors like Age, Gender, Religion, Caste, Educational level, influence of leaders and media.

Individual and Group Influence like Self perceived risk, Vaccination experience, perception of Safety, efficacy and accessibility of vaccines and vaccine importance, Mode of information and motivators.

Vaccine specific issues like Risk to children and elderly, Confidence in the COVID-19 vaccines available.

3.5 – Analysis

We used Excel and SPSS 22.0 to analyse the data using descriptive statistics, Chi square, and binary logistic regression.

Chapter 4 – Results

4.1 – Socio-Demographic Profile

We received 516 responses to the survey; of these 13 had missing values and were excluded from the analysis, leaving 503 responses. The demographic distribution of respondents showed that 19.5 percent were healthcare workers; the remainders were from general public. 53.1 percent of them were male. Majority of the respondents (87.9 percent) resided in urban areas, followed Hinduism (91.1 percent) and 83.7 percent belonged to General Category with OBC and others making up 9.5 and 6.8 percent respectively.

Age group 18-25 and 26-35 constituted the majority with 29.4 and 30 percent respectively. Age group 36-45, 46-55 and 55 and above saw a decreasing order with 16.5, 14.1 and 10 percent respectively. The educational status of the same was led by more than half i.e. 65.4 percent being graduates or holding higher degrees, 22.5 percent having secondary education and 12.1 percent having less than Grade 8 education. Of these 65.2 percent were employed and 34.8 percent were unemployed.

72.8 percent of them did not have any existing co morbidities while 18.3 of them did. The remaining 8.9 percent did not know whether they had any existing co morbidities or health conditions. (See Table 4.1)

Table 4.1: Demographic Attributes of the Respondents (N = 503)

Characteristics	Percent
Respondent Type	
Healthcare workers	19.5
General Public	80.5
Age	
18-25	29.4
26-35	30.0
36-45	16.5
46-55	14.1
56 and above	10
Gender	
Male	53.1
Female	46.9
Religion	
Hindu	91.1
Others	9.0
Caste	
General	83.7
Other backward class	9.5
Others	6.8

Table 4.1 continued

Residence	
Urban	87.9
Rural	12.1
Education	
Less than Grade 8	12.1
Secondary Schooling (9-12)	22.5
Graduate and above	65.4
Occupation	
Employed	65.2
Unemployed	34.8
Co morbidities	
Yes	18.3
No	72.8
Don't Know	8.9

4.2 – Vaccination Status

Analysis pertaining to CoWIN Registration and vaccination status and the results of the same suggested that about three fifth of the respondents (67.6 and 60.6 percent respectively) had both registered on the portal and gotten vaccinated. 18.1 percent respondents had not registered on CoWIN portal while 14.3 percent were going to register later.

25.2 percent of respondents were going to get vaccinated later and 14.2 percent were unsure whether they wanted to get vaccinated. Those who answered they would need more information, did not know, or would refuse the vaccine were categorised as vaccine hesitancy/unsure. (See Table 4.2)

Table 4.2: Vaccination and Registration status of the Respondents (N = 503)

Vaccination Status	
Yes	60.6
No, I will get it later	25.2
I'm unsure whether I want to	14.2
CoWIN Registration	
Yes	67.6
No	18.1
I will later	14.3

4.2.1 – Reasons for getting vaccinated

The top three reasons for getting vaccinated were ‘To protect me from the disease’, ‘on recommendation of family member’ and ‘on recommendation of health personnel’ respectively. As necessitated by employer or by indicators in work was another favored response. Mass influence like with everything else seemed to play a significant role in getting vaccinated. Surprisingly the positive influence of media was not seen as it was the lowest ranking option apart from others and is one of the top three trusted sources of information. (See figure 4.5.6)

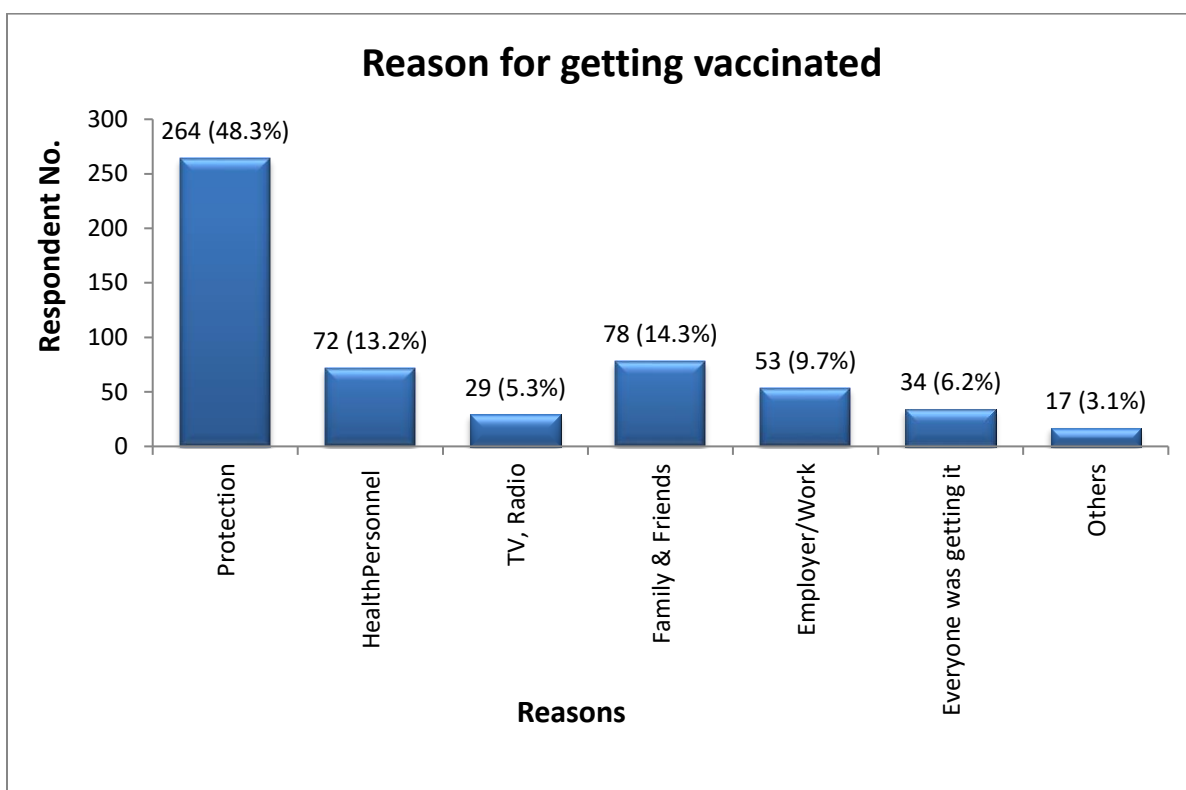


Figure 4.2.1 – Reasons for getting vaccinated

4.2.2 – Barriers to vaccination

While the barriers to vaccination has varied options

- Unavailability of vaccines (9.8 percent) and slots (12.5 percent) show intent to registration and getting vaccinated.
- Scared of side effects (19.3 percent), Scared of needle/pain (5.2 percent), Risks outweighing benefits (7.4 percent), wanting to wait until tested by others (19.9 percent) make up a whopping 51.8 percent that represents concerns regarding Safety and efficacy of Covid-19 vaccine.
- While the section that chose Covid 19 symptoms are mostly mild (4.9 percent), Natural immunity is better (8.2 percent), not at risk of catching the virus (7.4 percent) possesses a greater challenge to BCC and IEC programmes given the lack of acceptance for the disease severity and in turn the vaccine.

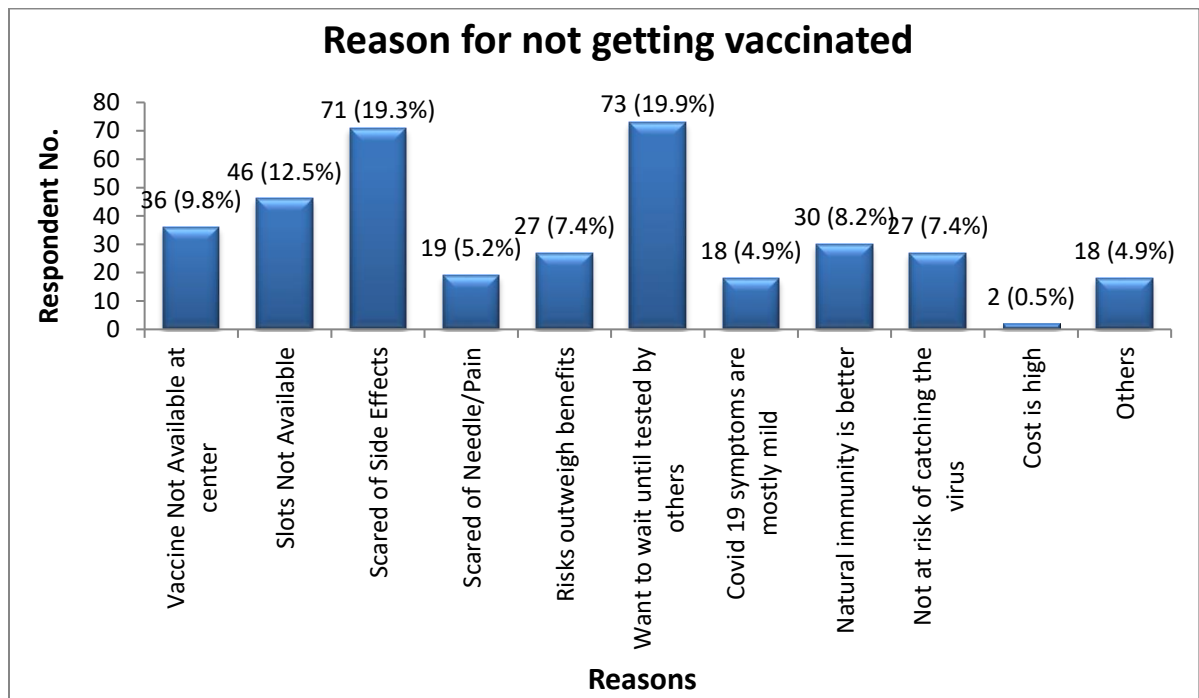


Figure 4.2.2 – Reasons for not getting vaccinated

4.3 – Factors associated with Vaccine Hesitancy

To understand the factors associated between “Vaccine Hesitancy” and different socio-demographic variables, chi-square test was accomplished separately. From the investigations, the $p < 0.05$ indicates that there was a **significant association between vaccine hesitancy and Respondent type, Age, Religion, Caste, Education, Co morbidities and CoWIN Registration**. Gender, residence and occupation did not show significant relation with Vaccine hesitancy (See Table 4.3).

Table 4.3 – Factors associated with Vaccine Hesitancy

Factors associated with Vaccine Hesitancy						
Demographic characteristics	Yes	No, I will get it later	I'm unsure whether I want to	Total	Chi square	P value
Respondent Type*						
Healthcare workers	73	21	4	98	13.237	0.001
General Public	232	106	67	405		
Age*						
18-25	85	48	15	148	46.361	<0.001
26-35	90	46	15	151		
36-45	36	24	23	83		
46-55	52	7	12	71		
56 and above	42	2	6	50		
Gender						
Male	163	61	43	267	2.912	0.233
Female	142	66	28	236		
Religion*						
Hindu	282	117	59	458	6.435	0.040
Others	23	10	12	45		
Caste*						
General	260	110	51	421	19.376	0.001
Other backward class	32	9	7	48		
Others	13	8	13	34		
Residence						
Urban	274	106	62	442	3.439	0.179
Rural	31	21	9	61		

Table 4.3 continued

Education*						
Less than Grade 8	32	18	11	61	12.464	0.014
Secondary Schooling (9-12)	56	34	23	113		
Graduate and above	217	75	37	329		
Occupation						
Employed	197	80	51	328	1.699	0.428
Unemployed	108	47	20	175		
Co morbidities*						
Yes	65	10	17	92	47.295	<0.001
No	228	102	36	366		
Don't Know	12	15	18	45		
CoWIN Registration*						
Yes	274	48	18	340	202.880	<0.001
No	31	31	29	91		
I will later	0	48	24	72		

* Denotes significant association i.e. < 0.05

4.4 –Determinants of Vaccine Hesitancy

An attempt was made to find out the determinants of vaccine hesitancy. A binary logit regression analysis was carried out with vaccination status Yes=0 and No =1. The analysis suggests that predictors namely, Age group, Respondent Type, Caste, Co morbidities and CoWIN Registration had emerged as statistically significant determinants for vaccine hesitancy (See Table 4.4).

Table 4.4 – Determinants of Vaccine Hesitancy

Determinants of Vaccine Hesitancy			
Determinants	Exp (B)	CI (lower)	CI (upper)
Respondent Type			
Healthcare workers@			
General Public*	4.316	1.840	10.125
Age			
18-25@*			
26-35	1.088	0.549	2.156
36-45	0.984	0.435	2.225
46-55*	0.149	0.049	0.449
56 and above*	0.059	0.016	0.216
Gender			
Male@			
Female	1.140	0.663	1.960
Religion			
Hindu@			
Others	1.008	0.369	2.750
Caste			
General@*			
Other backward class	0.461	0.175	1.215
Others	2.595	0.835	8.060
Residence			
Urban@			
Rural	1.504	0.682	3.317
Education			
Less than Grade 8@			
Secondary Schooling (9-12)	1.619	0.571	4.592
Graduate and above	1.160	0.451	2.985

Table 4.4 continued

Occupation			
Employed@			
Unemployed	1.326	0.732	2.401
Co morbidities			
Yes@*			
No	1.610	0.698	3.712
Don't Know*	4.076	1.355	12.254
CoWIN Registration*			
Yes@*			
No*	8.035	4.825	13.382

@ is Reference Category,

*Denotes significant association i.e. < 0.05

4.5 – Attributes for Vaccine Acceptance, Vaccine Confidence and Vaccine Preference

“Vaccine hesitant individuals are a heterogeneous group who hold varying degrees of indecision about specific vaccines or vaccination in general. Vaccine hesitant individuals may accept all vaccines but remain concerned about vaccines, some may refuse or delay some vaccines, but accept others; some individuals may refuse all vaccines.” (WHO SAGE Meeting, 2013)

It is a behavior, influenced by a host of factors out of which we selected three broad categories to answer our objectives- Vaccine Acceptance, Vaccine Confidence & Vaccine Preference. Basic understanding of the need for vaccines, belief in their safety and efficacy, and access to vaccines and immunization services are all important factors associated with vaccine uptake rates.

4.5.1 -Vaccine Acceptance

When there is no/low perceived risks and need for vaccine, and alternate ways (natural immunity, alternative medicines) are perceived to be better than vaccination it can be said that Vaccine Acceptance is low. Figure 4.5.1 shows the Concern about contracting diseases among the respondents. Though majority of them answered with Very concerned (36.5%) and moderately concerned (35.3%), a substantial number of people reported feeling a little

(16.7%) or not at all concerned (11.5%). As a follow up respondents were asked about how important they think Covid-19 vaccine is to prevent the disease. While a little more than half the respondents perceived the vaccine to be very important (50.7%), 2.2 percent thought the vaccine was of no import and 16.1 percent remain undecided on the importance of the vaccine to fight against the disease (See figure 4.5.1 (b)). Despite not being at all comparable to the actual population of India, as a representative sample the figures are a bit worrying as they show that figures for self perceived risk/severity of the disease and vaccination as a way to fight the disease are not where they ought to be.

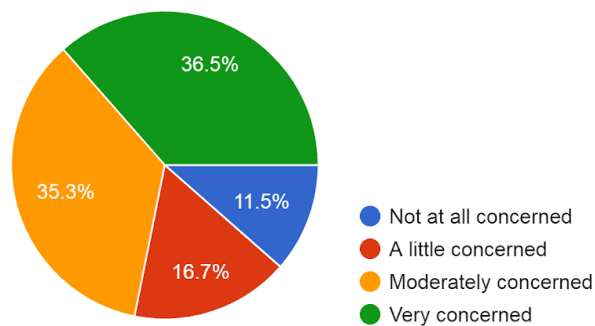


Figure 4.5.1(a) – Concern about contracting disease

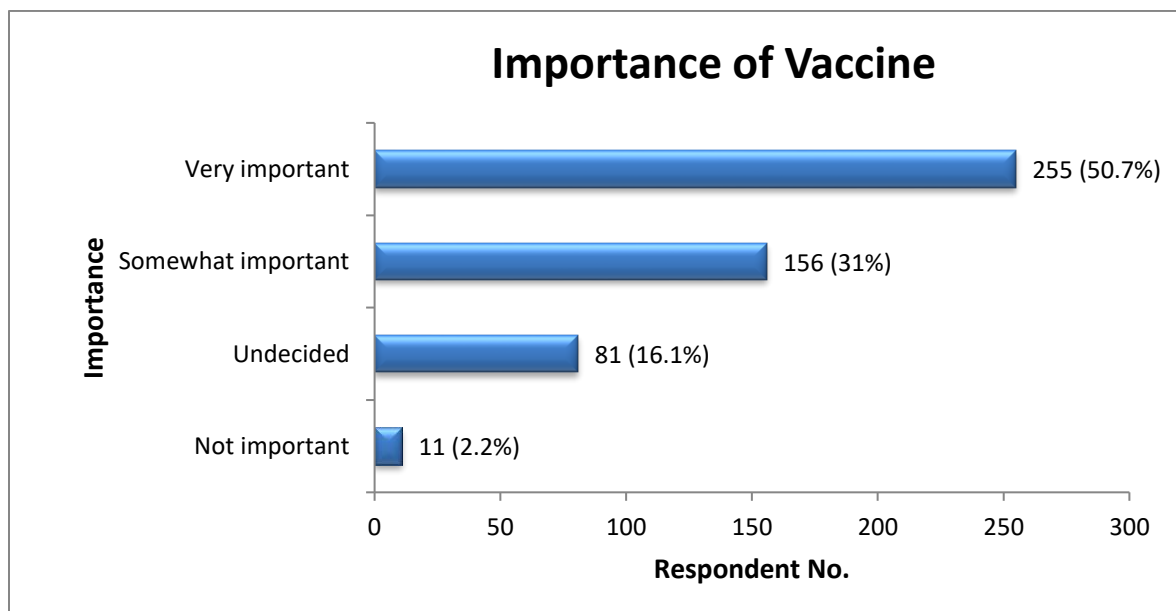


Figure 4.5.1(b) – Importance of vaccine

4.5.2 -Vaccine confidence

Vaccine confidence pertains to trust in safety and efficacy of vaccine, healthcare workers and public figures that endorse them and trust in the agenda of the companies that manufacture them. As can be seen from Figure 4.5.2 (a) for all three parameters of Safety (does not cause health problems), Effectiveness (protects against disease) and Accessibility (available in need) the highest score comes from between the scales i.e. a moderate amount. There are a good number of skeptics (19.3%, 11.9%, and 13.5%) and naysayers (3%, 2.6%, and 5.2%) for Accessibility, Efficacy and Safety respectively. When asked whether the vaccine is something they would recommend to children (hypothetically) and elderly, 82.5 percent respondents gave positive responses for elderly (63% chose definitely while 19.5% chose probably) and 66.4% gave positive responses for children (43.9% chose definitely while 22.5% chose probably). It is the respondents who were unsure or would definitely not recommend vaccination that need to be targeted while disseminating information (See figure 4.5.2 (b)). Vaccine hesitancy doesn't arise solely from a lack of knowledge or awareness, it also stems from misinformation (that is not clarified) and legitimate doubts that are not answered. What this tells us is that when targeting BCC or developing IEC material the most pertinent questions need to be addressed.

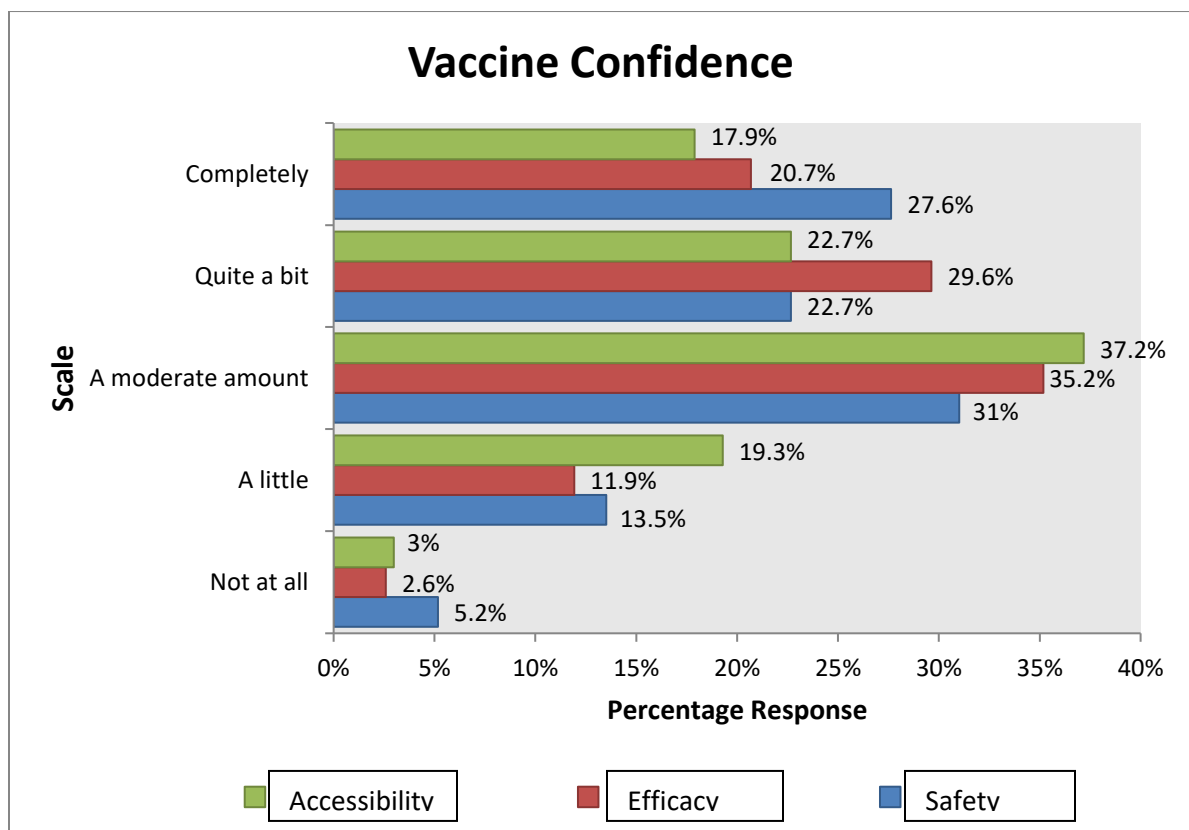
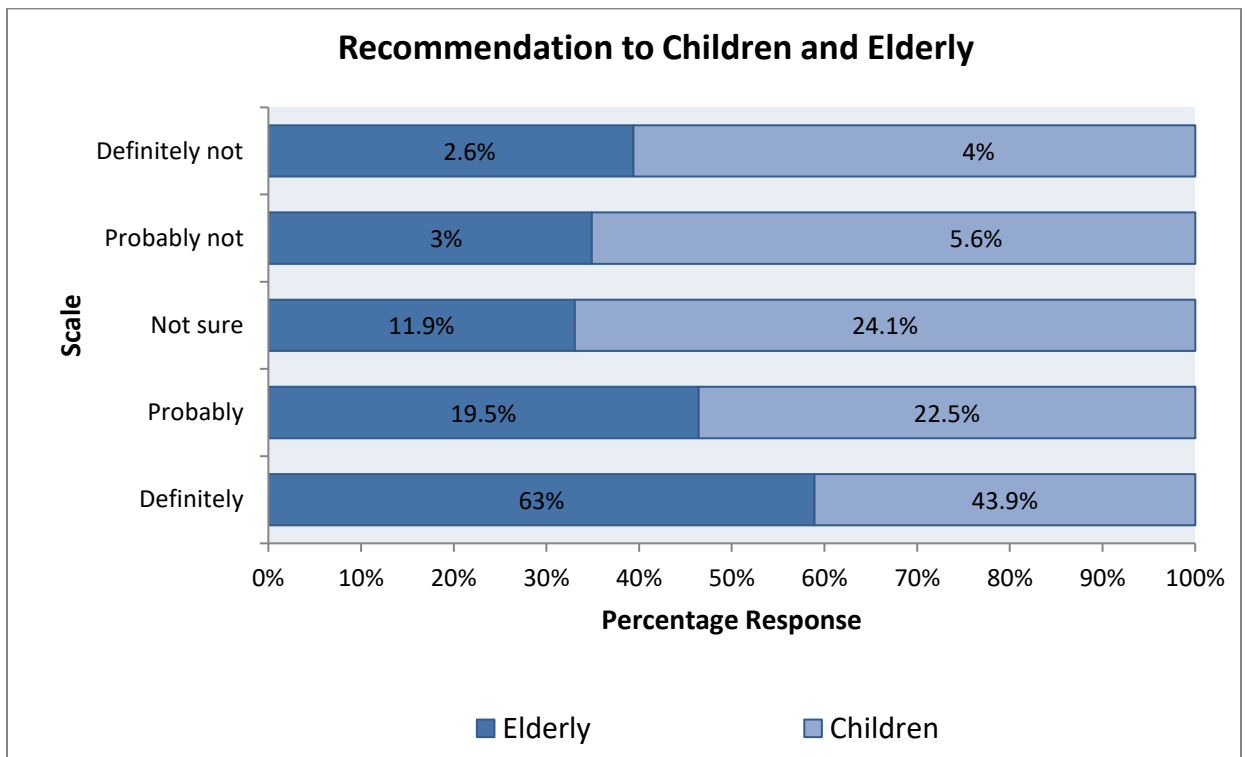


Figure 4.5.2 (a) – Safety, Efficacy, Acceptability



4.5.2 (b) – Recommendation to Children and Elderly

4.5.3 - Vaccine Preference

Vaccine Preference is the choice made based on ease of access, place of origin and other factors affecting views on vaccine.

In the course of decision making about vaccine uptake/utilization, having doubts and concerns regarding it is legitimate. With the world becoming a global village and all sort of information at our fingertips, misinformation regarding Covid-19 disease and its vaccine are bound to spread. It is thus imperative for public health officials and politicians championing the vaccine to find a viable medium to address the doubts and concerns of the masses as well as prepare a proper channel for effective messaging. To that end Arogya Setu App and CoWIN portal of India have won many accolades. Its fast track implementation and usage for Covid 19 vaccine registration has shown a significant relation with vaccine uptake, but how well does it work as a government approved outlet for information dissemination. How

does it fare compared to traditional media and what have the masses chosen as their information medium. To answer these questions the 3 most trusted sources of information were asked; Health personnel's (21.6%) and Family and Friends (15.8%), Television as a media outlet (14.7%) stood out. Internet (10.9%), Arogya Setu App (9.2%) and Newspaper (9.1%) followed (See Figure 4.5.3 (b)).

As can be seen from figure 4.5.3(a) half the respondents prefer domestically produced vaccines while 16 percent preferred foreign made vaccines. For 26 percent of the respondents the choice does not matter and almost 8 percent remain skeptic and would not choose any vaccine.

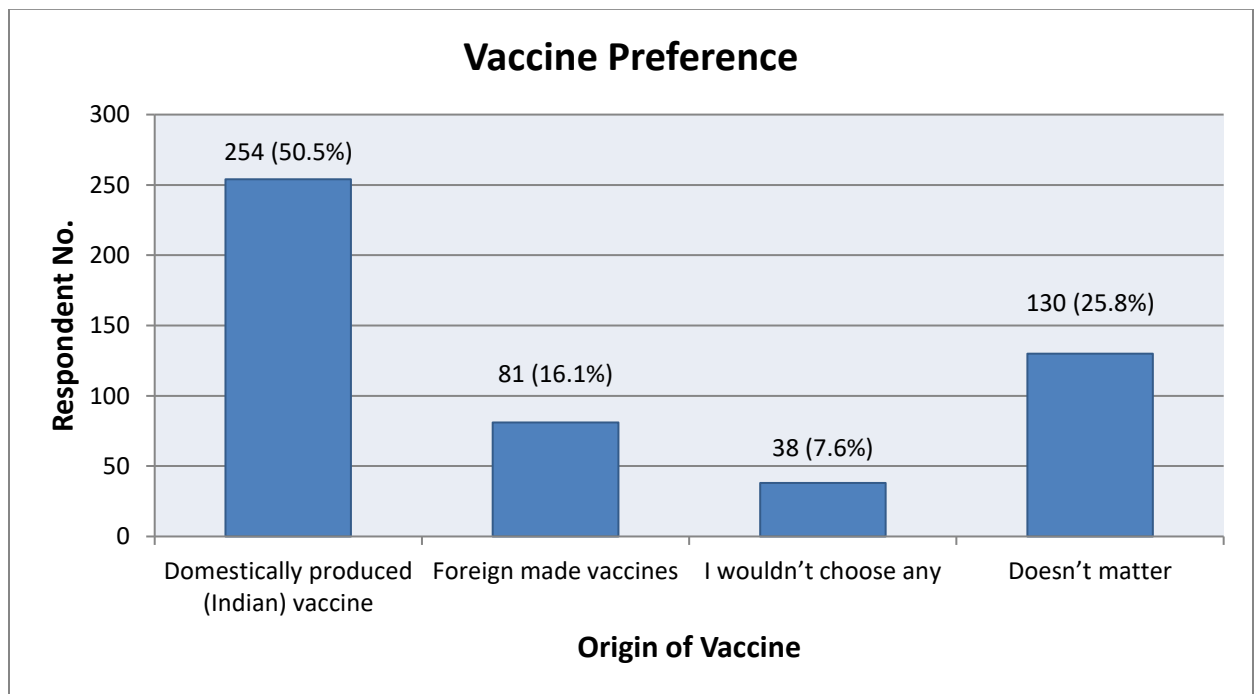


Figure 4.5.3 (a) – Preferred vaccine

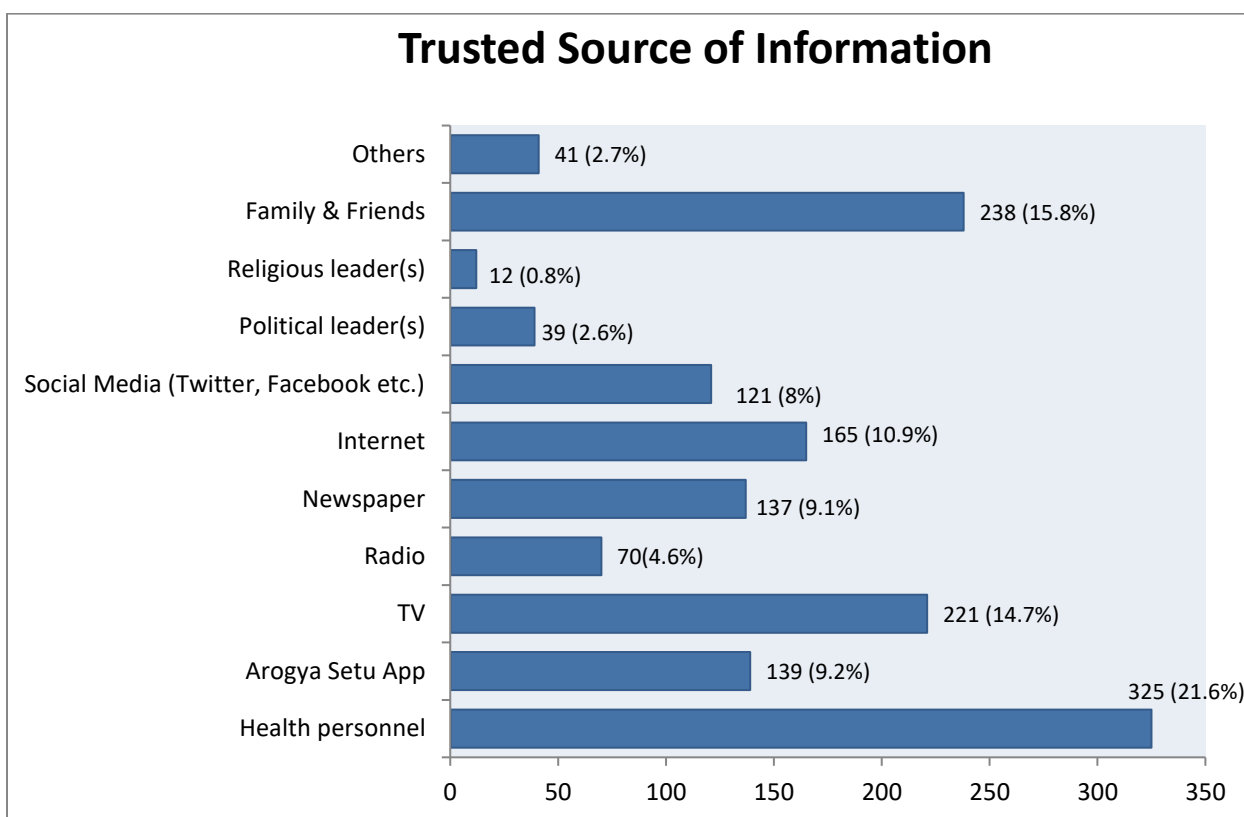


Figure 4.5.3 (b) – Trusted Source of Information

Chapter 5 – Discussion

With new cases and fatalities on a rise and non pharmaceutical interventions having limited effect in curbing them, containment and eventual eradication will require vaccines and its substantial uptake. While at the onset of disease, developing the vaccine was seen as the most imperative task, we have since learned that unless vaccine hesitancy is considerably decreased, authorized vaccinations would fail to achieve their intended aim. Thus, in order to strategize and achieve large scale vaccine acceptance, it is critical to examine VH and its causes locally.

Similar studies (A.A Malik et al; 2020, Alabdulla et al; 2021) show that “COVID-19 vaccine acceptance can be predicted with relatively high accuracy by readily available demographic characteristics.”

Here, the results revealed that in comparison to Healthcare workers, general public are significantly more likely to be vaccine hesitant. Among the age groups, those belonging to 46-55 and 56 and above were 0.85 and 0.94 times less likely to be vaccine hesitant than their other counterparts. Those who did not know about their current health status i.e. co-morbidities were 4 times more likely to be vaccine skepticsthan those who knew and had pre-existing health conditions. Those who did not register on CoWIN portal were 8 times more likely to be vaccine skeptics than those who registered. The finding that younger age group, those who had no pre-existing health conditions or were doubtful and not registering are less likely to be vaccinated, suggests that raising awareness targeting different age groups and levels of concern while addressing doubts regarding suitability of vaccine is the way to go forward.

A strong preference for domestically produced vaccines to those produced abroad had been observed during literature review. “Available evidence suggests that this preference for domestic vaccines over foreign ones may stem from prejudice against foreign countries, but identifying prejudice-based vaccine preferences is difficult because people also draw inferences about the quality of vaccines based on country of origin.” (Kobayashi Y et al; 2021). To this end a question for origin preference was included in this study. Our results show a skew towards domestically produced vaccines.

A fundamental to health education is that it must reach to all communities, especially the high risk and most vulnerable sections of society. Media plays a strong role in educating the masses about the disease, its vaccines, their safety and availability and in preventing future infections and deaths. The 3 most trusted sources of information were Health personnel’s (21.6%), Family and Friends (15.8%), and Television as a media outlet (14.7%) stood out. Despite best efforts negative media and fake news can’t be curbed, so developing trust in the official mode of communication is a must for effective messaging.

At its peak and when danger seems eminent, it is easy to disseminate messages, as the audience is eager to uptake. But having lived with a pandemic for about two years concerns regarding the same begin to drop. It was seen that quite a few respondents (11.5%) were not at all concerned about contracting the disease and few of the options chosen for not getting vaccinated like, Covid-19 is a disease with mild symptoms and natural immunity is better suggest that they do not accurately perceive threat or severity of Covid-19, and this directly

translates to the lack of uptake of vaccination by those respondents. Their behavioral intent is influenced by their perceived lack of threat and their variable evaluation of the benefits of vaccination.

While most of the respondents for this survey recognized the importance of vaccination, we need to acknowledge that there is a need for more targeted approach while disseminating information and awareness on Covid-19 and its preventive measures.

Limitations -

The sample may not be generalizable to the broader Indian population, which is a study limitation. A substantial majority of users live in urban areas, following Hinduism, and belonging to 18-35 age groups which skews the response base. The possible economic and environmental influences that are less explored could also account for differences in promoting vaccination.

Chapter 6 – Conclusion

Success of planned immunization initiatives and mass immunization depends on vaccine uptake and a significant proportion of the respondents for this study showed vaccine hesitancy to Covid-19 vaccine. The hesitancy attitudes were mostly driven by lack of knowledge and concern around the vaccine safety. The reliance on health personnel and family and friends opinions rather than personal research or the government mandated app underlines the role of positive media that targets family centrality (on recommendation of family members or for the protection of loved ones being popular choices) and addresses the concerns regarding Vaccine safety and efficacy.

We need more research to understand KAPA (Knowledge, Attitude, Practice, and Awareness) influences with regards to Covid-19 disease and its vaccine. A complex array of interrelated factors was seen at play since expected sociodemographic factors though significantly associated did not seem to be the determinants for vaccine hesitancy. VH was associated with both high and low educational and occupational status, place of residence and varied across age. This showcases the need for targeted evidenced based behavior change communication and IEC materials endorsed by healthcare professionals to increase COVID-19 vaccine acceptance.

These findings highlight the urgent need to address vaccination hesitancy in combination with vaccine distribution as COVID-19 vaccines become more widely available.

References:

1. Alabdulla M, Reagu SM, Al-Khal A, Elzain M, Jones RM. COVID-19 vaccine hesitancy and attitudes in Qatar: A national cross-sectional survey of a migrant-majority population. *Influenza and other respiratory viruses*. 2021 May;15(3):361-70.
2. Brewer NT, Chapman GB, Rothman AJ, Leask J, Kempe A. Increasing vaccination: putting psychological science into action. *Psychological Science in the Public Interest*. 2017 Dec;18(3):149-207.
3. Deml MJ, Jafflin K, Merten S, Huber B, Buhl A, Frau E, Mettraux V, Sonderegger J, Kliem P, Cattalani R, Krüerke D. Determinants of vaccine hesitancy in Switzerland: study protocol of a mixed-methods national research programme. *BMJ open*. 2019 Nov 1;9(11):e032218.
4. Dinga JN, Sinda LK, Titanji VP. Assessment of vaccine hesitancy to a COVID-19 vaccine in Cameroonian adults and its global implication. *Vaccines*. 2021 Feb;9(2):175.
5. Dror AA, Eisenbach N, Taiber S, Morozov NG, Mizrahi M, Zigron A, Srouji S, Sela E. Vaccine hesitancy: the next challenge in the fight against COVID-19. *European journal of epidemiology*. 2020 Aug;35(8):775-9.
6. Dubé E, Laberge C, Guay M, Bramadat P, Roy R, Bettinger JA. Vaccine hesitancy: an overview. *Human vaccines & immunotherapeutics*. 2013 Aug 8;9(8):1763-73.
7. Dubé E, MacDonald NE. Addressing vaccine hesitancy and refusal in Canada. *CMAJ*. 2016 Jan 5;188(1):E17-8.
8. European Commission. Report on the Conference on childhood immunisation: progress, challenges and priorities for further action; 2012; https://ec.europa.eu/health/sites/health/files/vaccination/docs/ev_20121016_mi_en.pdf
9. Ghazy RM, Abd ElHafeez S, Shaaban R, Elbarazi I, Abdou MS, Ramadan A, Kheirallah KA. Determining the cutoff points of the 5C scale for assessment of COVID-19 vaccines psychological antecedents among the Arab population: A multinational study. *Journal of Primary Care & Community Health*. 2021 May;12:21501327211018568.
10. Janse M, Brouwers T, Claassen E, Hermans P, Van De Burgwal L. Barriers Influencing Vaccine Development Timelines, Identification, Causal Analysis, and Prioritization of Key Barriers by KOLs in General and Covid-19 Vaccine R&D. *Frontiers in public health*. 2021 Apr 20;9:395.
11. Kashte, S., Gulbake, A., El-Amin III, S.F. *et al.* COVID-19 vaccines: rapid development, implications, challenges and future prospects. *Human Cell* **34**, 711–733 (2021). <https://doi.org/10.1007/s13577-021-00512-4>
12. Kata A. Anti-vaccine activists, Web 2.0, and the postmodern paradigm—An overview of tactics and tropes used online by the anti-vaccination movement. *Vaccine*. 2012 May 28;30(25):3778-89.

13. Kennedy A, LaVail K, Nowak G, Basket M, Landry S. Confidence about vaccines in the United States: understanding parents' perceptions. *Health affairs*. 2011 Jun 1;30(6):1151-9.
14. Kobayashi Y, Howell C, Heinrich T. Vaccine Hesitancy, State Bias, and Covid-19: Evidence from a Survey Experiment using Phase-3 Results Announcement by BioNTech and Pfizer. *Social Science & Medicine*. 2021 Jun 15:114115.
15. Kreps S, Prasad S, Brownstein JS, Hswen Y, Garibaldi BT, Zhang B, Kriner DL. Factors associated with US adults' likelihood of accepting COVID-19 vaccination. *JAMA network open*. 2020 Oct 1;3(10):e2025594-.
16. Kwok KO, Li KK, Wei WI, Tang A, Wong SY, Lee SS. Influenza vaccine uptake, COVID-19 vaccination intention and vaccine hesitancy among nurses: A survey. *International journal of nursing studies*. 2021 Feb 1;114:103854.
17. Lane S, MacDonald NE, Marti M, Dumolard L. Vaccine hesitancy around the globe: Analysis of three years of WHO/UNICEF Joint Reporting Form data-2015–2017. *Vaccine*. 2018 Jun 18;36(26):3861-7.
18. Larson HJ, Jarrett C, Eckersberger E, Smith DM, Paterson P. Understanding vaccine hesitancy around vaccines and vaccination from a global perspective: a systematic review of published literature, 2007–2012. *Vaccine*. 2014 Apr 17;32(19):2150-9.
19. MacDonald NE. Vaccine hesitancy: Definition, scope and determinants. *Vaccine*. 2015 Aug 14;33(34):4161-4.
20. McAteer J, Yildirim I, Chahrudi A. The VACCINES Act: deciphering vaccine hesitancy in the time of COVID-19. *Clinical Infectious Diseases*. 2020 Jul 28;71(15):703-5.
21. Sallam M. COVID-19 vaccine hesitancy worldwide: a concise systematic review of vaccine acceptance rates. *Vaccines*. 2021 Feb;9(2):160.
22. Schernhammer E, Weitzer J, Laubichler MD, Birmann BM, Bertau M, Zenk L, Caniglia G, Jäger CC, Steiner G. Correlates of COVID-19 vaccine hesitancy in Austria: trust and the government. *Journal of Public Health (Oxford, England)*. 2021 May 5.
23. Soares P, Rocha JV, Moniz M, Gama A, Laires PA, Pedro AR, Dias S, Leite A, Nunes C. Factors associated with COVID-19 vaccine hesitancy. *Vaccines*. 2021 Mar;9(3):300.
24. Taddio A. Setting the stage for improved practices during vaccine injections: A knowledge synthesis of interventions for the management of pain and fear. *The Clinical journal of pain*. 2015 Oct;31(Suppl 10):S1.
25. The SAGE Vaccine Hesitancy Working Group. Report of the SAGE working group on vaccine hesitancy. 2014;
26. Troiano G, Nardi A. Vaccine hesitancy in the era of COVID-19. *Public Health*. 2021 Mar 4.
27. WHO. Meeting report: Measuring behavioural and social drivers (BeSD) of Vaccination Working Group. (2019)
28. Wiysonge CS, Ndwandwe D, Ryan J, Jaca A, Batouré O, Anya BP, Cooper S. Vaccine hesitancy in the era of COVID-19: could lessons from the past help in divining the future?. *Human vaccines & immunotherapeutics*. 2021 Mar 9:1-3.
29. World Health Organization. *10 Facts on Immunization* [Internet]. Geneva: World Health Organization (2018). Available online at: <https://www.who.int/features/factfiles/immunization/en/>

Data collection tool - Questionnaire

The questionnaire is composed of four sections. The first section collects data on sociodemographics: age, gender, education, occupation etc (Q 1-9). The second, third and fourth sections include questions on Vaccine acceptance (Q 10-17), Vaccine Confidence (Q 18-24) and, Vaccine Preference (Q 25-28) respectively.

S No.	Questions	Options	Code
Demographics			
1.	Respondent Type	Healthcare workers General Public	1 2
2.	Age	18-25 26-35 36-45 46-55 56-65 66 and above	1 2 3 4 5 6
3.	Gender	Male Female Others	1 2 98
4.	Religion	Hindu Muslim Sikh Christian Others	1 2 3 4 98
5.	Caste	General Scheduled caste Scheduled tribe Other backward class Other	1 2 3 4 98
6.	Residence	Urban Rural	1 2
7.	Education (In terms of highest standard completed)	Illiterate Never attended school but can read and write Primary (upto class 5th) Secondary (upto class 8th) High School	1 2 3 4 5 6

		Graduate and above	
8.	Occupation	Government employee	1
		Private employee	2
		Self employed	3
		Daily Wage earner	4
		Unemployed	5
		Student,	6
		Retired,	7
		Homemaker	8
		Other	98
9.	Do you have any pre-existing illness or health conditions (like Pregnancy, Heart conditions, Diabetes, Hypertension etc)	Yes	1
		No	2
		Don't know	98
Vaccine Acceptance			
10.	How concerned are you about getting Covid-19	Not at all concerned	1
		A little concerned	2
		Moderately concerned	3
		Very concerned.	4
11.	Have you been tested for Covid	Yes, a positive test	1
		Yes, a negative test	2
		Had symptoms but not been tested	3
		No symptoms, not been tested	4
		No symptom, but got tested	5
		Other	98
12.	Have you registered on the Co-WIN Portal for vaccination?	Yes	1
		No	2
		I will later	3
		I never will	4
		Not applicable	5/98
13.	If No/I will later/never will, Why	Finding it difficult to register online	1
		I doubt the efficiency of the vaccine	2
		I have heard negative things about the vaccine	3
		I am Pregnant/lactating mother	4
		I have other medical conditions/disease/s	5
		My religious beliefs don't allow it	6
		Others	98
14.	Have you been vaccinated against Covid 19	Yes	1
		No, I will get it later	2
		I'm unsure whether I want to	3
		I do not plan to ever	4
15.	If Yes, what was the main reason you decided to get vaccinated?	To protect me from the disease	1
		On recommendation of health personnel	2
		Recommendation from TV, Radio, health campaign etc	3
		On recommendation of family member	4

		Necessitated by employer/by indicators in my work	5
		Everyone was getting vaccinated, so I did it too.	6
		Others	98
16.	If No/Unsure/Never, Why (Multiple choice)	Vaccine not available at center	1
		Slots not available	2
		Scared of side effects	3
		Scared of needle/pain	4
		Risks outweigh benefit	5
		Want to wait until tested by others	6
		Covid 19 symptoms are mostly mild	7
		Natural immunity is better	8
		Not at risk of catching the virus	9
		Cost is high	10
		Other	98
17.	In your opinion, how important is the Covid-19 vaccine to prevent the disease.	Not important	1
		Undecided	2
		Somewhat important	3
		Very important	4
Vaccine Confidence			
18.	How much do you think the following characteristics apply to Covid vaccines available in India –		
19.	Safe (does not cause health problems)	Not at all	1
		A little	2
		A moderate amount	3
		Quite a bit	4
		Completely	5
20.	Effective (protects against disease)	Not at all	1
		A little	2
		A moderate amount	3
		Quite a bit	4
		Completely	5
21.	Accessible	Not at all	1
		A little	2
		A moderate amount	3
		Quite a bit	4
		Completely	5
22.	Will you recommend vaccine to elderly family member?	Definitely	1
		Probably	2
		Not sure	3
		Probably not	4
		Definitely not	5

23.	Will you get your children (below 18) vaccinated for Covid-19?	Definitely Probably Not sure Probably not Definitely not	1 2 3 4 5
24.	On whose recommendation would you get vaccinated (multiple choice)	Health personnel (Doctor, Nurse etc) Public figure Ministry of Health/WHO friends/family Recommendation from TV, Radio, health campaign etc Other	1 2 3 4 5 98
Vaccine Preference			
25.	The vaccine you would choose to get vaccinated with or recommend to others would be	Domestically produced (Indian) vaccine Foreign made vaccines I wouldn't choose any Doesn't matter	1 2 3 4
26.	Do you feel you get enough information about Covid-19 vaccines and their safety?	Not enough information Sufficient information Too much information	1 2 3
27.	Have you seen/heard any information about Covid-19 vaccines that you could not determine were true or false?	Yes No Don't Know	1 2 98
28.	What is your most trusted source of information about Covid19 vaccines?	Health personnel Arogya Setu App TV Radio Newspaper Internet Social Media (Twitter, Facebook etc.) Political leader(s) Religious leader(s) Family and Friends Others	1 2 3 4 5 6 7 8 9 10 98

Informed Consent Statement –

Participation in this study was voluntary. Informed consent was ensured by the presence of an introductory section in the survey, with the submission of responses implying an agreement to participate.

Conflicts of Interest

The author declares no conflict of interest.