

Young adults' perspectives, acceptance, hesitancy and suggestion regarding the COVID-19 vaccine uptake in Hong Kong

Introduction

The coronavirus disease 2019 (COVID-19) has become a pandemic and profoundly creating burden around the globe. As of 27th August 2021, it has contributed to more than 4 million documented deaths with more than 200 million people being infected with the disease [1]. Preventive efforts such as vaccination is of supreme importance to quell the infection rate. Despite the fact that many countries have implemented a covid-19 vaccination program, however, vaccine hesitancy, a phenomenon referring to the delay or refusal of vaccination in regardless the availability of vaccine [2], has remained a substantial challenge in achieving herd immunity in which World Health Organization (WHO) has listed as one of the top ten global threats in 2019 [3].

It has been estimated by the Centers for Disease Control and Prevention (CDC) that an uptake of 82% is necessary to achieve herd immunity when $R_0 = 5.7$ via either vaccination or prior infection [4]. In Hong Kong, despite the government has offered free vaccination to the public, the vaccination rate is still falling below the target [5]. Young adults are a unique demographic group as characterized by higher transmission efficiency than other age group, rendering a high potential to jeopardize the health of older unvaccinated individuals [6]. Furthermore, Faasse revealed that youngster (18-29) was associated with poor engagement with health-protective behaviors in Australia [7]. Even though there is extensive research investigates willingness to take the COVID vaccine and related determinants of vaccine hesitancy using survey-based methodology, the closed-ended questions may contribute to low validity and restrict participant's response [8]. Moreover, studies regarding the reconsideration of vaccine among people who are vaccine hesitant are sparse.

Accordingly, there is a need to better understand young adults' concern and their criteria in reconsidering the vaccine. Our first aim of this exploratory study is to fill the research limitation with regards to quantitative studies. We first study the up-to-date topics while at the same time gather the information on why they would support the vaccine uptake on vaccine among young adults (18-29) whom refuse and accept the COVID vaccine. Our second aim is to probe participant's internal criteria when it comes to COVID vaccine. Through qualitative in-depth interview, this study summarized the common topic of refusal and acceptance of vaccine and details on participant's criteria on decision making. These could be useful in guiding the development strategies aimed at maximizing vaccine uptake by shifting the right focus.

Methods

Study design

We purposely recruited Hong Kong residents for whom they have explicitly been identified to refuse or to accept the vaccine to this study based on convenience sampling on social media from March to July 2021. They were given an informed consent form online to read and to sign their agreement to participate and to be audio-recorded. The interview took place online via Zoom and was recorded.

Data collection

The questions were adopted and modified by previous qualitative research [9, 10]. Questions were open-ended, and responses were allowed to add their thoughts at the end of the interview. Questions include but not limited to: Why do(n't) you receive the COVID vaccine? What can be done to increase the vaccine uptake rate? In what situation will you get the jab? Data was

collected during May to August 2021. The topic guide was first pilot tested on two participants and with no further adjustments. The verbatim was transcribed by a voice recognition software (Google speech to text) in preparation for analysis and deleted immediately. The reasons for support and hesitancy have been evaluated and later merged into different topics. Similar strategy also applied in attempt to group the criteria for reconsideration and perceived way to increase vaccine uptake.

Result

Participants characteristics

A total of 20 participants: 11 male (55%) and 9 females (45%), range from 18-26 (mean 22.4 ± 2.04). The duration of interview ranges from 17.68 - 60.07 (mean 34.65 ± 13.28) minutes. Based on the percentage shown in Table 1, the majority of the participants are students (70%). For those who have already received the vaccine, 9 out of 10 received Comirnaty (BioNTech) while the remaining one received CoronaVac (Sinovac).

Characteristics		N (%) or mean \pm SD
Gender	Male	11 (55)
	Female	9 (45)
Age		22.4 ± 2.04
Occupation	Student	14 (70)
	Healthcare-related	2 (10)
	Engineer	2 (10)
	Education-related	1 (5)
	Service sector	1 (5)
Vaccine brand (for those who received)	Comirnaty (BioNTech)	9 (90)
	Coronavac (Sinovac)	1 (10)

Table 1. Characteristics of participants in study, Hong Kong, 2021 (n=20)

Vaccine hesitancy: confidence in vaccine

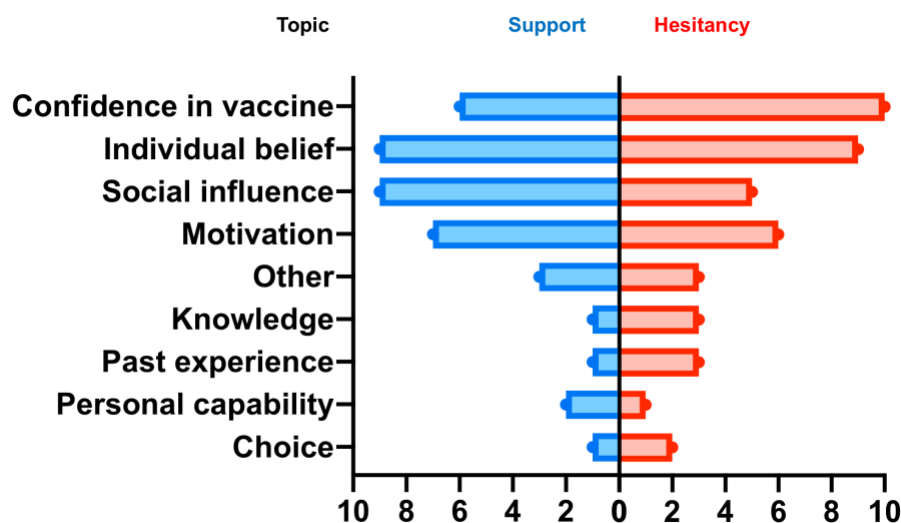


Figure 1. Factors for vaccination attitudes.

In the first part of the study, low confidence in vaccine is among the most frequently raised topic from the participants (Fig. 1), it includes the trust in different stakeholders, safety issue and vaccine efficacy. All participants indicated fear of extreme side effect as their top determinant due to the speed of development. It is obvious that people who are unwilling to get immunization are more likely to focus on rarer side effects than common complications such as fever and soreness.

“I think getting a jab is highly risky, because I heard someone got facial palsy and some even died...I won't gamble, and my choice is to wait.” (Participant 9)

Of note, even though some of the participants acknowledged the low probability of getting the extreme side effect brought by the vaccine, however, this group of people did think that they were highly susceptible to get the extreme side effect if they get the jab.

“I heard someone died after the injection...I know the probability is low, but it still has the chance...and I am afraid that I am the unlucky one.” (Participant 12)

Aside from vaccine safety, few participants commented that they did not receive the jab because they did not trust the government as the government tried to hide the adverse events caused by vaccine, which made them felt even more unsafe.

“Somehow people do not trust the government...I think the attitude has been accumulated overtime, not only because the government not willing to close the border decisively, but also due to the previous social movement...nowadays people, especially teenagers have low faith on them...so when the government want to implement policy, it is reasonable that some will go against them.” (Participant 1)

Although media can trigger emotional respond, participants argued that the government should not hide any adverse events so as to avoid any exaggerated statement triggering negative perceptions towards COVID vaccine even if the adverse events may actually make the public feel more vulnerable and anxious. The unprecedented pace of vaccine development and lack of both long-term data and test summed up to low confidence in vaccine.

“When Hong Kong government decided to import these vaccines, they did not disclose all the data, which is greatly lack of transparency! The government should let the citizens to know all the information including those adverse events. You know what, I received most of the information from oversea media!” (Participant 3)

“Development of vaccine generally takes 5 to 10 years but this COVID vaccine can be applied to human with just few months...one of the vaccines not even have the third phase result, how come the government can authorize it?” (Participant 3)

One also mentioned that although clinical data revealed that BioNTech had 95% protective rate, however, such data was still unsure on its applicable in applying to the globe.

“Even the clinical data revealed high protective rate after 2 doses of injection, it does not tell me whether such number can quell the pandemic or not” (Participant 1)

Other concerns such as unsure about durability of immunity like how long the antibody could last for also added up to the doubt in terms of the usefulness of the vaccine.

Vaccine hesitancy: Individual belief

Aside from low confidence, decision making is governed by individual belief. Under the strict anti-pandemic measurements in Hong Kong, the disease is as yet under containment. Without surprise, many participants said that they had low risk of contracting disease and thus no point to get the vaccine. When asked about the herd immunity, participant 3 responded that vaccine could not guarantee his life as the side effect might kill him, let alone protecting others. Furthermore, all participants under this topic mentioned that wearing mask was better than vaccine and it might be linked to past experience.

“Vaccine is not necessary. In 2003, the containment of SARS did not require the use of vaccine...and during the early outbreak of the pandemic, Hong Kong can reach to 0 confirmed case by just wearing mask and social restriction. This clearly tells us that vaccine is not the only solution!” (Participant 11)

Besides, she supplemented that individual preferred wearing mask as it did not cause any side effect while vaccine did. Such thought reinforced vaccine refusal attitude. Intriguingly, participant 7, who have been immunized. expressed that vaccination could foster the spread of the disease.

“The vaccine is not 100% fully protective. One may reduce anti-pandemic awareness and easily get the COVID because they might think that he is fully protected and no longer adhere to fight against the COVID.” (Participant 7)

Vaccine acceptance: Individual belief and social influence

In regard to the reason for support, individual belief and social influence were dominated. When asked about the effective means of ending the pandemic, part of the participants replied vaccination as one of their choices. Despite the fact that the vaccine protective rate was reduced due to mutant strain, however, participant 6 reported “at least it can protect the non-mutated one” and participant 8 reported “actually I don’t know much about this vaccine, but I think it can protect us in a certain degree”. While for social influence, most participant mentioned that some of their close friends had already received the vaccine and thereby gave confident to them. Addition to that, participant 8 mentioned there were lots of vaccination promotion campaigns worldwide and oversea governments strongly advocate for the vaccine in which individual has foreseen vaccination as a social norm.

Reconsideration of vaccine

When asked about reconsideration of vaccine, “policy” is the most frequently mentioned topic that involved 13 participants (Fig. 2), for example: “If I have given a choice, I won’t go for it. I will only go if vaccine-related policy affects my living”, “I have money is a good way to motivate us... people are realistic”. Some participants also mentioned few suggestions, these include: “It is necessary to let the public know the distinct benefits between jab and not, for my job, I don’t even get any advantages if I received the vaccine”, “Maybe we can follow the US to abandoned mandatory mask-on policy as an incentive”.

“Data” is followed by “policy”. People who hesitate to get the vaccine often mentioned side-effect as their main concern (Table 2). However, even though efforts were given such as clarification of myth from the medical expert, they still hold their belief. A more comprehensive proof is needed.

“I know the probability of having extreme side effects is low, but their sample size is too small... I wonder what the global death rate and total number of adverse events is due to COVID vaccine worldwide”. (Participant 9)

Education is also ranked second. Most of the participants agree that education can increase the vaccine uptake. The content includes: how vaccine can generate immunity in our body, how does vaccine prevent the spread of the disease and how does the vaccine cause different side effects (Table 2). One participant listed social education as the most crucial measurement.

“The older generation may not receive good education and might missed the importance of vaccination. It will be ideal if there are public workshop or talk to deliver such knowledge to them, on top of formal educational curriculum” (Participant 3)

“There are lots of media reporting the negative events of the vaccine, we are no doubt that being influenced by this information and our view on vaccine will become more subjective. Education exposes facts to student in which it can make them more object in making judgment”. (Participant 17)

Media is ranked third. Mass media campaigns can attain wide swathes of population which can be effectively deliver significant messages. It has been told by the participants that news report is the most trusted source, because “they have been filtered out fake information” (Participant 10).

Participants also mentioned that media can be more effective when health professionals are involved. Participants mentioned that TV ads should put time on explaining the mechanism of the vaccine rather than just call people to get the jab. Intriguingly, when asked about the source of vaccine-related information, one-third of the participants who received COVID vaccine reported foreign news such as BBC as their major source as they are less likely to be influenced by the local government. Due to the fact that distrust government and its source is one of the reasons for hesitancy, a participant suggested that the ads should cite more research data with reference.

“Many people don’t trust the government, but if they cite the data with proper citation, it can definitely boost the credibility”. (Participant 17)

It is of prime importance for the government and scientific committee to recognize the public desire for information about the negative events caused by the vaccine. It appears to correlate a greater sense of public’s rights and sense of security. Nevertheless, the young adults who hesitate to get the vaccine in our study frequently express dissatisfaction with the amount of explanation related to adverse event they received. They reasoned that the scientific committee often emphasize that death cases were just ‘specific cases’ and there was no evident to prove a link between vaccine and the death.

Furthermore, few participants felt annoying when they have seen the advertisement on vaccination. They explained that those ads did not persuade them why they should get the vaccine and concluded that they have received neither all the information that they want, nor all the information that they need. On top of that, few of the participants who have received the vaccination appeared to be particular poorly served by the current source of information given by the government. For example:

“I get most of the information from different accounts on Instagram, they have summarized, compared and contrasted the side effect of multiple brand of vaccines” (Participant 1)

This participant also mentioned that each time he discovered these posts, he felt like the government was trying to hide something and the ‘real’ truth is being suppressed. In addition, few participants who received the vaccine often reported that they have read external source of information. They were keen to find out more about the vaccine and its side effect management. They believed information on these topics would allow them to better understand the vaccine.

Discussion

Prophylactic vaccine is a promising strategy for combatting the pandemic. A high coverage rate is undoubtedly ideal when involving novel vaccines that confer unknown efficacy towards mutant strains. As such, vaccine hesitancy is an emerging threat in the era of COVID-19. There is a dire need to know the reasons why they are willing and unwilling to do so in order to promote vaccine uptake. Many studies worldwide have identified different factors associated with vaccine hesitancy. However, most studies are survey-based in which participants are restricted to provided options. Here, we utilize qualitative research method to explore key determinants that contribute to vaccine acceptance and hesitancy.

From this qualitative study of young adults in Hong Kong, we found that the major factor that contribute to vaccine hesitancy is confidence in vaccine, which touch upon trust in different stakeholders, safety issue and vaccine efficacy. These results resonated with a study done in the United State [11]. However, the confidence in vaccine can be built through various approaches. For instance, trust towards government can be developed via disclosure of proper reports on explaining adverse event caused by immunization (Fig. 2). Participants also generally think that wearing face mask offers more protection than vaccine. Study has proved that vaccination and wearing mask can both reduce influenza transmission at a similar rate [12]. On the other hand, individual belief and social influence are frequently mentioned among those who already done their immunization. Contrast to beliefs from vaccine hesitant individuals, people who have received vaccine do believe that vaccine is the solution, though they did not brush aside the protective effects given by the mask. This divergence can be solved via the establishment of social norm [13], which will be discuss later in this section.

Interestingly, when respondents who were hesitant about vaccine were asked questions related to herd immunity, most of them affirmed the importance of herd immunity and agreed that we shall all receive the vaccine in an attempt to protect others given that the vaccine was safe. They annotated safe as “no extreme side effects such as facial palsy and myocarditis”, even they acknowledged the miniscule probability of occurrence. This phenomenon can be termed as probability neglect, which refers to the cognitive bias of neglecting a low-probability threat that will actually occur. This can be due to the involvement of emotion evoked by the media when newspapers are stressing the rare serious cases from vaccination [14]. Given the presence of probability neglect, education is perhaps an effective way when strong emotion is dragged in, as suggested by Sustain [14]. In figure 2, we summarized the key contents that the government should focus, examples including the needs to teach the public on how the side effects are caused by immunization. Due to the newly used mRNA technology, contents related to the mechanism should also be available to the public. Health professionals should not undermine public’s desire for information and think that the public may not possess the appropriate knowledge and related scientific background to process the information.

Education is an aspect that most participants treat it as one of the effective ways to boost vaccine uptake. It can be reasoned that people who have been exposed to vaccine education may have a better impression and thus more likely to receive the vaccine. However, in our study, even though most of the participants are students, they still refuse to get the vaccine. Rationales such as different subject of study and newer technologies in generating vaccine may explain the discrepancy, since most of the participants responded that their knowledge related to vaccine were from high school biology. A survey based in Hong Kong also revealed that inadequate knowledge about transmission of the disease could associate with intention to be vaccinated [15]. In the future, vaccine education may need to integrate into general curriculum.

One of the biggest challenges in the previous survey-based research is that they do not allow the participants further elaborate or define key words. “Insufficient data”, for example, does not tell us what data they are looking for. Thence, vagueness causes policy maker hard to tackle the concern specifically and efficiently. Herein, we not only asked for their criteria in reconsidering vaccination but also permit them to define their wordings (Fig. 2). Our result suggested that the government should proactively provide information about their selected doubt to break this barrier and address hesitancy among young adults. Government can also consider messaging to tailor address the concerns held by young adults. Work should be done on designing effective content to overcome hesitancy in each situation.

Health behavior and attitude among young adult can vehemently influenced by their peer[16]. Study by Quinn provided evidence that social norms are correlated to influenza vaccine uptake [17]. Following this train of thought, a large-scale social norm establishment for vaccine can shift biased perception towards vaccination. Indeed, in our study, few participants deemed social norm as one of their turning point from hesitancy to acceptance. But how can we establish norm among them? A study conducted by Stout revealed that HPV vaccination intention is greatly enhanced when individuals perceiving support from parents, doctors, and to a lesser degree, friends [18]. Thereby, health professionals should help promote the vaccination against COVID-19 among the general public. During the interview, participants expressed that medical expert but not government officials should be responsible for vaccine advocate.

Many other studies which explore the reasons on the group who are willing to receive a vaccine [11, 19-22]. However, their willingness to accept vaccine does not necessarily contribute to actual vaccine uptake. One of the advantages of this study is that we have interviewed the young adults who have actually received the vaccine and allow us to explore the turning point from them. In summary, this study has examined the factors associated with vaccine acceptance and hesitancy. Our findings highlighted that low confidence in vaccine is the key determinant for the delay in vaccine uptake. On the other hand, individual belief and social influence contribute to vaccine uptake, development of social norm can be an effective mean to boost vaccine uptake. Our study results also provide guidance on policy making and how the related stakeholders should promote and educate the young adults for COVID-19 vaccine.

Limitation

This study is subject to several limitations. First, our present study focused on young adults, future studies should be performed among children since they have the lowest vaccine uptake rate in Hong Kong. Second, most of our study participants are students in which they may exhibited similar perception toward vaccine. Third, sample size is too small and qualitative

research might include researcher's biases. Therefore, future quantitative study should be used to quantify some of the preferences and statements marked on this study to better understand the generalizable of this study among wider group of population.

Factor	Reason [Support]	Reason [Hesitancy]
Confidence in vaccine	Clarification of vaccine myth by scientific committee	Do not trust the location of manufacture Lack of information Low transparency of information Lack of successful case that vaccine can quell the pandemic Distrust local government and its source Insufficient testing Lack of long-term data
	General side effects are acceptable Low occurrence of extreme side effect Experts say it is safe	Fear of general side effects Fear of extreme side effects Fear of the side effects that can pass on to next generation Adverse vaccine event reporting
	High protective rate from phase III data	Protection cannot last long Vaccine is not 100% protective
Individual believe	Vaccine is the solution Better than none even the vaccine is ineffective Perceived high susceptibility to disease Perceived good health Belief in benefits of vaccine	Perceived strong immunity Perceived low severity of illness Vaccine cannot tackle the root cause of the disease Perceived low risk of contracting disease Wearing mask is better than vaccine
Social influence	University advocate Number of job is high Government officer/health committee/celebrity received the job Peer influence Promotion of vaccine administration worldwide Low vigilance and awareness of the pandemic in the public Social responsibility	Close friends are holding wait-and-see attitude Local vaccination rate is not high enough Friends who reported adverse events following immunization
Motivation	Job requirement Fulfil (future) travelling requirement Anticipate relaxing COVID restrictions after vaccination	Lack of incentive
Other	Disease uncertainty	Parental influence
Knowledge		Lack of knowledge regarding vaccine
Past experience		Past experience Containment of SARS (2003) did not require vaccine
Personal capability	Perceived good health Youngness	Concern on individual's condition for suitability of vaccination
Choice	No more BIONTECH	Lack of choice Waiting for better vaccine

Table 2. Distribution of different reasons arising from in-depth interviews about vaccine attitudes, Hong Kong, 2021

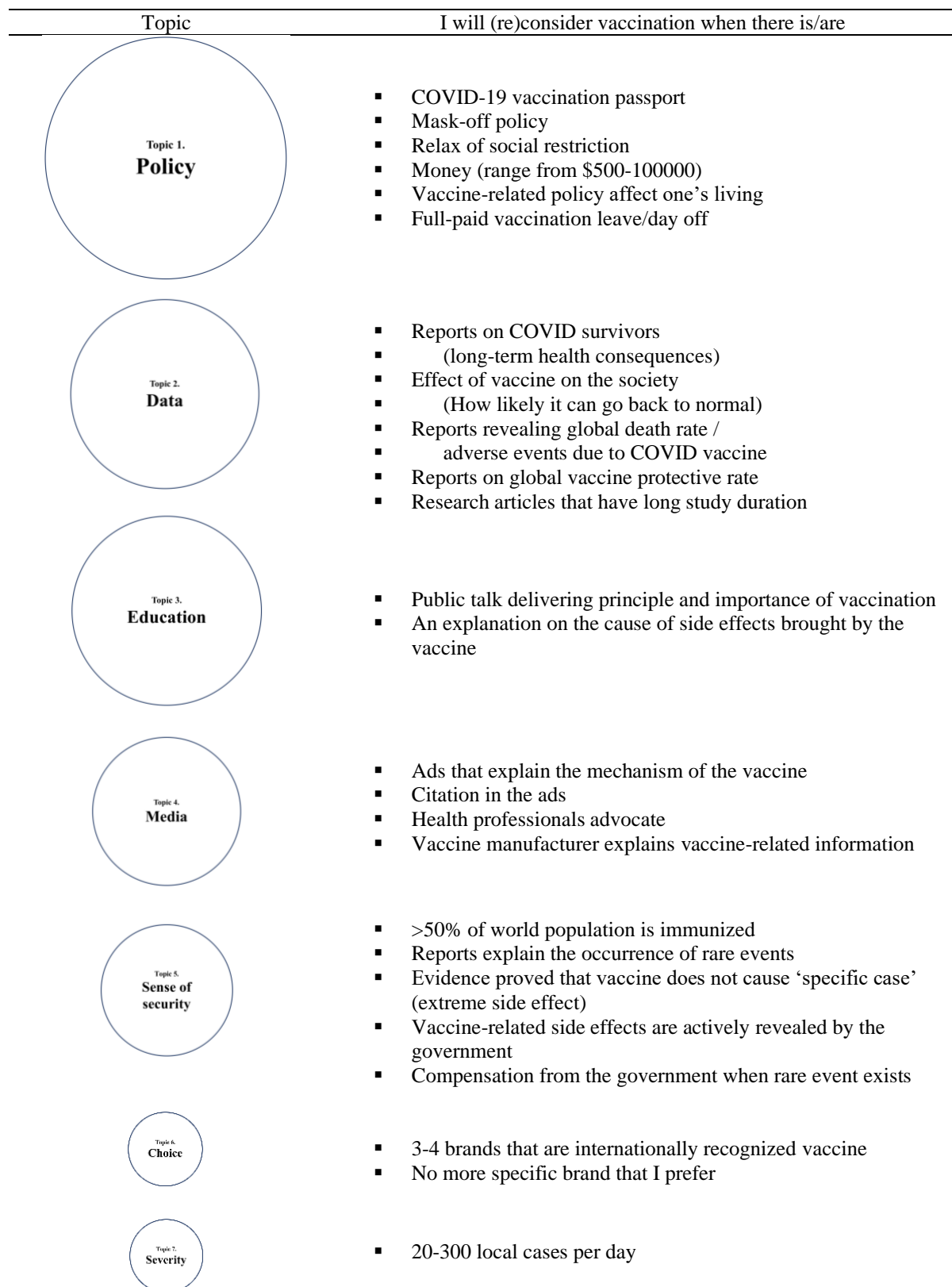


Figure 2. Aspect regarding vaccine reconsideration. Circle size is proportional to the number of participants who talked about.

References

1. WHO. *WHO Coronavirus (COVID-19) Dashboard*. 2021; Available from: <https://covid19.who.int/>.
2. MacDonald, N.E., *Vaccine hesitancy: Definition, scope and determinants*. *Vaccine*, 2015. **33**(34): p. 4161-4164.
3. WHO. *Ten threats to global health in 2019*. World Health Organization 2019.
4. Sanche, S., et al., *High Contagiousness and Rapid Spread of Severe Acute Respiratory Syndrome Coronavirus 2*. *Emerg Infect Dis*, 2020. **26**(7): p. 1470-1477.
5. HKSAR. *Hong Kong Vaccination Dashboard*. 2021; Available from: <https://www.covidvaccine.gov.hk/en/dashboard>.
6. Monod, M., et al., *Age groups that sustain resurging COVID-19 epidemics in the United States*. *Science*, 2021. **371**(6536): p. eabe8372.
7. Faasse, K. and J. Newby, *Public Perceptions of COVID-19 in Australia: Perceived Risk, Knowledge, Health-Protective Behaviors, and Vaccine Intentions*. *Frontiers in Psychology*, 2020. **11**(2553).
8. Krause, N., *A comprehensive strategy for developing closed-ended survey items for use in studies of older adults*. *The journals of gerontology. Series B, Psychological sciences and social sciences*, 2002. **57**(5): p. S263-S274.
9. Glanz, J.M., et al., *A mixed methods study of parental vaccine decision making and parent-provider trust*. *Acad Pediatr*, 2013. **13**(5): p. 481-8.
10. Enkel, S.L., et al., *'Hesitant compliers': Qualitative analysis of concerned fully-vaccinating parents*. *Vaccine*, 2018. **36**(44): p. 6459-6463.
11. Fisher, K.A., et al., *Attitudes Toward a Potential SARS-CoV-2 Vaccine : A Survey of U.S. Adults*. *Ann Intern Med*, 2020. **173**(12): p. 964-973.
12. Uchida, M., et al., *Effectiveness of vaccination and wearing masks on seasonal influenza in Matsumoto City, Japan, in the 2014/2015 season: An observational study among all elementary schoolchildren*. *Preventive medicine reports*, 2016. **5**: p. 86-91.
13. Edmonds, B. and M. Xenitidou, *The Complexity of Social Norms*, in *Computational Social Sciences*,. 2014, Springer International Publishing : Imprint: Springer,: Cham. p. 1 online resource (VI, 205 pages 13 illustrations, 5 illustrations in color).
14. CR, S., *Probability Neglect: Emotions, Worst Cases, and Law*. John M. Olin Program in Law and Economics Working Paper, 2001. **138**.
15. Luk, T.T., et al., *Prevalence and determinants of SARS-CoV-2 vaccine hesitancy in Hong Kong: A population-based survey*. *Vaccine*, 2021. **39**(27): p. 3602-3607.
16. Bibliography, A. and A. Berkowitz, *The Social Norms Approach*. 2004.
17. Quinn, S.C., et al., *The influence of social norms on flu vaccination among African American and White adults*. *Health Educ Res*, 2017. **32**(6): p. 473-486.
18. Stout, M.E., et al., *Self-efficacy and HPV Vaccine Attitudes Mediate the Relationship Between Social Norms and Intentions to Receive the HPV Vaccine Among College Students*. *Journal of Community Health*, 2020. **45**(6): p. 1187-1195.
19. Mant, M., et al., *University students' perspectives, planned uptake, and hesitancy regarding the COVID-19 vaccine: A multi-methods study*. *PLOS ONE*, 2021. **16**(8): p. e0255447.
20. Wang, K., et al., *Change of Willingness to Accept COVID-19 Vaccine and Reasons of Vaccine Hesitancy of Working People at Different Waves of Local Epidemic in Hong Kong, China: Repeated Cross-Sectional Surveys*. *Vaccines*, 2021. **9**(1): p. 62.

21. Gerussi, V., et al., *Vaccine Hesitancy among Italian Patients Recovered from COVID-19 Infection towards Influenza and Sars-Cov-2 Vaccination*. *Vaccines*, 2021. **9**(2): p. 172.
22. Chan, P., Wong, MCS., Wong, ELY., *Vaccine hesitancy and COVID-19 vaccination in Hong Kong*. Hong Kong Academy of Medicine, 2021. **27**(2): p. 90.