Research Article

Attitudes of People Towards Covid-19 Booster Shots

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Abstract:

Background: To combat the deadly contagion of COVID-19, immunization campaigns were organized worldwide since late 2020. As the immunity provided by vaccines wanes over time and new strains of the deadly virus kept on emerging, further adding up to the concerns of the public regarding the efficacy of vaccines, booster doses were direly needed. Just similar to the one faced with vaccines, the phenomenon of hesitancy was encountered regarding boosters, but this time with even more intensity. This study aims to assess people's opinions toward COVID-19 booster doses, including the causes of acceptance or reluctance.

Methodology: Articles published in PubMed, Google Scholar, and MDPI in the English language were peer-reviewed in July-August, 2022. The search yielded a total of 116 articles, and after assessing, a total of 28 relevant studies were eligible to comprise this review.

Results: These studies comprised surveys on data about the attitudes of the public on COVID-19 booster doses from 22 different countries. The highest rates of acceptance of Booster doses (>90%) among the common people were found in 3 studies conducted in Fukushima, Japan (97.9%), China (93.7%), and the UK (92.3%) while the lowest rates (< 60%) were obtained from 5 studies conducted in Indonesia (56.3%), USA (53%), Algeria (51.6%), Jordon (44%), and Malaysia (43%). Among the three studies conducted among the university community, Booster Acceptance rates were greater than 70% with the highest being in Germany (87.8%), followed by Italy (85.7%) and UAE (77%). For the three studies conducted on Health Care Workers (HCWs), the highest acceptance was found in the USA (92.1%) followed by Singapore (73.8%) and Czechiaa (71.3%).

Conclusion: Factors such as uncertainty— about the government, doctors, pharmaceutical companies, and the product itself, fear of adverse effects, religious and cultural beliefs, conspiracy theories, political affiliations, lower socioeconomic status, and unemployment all contributed to hesitance.

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1. INTRODUCTION:

Severe Acute Respiratory Syndrome Corona Virus-2 (SARS-CoV-2) is a positive sense RNA virus that causes the Coronavirus Disease 2019 (COVID-19).[1] It has had a shattering impact on demographics worldwide, killing >3.8 million people globally, making it a substantial global health emergency, second only to the influenza pandemic of 1918.[2] Despite the lightning-quick transmission of illness, several countries have seen a decline in COVID-19 mortality because to the vaccine. Vaccines can help to prevent several diseases including COVID-19.

Therefore, extensive research was started by mid-2020 to develop a vaccine to combat the deadly virus. Till September 2020, WHO had authorized 4 COVID-19 vaccines for emergency use. According to the latest data, 18 COVID-19 vaccines have been authorized and are now being used around the world.[3] After the development of the initial vaccine course, booster doses have been developed for further protection against the new and ever-mutating strains. Despite all this, a large population remains resistant and hesitant towards vaccines, especially booster doses. According to WHO, by 5th November 2021, only 41.6% of the global population had been vaccinated.[4]

Despite the accessibility to vaccines, people have been reluctant towards immunization. Delay in accepting or refusing immunization is termed vaccine hesitancy according to the SAGE Working Group on Vaccination Hesitancy.[5]

It may be due to varied reasons such as a lack of trust— in the authorities, doctors, pharmaceutical companies, and the product itself—as well as vague, incomplete information, defying the advice of authorities, and safety of the vaccine and other effectiveness issues.[6–9] Fear of side effects especially once experienced with previous doses also makes people hesitant.[10]

Religious and cultural beliefs, conspiracy theories, and political affiliations have also led to the spread of misinformation about vaccines.[11,12] Homemade remedies circulated in media by unauthorized and unqualified sources have also contributed signify-cantly to people's disbelief in the potential of vaccines or any other medical intervention in general. People from certain ethnic minority groups, those having low socioeconomic status, unemployed individuals, and divorced/ widowed/ separated participants showed reluctance to receive COVID–19 vaccines.[6,13] A large percentage of people refusing booster are those who have received the initial dose and now deem the booster unnecessary.[10,14,15] Furthermore, the decreasing number of COVID-19 cases has also increased the rejection of vaccines by the general public.

Booster dose acceptance was aimed at acquiring additional protection including family, community, and patient welfare. Those people who were economically well-off, those who had direct patient interaction at the workplace, those with a sense of risk and anxiety of the illness, and those who have already received an influenza vaccination are more likely to accept additional doses.[16,17] Regional variation also markedly influences the acceptance rates. Chinese

and people from the central region of Asia, in particular, indicated much higher probabilities of being eager to get booster shots.[18] Newly emerging strains of the virus have also increased the acceptance rate of boosters as observed since the emergence of Omicron.[17] Acceptance generally increases with age. [9,19–24] Gender, on the other hand, has a mixed influence.

To combat disease, creating safe vaccinations and proving their efficacy is no longer sufficient due to the alarming rise in vaccine rejection and hesitation. One of the most urgent challenges affecting public health is vaccine hesitancy, which refers to people's general apprehension against and resistance to receiving vaccinations. Thus studying the prevalence and causes of hesitation to get vaccines, especially booster shots against COVID-19 emerges as a hot topic having wide practical relevance in establishing healthcare policies for eradicating this deadly pandemic.

2. METHODS:

These were conducted according to the PRISMA guidelines.

2.1. Search Strategy:

Papers published in PubMed, Google Scholar, and MDPI evaluating COVID-19 booster vaccine hesitancy / vaccine uptake / vaccine acceptance were found eligible to be included in this review. Keywords used were “hesitancy”, “acceptance“, “Restraints” and “booster dose”.

2.2. Study Selection:

English was the set language for this review. The criteria for inclusion comprised of [1] studies that provide data regarding COVID-19 booster acceptance among people both before and after getting fully vaccinated; [2] Studies about the general public, healthcare staff, minorities, and other ethnic groups, patients or students; [3] Studies on all types of COVID vaccine booster doses were part of this study; [4] Case-control, cross-sectional, and cohort study designs published in English from 2021 to 2022 were included.

The exclusion criteria were [1] Proceedings, Case series/reports, and conference papers; [2] Paid access articles, editorial reviews, letters of communications, commentaries, and grey literature; [3] Articles in other languages.

2.3. Data Extraction:

The data extraction was done in three groups. One group each was assigned to search the three search engines i.e. Google Scholar, PubMed, and MDPI. The relevant articles were selected and screened according to the inclusion- exclusion criteria. Data were extracted based on these items; the date on which the survey was conducted, the region or country where it was conducted, the specific population of interest (e.g., general population, healthcare and paramedics, factory employees, students, etc.), the overall number of responses recorded, and the rate of acceptance of COVID-19 Booster.

First, we selected articles relevant to our title of study from all the search engines and screened them for duplicates, titles, and abstracts. The full-length articles were studied and the data was finalized.

3. RESULTS:

116 records were identified in total and 28 articles

were included in our systematic review after the screening procedure.

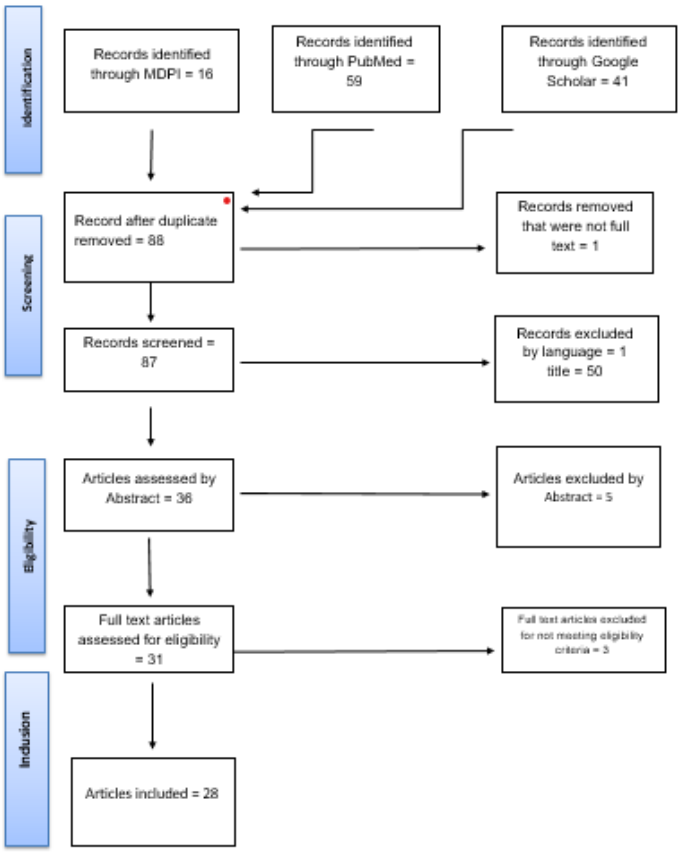

Figure 1: PRISMA Flowchart of the study screening procedure.

3.1. Attributes of the Studies Included:

28 published papers were assessed and evaluated in our review. These studies comprised surveys on data about the attitudes of the public on COVID-19 Booster doses from 22 various nations. Surveys were conducted mostly in the USA (n = 6), followed by China (n = 5). The dates of the Surveys ranged from April 2020 to March 2022. Two of the studies were done in more than a single country, including the Weitzer J et al. 11 studies involving 3 countries of the D-A-CH region i.e. Austria, Germany, and Switzerland, and the study by Iguacel I et al. 23 including data from Colombia, El Salvador, and Spain.

According to the sample size, the largest survey was conducted in Denmark n= 31,721) 24, while the smallest was among the ones conducted in the USA (n =501) 25. A total of 19 surveys were carried out on the General population while 1 was done on Factory workers, 1 on medical students, 3 on Health care workers, 3 on University students and employees and 1 specifically focused on child caregivers.

Sr. No	Study	Country	Date of survey	Response recorded as vaccine acceptance	N	Target population	Acceptance rate	Age-sex correlation with higher vaccine acceptance
1	Wong et al. [26]	Malaysia	Nov 2021-Feb 2022	Yes possibly	1010	General vaccinated population	43%	• Younger population • Females
2	Apostolopoulos et al. [18]	China	Nov 2021	Yes definitely	3119	General population	93.7%	• Younger population • Females
3	Batra et al. [22]	Fukushima	Sep-Oct 2021.	Yes definitely	2439	General population	97.9%	• Younger population • Survey was only done on the male population
4	Yadete et al. [9]	United States	July 2021	yes	2138	General Population	61.8%	• Older age group • Males.
5	Weitzer et al. [11]	D-A-CH region in Europe	July – Aug 2021	Yes	3,067	General population	82.4%	• Older Age group in Germany and Austria, but not in Switzerland. • Males in Austria, but not in Switzerland and

6	Wu et al. [21]	China	Oct, 2021	yes	8229	General Population	76.8%	• Older Age group • Males
7	Kabir et al. [12]	Indonesia	Feb 2022	Yes	2674	General Population	56.3%	• Females
8	Zhang et al. [27]	China	Oct 2021	Intend to accept	2329	Factory workers	84%	• Older age group • Females
9	Wu et al. [28]	China	Aug 2021	yes	29925	General population of 31 provinces	91.6 %	• Females
10	Massimi et al. [29]	Singapore	Jan -Dec 2021	yes	756	Health Care Workers	73.8 %	_____
11	Moeed et al. [30]	Pakistan	Jan -Feb 2022	yes	787	General Vaccinated Population	77.8 %	• Younger age group • Males
12	Pal et al. [7]	United States of America	Feb-march 2021	yes	1358	Health care workers	92.1 %	• Older age group • Males
13	Perlis et al. [17]	United States Of America	April 2020 – Sep 2021	No	22,277	General Public	53 %	• Older Age Group • Males
14	Batra et al. [25]	United States	Oct 2021	Yes	501	General Population	58.3%	• Older age group • no significant correlation with sex
15	Batra et al. [31]	China	Nov 2021	Definitely yes	1724	Child caregivers	88.46%	• No significant age/sex correlation.
16	Barattucci et al. [32]	Italy	Nov-Dec,2021	Definitely yes	615	A University community in Italy	85.7%	• those older were more likely to accept the booster • males
17	Batra et al. [15]	Algeria	Jan to March 2022	Yes	787	Adult population with the capacity to communicate in Arabic and French	51.6 %	• Older age groups especially those suffering from the chronic disease have higher acceptance. • Males
18	Iguacel et al. [23]	Columbia El-Salvador Spain	Aug to Dec 2021	Definitely yes	3026	Adult population including Hospital care workers and non-hospital care workers	80.7 %	• Older age group • No correlation with gender
19	Kwok et al. [16]	Germany	Dec 2021	Definitely Yes	930	German University Students and Employees	87.8%	• No correlation with age/sex. •
20	Jairoun et al. [6]	UAE	Aug-Oct 2021	Yes	614	Students and faculty of Ajman University	77%	• Male •
21	Al-Qerem et al.[3]	Jordan	Oct-Dec 2021	Yes	915	General population	44%	• None
22	Kunno et al. [33]	Thailand	Sept-Dec 2021	Yes	780	General population	81%	• None
23	Jørgensen et al. [24]	Denmark	Dec 2021 - Feb 2022	Definitely Yes	31,721	General population	87%	• Older age group • Females
24	Neely et al. [34]	America	July 2021	Yes	600	General population	69.6 %	• Older age group • No significant correlation with sex
25	Al Janabi et al. [35]	America	Jan 2022	319	1762	Medical students	70.2%	• No significant correlation with age/sex
26	Klugar et al. [20]	Czechia	Nov 2021	Yes	3454	Healthcare professionals	71.3%	• older participants • Males
27	Rzymski et al.[10]	Poland	Sept 2021	Yes	2427	General population	71%	• older individuals • Female
28	Paul et al. [19]	UK	Nov to Dec 2021	Yes	22,139	Fully vaccinated adults	92.3 %	• Adults ages 30-44 were more willing to get booster doses as compared to younger adults.

Table 1: Covid-19 Acceptance in different studies based on dates of the survey, target population, sample size, etc.

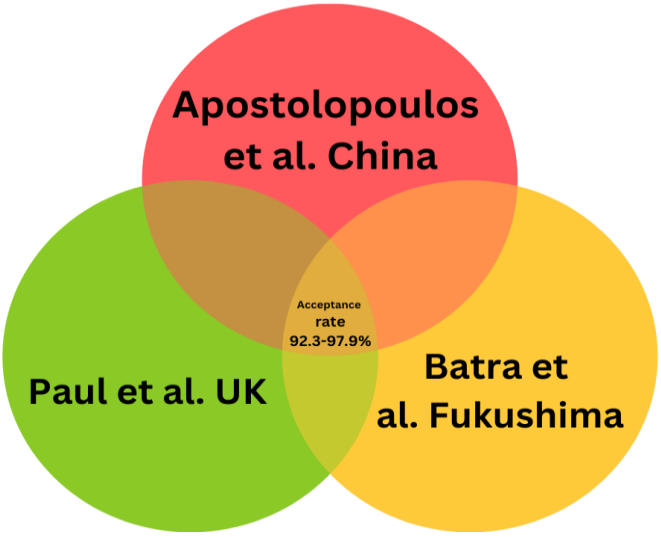

Figure 2: COVID-19 Booster dose acceptance rates.

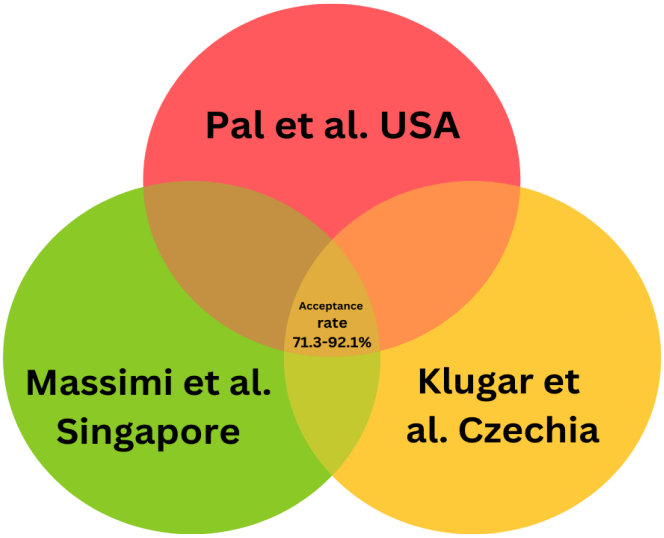

Figure 3: COVID-19 Booster dose acceptance rates among healthcare workers (HCWs)

3.2. Acceptance rates for COVID-19 vaccination

The rate of acceptance of booster doses is presented in Table 1 as depicted by the individual studies. Per study analysis, the highest rates of acceptance of booster dose (>90%) among the common population were seen in 3 studies conducted in Fukushima, Japan (97.9%), China (93.7%), and the UK (92.3%) while the lowest rates of acceptance (< 60%) were present in 5 studies from Indonesia (56.3%), USA (53%), Algeria (51.6%), Jordon (44%), Malaysia (43%). In Figure 2, 3 rates of acceptance of COVID-19 booster doses are displayed per country, with the most recent, up-to-date surveys used for countries with several studies.

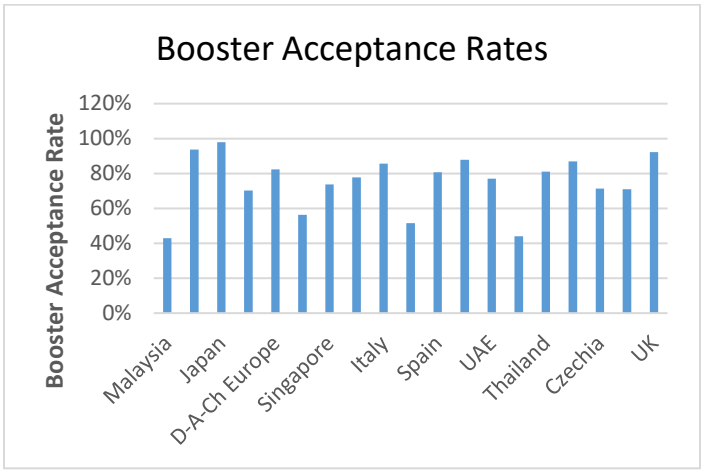

Figure 4 Rates of acceptance of COVID-19 booster doses per country, with the newest approximation used for countries with multiple studies.

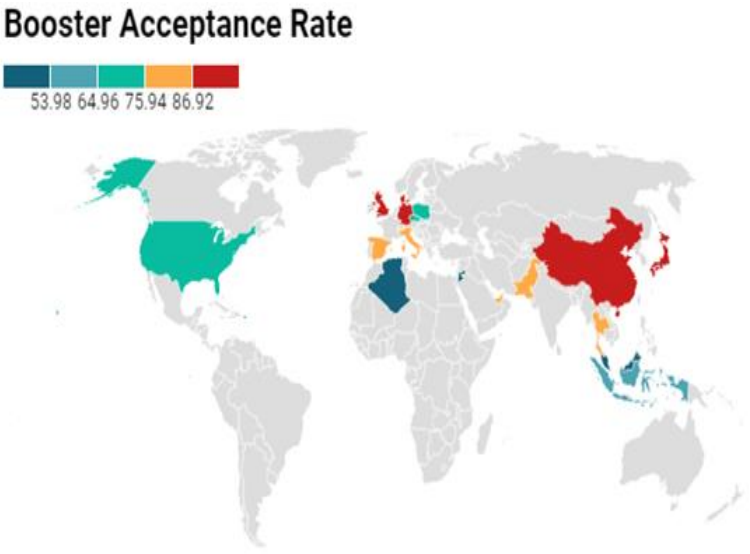

Figure 5: COVID-19 vaccine acceptance rates worldwide. For countries with more than one survey

study, the vaccine acceptance rate of the latest survey was used in this graph.

Among the three studies done on the university community, Booster Acceptance rates were greater than 70% with the highest being in Germany (87.8%) followed by Italy (85.7%) and UAE (77%).

For the three studies conducted on Health Care Workers (HCWs), the highest acceptance was found in the USA (92.1%) followed by Singapore (73.8%) and Czechia (71.3%). The ultimate goal of CRC screening is to discover potentially.

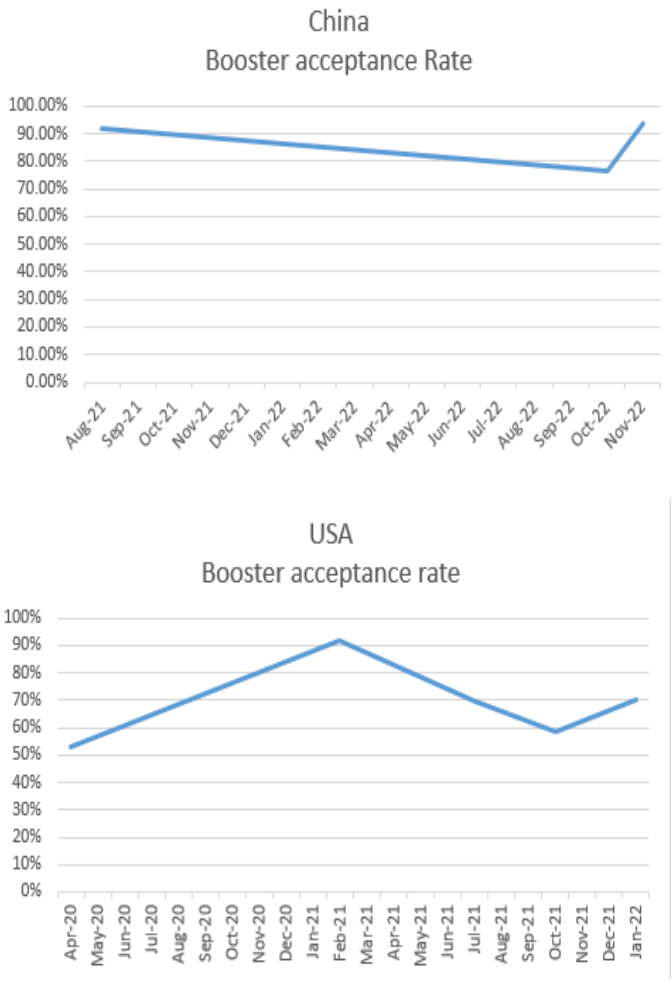

Figure 6,7: Trends in Booster Acceptance Rates in USA and China.

4. DISCUSSION:

Following the emergence of various highly contagious variants of Covid-19, vaccines followed by boosters were made to combat the deadly virus. This policy has however posed another great challenge for the state authorities which was to persuade their public to get the booster dose after the completion of COVID-19 primer dose vaccines, which was a public hurdle in itself. Booster hesitancy has been one of the major hindrances in way of successful completion of National vaccination programs worldwide, therefore estimates of booster vaccine acceptance rates and understanding the general attitude of the public towards the shots would provide the baseline platform in planning and evaluation of the steps required to raise public knowledge and reassure the public that vaccines are one of the safest drugs and need of vaccine administration is huge, which in turn would help to curb the dissemination of the virus and lessen the detrimental effects of this unparalleled disaster. [36]

Our review included 28 Studies from around the globe assessing public opinion about Covid-19 booster doses selected and after a thorough screening from PubMed, Google Scholar, and MDPI. In this review, huge variabilities have been found between the attitudes of the public toward Booster doses, however, specific patterns can be deduced. Firstly Vaccine acceptance rates were generally higher (>90%) in East Asian countries as indicated by 2 surveys from China and one from Fukushima, Japan. [18, 22, 28] Acceptance rates in European states were also fairly high (>80%) as shown by various surveys from

the UK, Denmark, Germany, Italy, Spain, Austria, and Switzerland. [11,16,19,23,24, 32] Data from south Asia, Africa, and the Middle East was inadequate to formulate any recognizable pattern.

Concerning the factors related to booster hesitation, sex, and age were found the leading correlations. A total of 10 studies showed higher acceptance in the male population while 7 indicated higher acceptance in the Female population, the most common explanations found for this pattern were related to the psychological and hormonal characteristics of females including increased risk perception.15In regards to age, most of the studies, 14 to be exact, correlated higher booster dose acceptance with increasing age. This can be attributed to the fact that the elderly are at increased risk of getting infected and therefore are among the prioritized group for booster administration and a large percent of the vaccine campaigns are targeted towards them [15,32] and only 4 of the total studies found higher booster acceptance in the younger population, while rest of the studies failed to provide any correlation with sex and age.

In countries with more than one survey conducted at various times, the alteration in trends of rates acceptance of COVID-19 booster doses was as followed. As far as the United States is concerned, the rate of acceptance was 53% in April 2020, 92% in February/ March 2021, 69.6% in July 2021, 58.3% in October 2021, and 70.2% in January 2022. In China, it was recorded at 91.6% in august 2021, 76.8% in October 2021, and 93.7% in November 2021.

5. Limitations:

The reliance on a small number of search engines was one of the study's shortcomings. However, this technique was adopted to provide a brief assessment of the restraints regarding covid-19 booster shots among the people but due to this, some relevant studies might have been missed. Also, this study included many cross-sectional studies, and online surveys with different sample sizes which involve selection bias, volunteer bias, and self-report bias which might have distorted the results. People without smartphones won't have responded to online surveys thus limiting the accuracy of results. In most studies acceptance was measured by self-reports without any scale. Finally, the information on occupation was not collected due to which differences in vaccine acceptance due to occupation cannot be explained thus these variables should be taken into account to evaluate and compare the reasons for hesitancy to accept the Covid 19 booster shots.

6. CONCLUSION:

Vaccine rates of acceptance were generally higher (>90%) in East Asian countries as indicated by 2 surveys from China and one from Fukushima, Japan (29–31). Acceptance rates in European states were also fairly high (>80%) as shown by various surveys from the UK, Denmark, Germany, Italy, Spain, Austria, and Switzerland (32–37). Data from south Asia, Africa, and the Middle East was inadequate to formulate any recognizable pattern. This implies that more acceptance rate in South Asia and the Middle East would help to achieve control over this

pandemic.

Vaccine hesitancy was evaluated to be one of the biggest obstacles in the way of achieving control over Covid 19 spread. The acceptance of the Booster dose was more among Males and acceptance was also increased in individuals with increasing age.

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