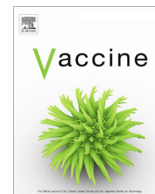




Since January 2020 Elsevier has created a COVID-19 resource centre with free information in English and Mandarin on the novel coronavirus COVID-19. The COVID-19 resource centre is hosted on Elsevier Connect, the company's public news and information website.

Elsevier hereby grants permission to make all its COVID-19-related research that is available on the COVID-19 resource centre - including this research content - immediately available in PubMed Central and other publicly funded repositories, such as the WHO COVID database with rights for unrestricted research re-use and analyses in any form or by any means with acknowledgement of the original source. These permissions are granted for free by Elsevier for as long as the COVID-19 resource centre remains active.



# Attitudes and perception of influenza vaccines among older people in Singapore: A qualitative study

L.M. Teo<sup>a</sup>, H.E. Smith<sup>a,\*</sup>, M.O. Lwin<sup>b</sup>, W.E. Tang<sup>c</sup>

<sup>a</sup> Lee Kong Chian School of Medicine Nanyang Technological University, Singapore

<sup>b</sup> Wee Kim Wee School of Communications and Information, Nanyang Technological University, Singapore

<sup>c</sup> Clinical Research Unit, National Healthcare Group Polyclinics, Singapore



## ARTICLE INFO

### Article history:

Received 14 November 2018

Received in revised form 8 September 2019

Accepted 10 September 2019

Available online 18 September 2019

### Keywords:

Influenza vaccines

Elderly

Older adults

Barriers

Motivators

Travel

Healthcare workers

Misconceptions

Singapore

## ABSTRACT

**Background:** Despite recommendations for influenza vaccination of people aged 65 and above, uptake rate of influenza vaccines remains low.

This study aims to understand barriers and motivators behind older adult's decision on influenza vaccination.

**Methods:** Face to face interviews with participants aged 65 and above were conducted and audio recorded in Geylang polyclinic in Singapore. Thematic content analysis was used to organise the data.

**Results:** 15 older adults were interviewed, aged between 66 and 85 years old. 6 were vaccine refusers, 3 defaulters and 6 acceptors.

A perceived lack of vulnerability, fear of side effects, and trivialisation of influenza were common reasons for not taking the vaccine. Encouragement from family and friends, travel and previous positive vaccination experiences were motivators for getting vaccinated. Healthcare workers played a role in influencing many of the participants' decision-making. Common misconceptions included vaccines considered as necessary only before travel and as a cure rather than prevention. Most participants exhibited ambivalence, giving reasons both for and against vaccine uptake.

**Discussion:** Most older adults do not perceive influenza as a potentially serious disease nor trust in influenza vaccines' efficacy. Misconceptions played a significant role in vaccine decline. Novel findings include the importance of the family unit in decision making, prioritization of chronic health problems over vaccination and misconception that vaccines are only needed when travelling out of country. Healthcare workers and family members appear to be important influencers in the decision making of older adults and should be actively engaged in future health promotion initiatives.

© 2019 The Authors. Published by Elsevier Ltd. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

## 1. Introduction

In Singapore, annual influenza vaccination is recommended by the Ministry of Health (MOH) Expert Committee on Immunization (ECI) to protect population groups at higher risk of influenza complications, which includes those aged 65 and above and persons with chronic medical conditions such as diabetes, asthma and heart disease [1]. However, despite these recommendations, uptake of influenza vaccine among the population remains low.

The uptake rate of influenza vaccines for Singaporeans aged above 50 is 15.2% based on the National Health Surveillance Survey

in 2013 [2] and 8.7% based on Health Behaviour Surveillance Survey in 2012 [3]. These uptake rates are much lower than other developed countries; the Organisation for Economic Co-operation and Development (OECD) reports influenza uptake rates among individuals aged  $\geq 65$  of 72.6% in United Kingdom, 67.5% in United States and 65.0% in New Zealand [4]. The vulnerability of the older adults to influenza complications has been underlined by previous studies. Between 1996 and 2003, influenza associated excess death rate was 11.3 times higher amongst those aged 65 and above as compared to the general population of Singapore [5]. Similarly, influenza-associated hospitalization rates were much higher in those aged 65 and above as compared to the general population, based on MOH national surveillance program for influenza [3].

Despite the low vaccination uptake rates, there have been no previous studies conducted using in-depth qualitative interviews to explore the reasons behind the low uptake among Singaporeans

\* Corresponding author at: Lee Kong Chian School of Medicine, Nanyang Technological University Singapore, 11 Mandalay Road, Singapore 308232, Singapore.

E-mail address: [h.e.smith@ntu.edu.sg](mailto:h.e.smith@ntu.edu.sg) (H.E. Smith).

aged 65 and above. A previous quantitative study looked for associations between the uptake of influenza vaccines and socio-demographic characteristics of Singapore's older adults but did not explore how these factors affected participants' decision to have the vaccine [2]. Another study found a lack of knowledge on influenza vaccines in diabetics, but further exploration of the reasons was restricted by its quantitative nature [6].

By 2030, it is estimated that 1 in 4 Singaporeans will be aged 65 and above [7]. With this demographic shift, influenza infection-related complications will pose an even greater threat to society. The efficacy of influenza vaccines in reducing influenza-associated complications have been proven in other countries and improving uptake rates in Singapore would likely provide similar outcomes [8,9].

This research aims to understand the barriers and motivations behind older adults' decision to accept or decline the influenza vaccine and assess their knowledge of the vaccine using an in-depth qualitative methodology.

## 2. Methods

### 2.1. Interviews

Face to face interviews were conducted to explore in depth, the barriers and motivators behind influenza vaccine uptake. Semi-structured interviews were guided by an interview schedule, but with the option to explore new themes as they arose. Interviews began with a description of the purpose of the study and explanation of confidentiality. Written informed consent was obtained and the interviews were audio recorded with a digital recorder. For confidentiality, participants were asked not to mention any names of healthcare professionals, friends or family throughout the interview. The interviewer also used generic titles such as Sir or Madam when addressing the participants. Participants were given an SGD 10 voucher as a token of appreciation. Ethics approval was obtained from the Domain Specific Review Board, the ethics board of the National Healthcare Group [2017/01164].

Participants' age, gender, chronic medical conditions and date of last influenza vaccination were recorded. The interviews explored interviewees' knowledge of influenza and opinions towards the vaccine. Interviewees were encouraged to reflect on why they chose whether or not to take up influenza vaccines, identifying the motivating and discouraging factors influencing uptake. Factors that would persuade participants to change their current views towards influenza vaccines were also explored.

### 2.2. Setting and participants

Interviews were conducted in Geylang Polyclinic which provides accessible and affordable primary care. There is a high prevalence of older adults with chronic conditions amongst polyclinic patients making vaccination a very pertinent issue for this group [10].

Only people aged 65 and above were interviewed. This study focused only on participants who could speak English or Mandarin. Vaccination status was not known at recruitment.

### 2.3. Sampling

Participants were approached in the pharmacy, doctor's consultation and registration areas of the polyclinic. Those who were willing to participate had their age verified and were led to a pre-designated quiet room where the interview was conducted. Each interview was estimated to last around 15–25 min. Sample size was estimated based on the information power of this study.

Information power indicates that the more information the sample holds relevant to the research question the lower the number of participants needed [11]. With this study's narrow aim, high specificity and focused dialogue, a sample size of around 15 participants is estimated to provide sufficiently high information power.

### 2.4. Content analysis

To protect confidentiality of participants, all identifiable information was replaced with a subject code (S01, S02, etc.). After the interview, recordings were transcribed verbatim in English. Transcripts were analysed independently by two investigators (HES + TLM) using thematic content analysis. Each transcript was read repeatedly for data immersion and summarising of common themes. Emerging common themes were then discussed and the number of participants who matched each theme was determined. This allowed the team to understand the spread of the data and identify outliers. Common themes were then listed and structured to be presented comprehensively with room for inter-case and within-case analysis. Common themes were illustrated with relevant verbatim quotes from interviewees. Quotes were identified by the vaccination status of the interviewee to allow for context, while ensuring confidentiality of participants.

## 3. Results

In total, 15 older adults, aged between 66 and 85 years old, were interviewed. Data saturation was achieved. There were 8 male and 7 female participants. 9 interviews were conducted in English and 6 in Mandarin. The date of last vaccination was self-reported by participants and used to categorise participants by their vaccination status in the analysis. Three categories were defined; *acceptors* who had received the influenza vaccine within the one year prior to the interview, *defaulters* who had received the influenza vaccine previously but not in the year prior to the interview and *refusers* who had never taken the influenza vaccine. Overall, the sample consisted of 6 refusers, 3 defaulters and 6 acceptors (Table 1).

### 3.1. Knowledge and views about influenza and vaccination

All participants were aware of what influenza is and were able to describe some common symptoms of influenza including cough, cold, fever, runny nose and body ache.

*"you start feeling a little bit feverish and after that you start getting nose stuffed up, got throat itch, a lot of signs. It's not one thing, it's literally a whole thing that's together."* (S14, acceptor)

Some were aware of pneumonia arising as a complication from influenza.

*"Of course, your lungs got water. Then will suffocate... Once you are breathless suffocate, then you need oxygen."* (S09, acceptor)

Most also expressed ideas of how one gets influenza and had practices which they believed protected them from catching it. Contact with people who have contracted influenza was widely recognised as a source of infection.

*"Through personal contact... when you are with a group and you start sneezing away, I think others around if their immune system is not strong, or they haven't gotten the resistance, then obviously they will catch you know, err influenza."* (S03, refuser)

Other lifestyle and environmental factors such as diet and weather were cited as explanations for getting influenza.

**Table 1**  
Participants' characteristics.

Participants' code	Gender	Age	Language Spoken	Vaccination status	Chronic Medical Conditions
S001	Female	68	English	Defaulter	Hypertension, Hyperlipidaemia
S002	Male	81	English	Refuser	Hypertension, Hyperlipidaemia
S003	Male	82	English	Refuser	Hypertension
S004	Male	85	Mandarin	Refuser	Hypertension
S005	Male	66	English	Accepter	Ischemic Heart Disease
S006	Male	80	Mandarin	Defaulter	Hypertension
S007	Female	73	Mandarin	Refuser	Hypertension
S008	Male	71	English	Refuser	Stroke
S009	Female	74	English	Accepter	Hypertension, Hyperlipidaemia
S010	Female	66	Mandarin	Defaulter	Hypertension, Hyperlipidaemia
S011	Female	84	Mandarin	Accepter	Hypertension, Diabetes Mellitus
S012	Male	69	English	Accepter	Diabetes Mellitus
S013	Female	82	Mandarin	Refuser	Hypertension
S014	Male	71	English	Accepter	Ischemic Heart Disease
S015	Female	70	English	Accepter	Ischemic Heart Disease

*"Sometimes you anyhow eat food, eat already will get the flu. Rain, getting caught in rain. . . weather too hot also will get the flu."* (S06, defaulter)

The awareness of influenza vaccines among the participants was much less prevalent as compared to their awareness of influenza itself. When asked about the influenza vaccine, 3 out of 6 refusers said that they were not aware of the availability of such a vaccine. Even among those aware of the vaccine, some were unsure of how often they needed to take it. Others had misplaced ideas of what the vaccine does, with one participant attributing it to protection from pathogens in food.

*"it's like the food we eat, if scared of the germs, inside our body have the germs to go and fight them, less easy to become infected like that [with the vaccine]"* (S10, defaulter)

Another participant thought that the vaccine will only exert its effect when the recipient gets influenza but dismissed the vaccine's preventative role.

*"Ah, but I did not experience any such symptoms and as such I wouldn't be able to know whether the vaccine really helped me or not helped me you see."* (S14, acceptor)

### 3.2. Reasons why people sought vaccination

**Travel.** Among those who took the vaccine, 7 participants cited travel as a reason, feeling that vaccines were necessary because a change in environment placed them at greater risk of influenza infection.

*"As a precaution, you see when you go overseas you do not know the conditions, you do not know the foods, sometimes the change in weather then you expose yourself. You can easily get cough and cold."* (S14, acceptor)

Complying with official recommendation was another reason for taking influenza vaccines before travel.

*"I think when I first came for this vaccination because I am going to Mecca, and it's err imposed by the government so when I went I came to see the nurse and this is what I was told."* (S12, acceptor)

**Perceived vulnerability to influenza** was cited by 6 participants as a reason for vaccination. Perceived vulnerability was evidenced by frequent influenza episodes previously and the notion that a vaccine would reduce the severity of infection.

*"I think it's good ah because I am prone to cough. . . so to promote my immunity, to protect actually. . . Even though you get the cough but it won't prolong."* (S09, acceptor)

A weaker immune system as one aged was another common reason for the perceived vulnerability.

*"Because as we age, our body tissue everything that is related to health, and our immune system becomes slower. So that's one of the reasons why precautions are better."* (S14, acceptor)

Furthermore, associated symptoms such as urinary incontinence made participants more cautious of contracting influenza.

*"I am also scared others spread their flu to me, because as we age, once we cough or sneeze, urine will rush straight out."* (S10 defaulter)

**Previous positive experience with influenza vaccines.** Four acceptors felt that previous protective effects for themselves and their families encouraged them to continue vaccination yearly.

*"Last time I keep getting flu one, now I take this jab once every year then don't have already."* (S11, acceptor)

*"My late husband he had a heart bypass, because of him the doctor advised us to take the flu jab. . . And within that he has no fever, cough slightly yes la, but fever no, that's why he survive 10 years."* (S09, acceptor)

**Trust in safety of vaccines,** built up overtime among some acceptors motivated them to a routine of regularly having the vaccine each year.

*"One thing, it doesn't harm you, why not? Just to protect yourself. . . if it is good, it's for your health, why not?"* (S12 acceptor)

*"Every year take the vaccine like that lor. If nothing wrong, then take every year no issue lor."* (S11, acceptor)

With trust in safety of the vaccine, even an occasional lack of effectiveness did not deter participants from continuing to be vaccinated.

*"Well if I get the flu I get the flu, that's it. . . there's no harm in taking it [the vaccine] so I will still take it yea"* (S05, acceptor)

**To protect their loved ones.** Some participants took the vaccines to prevent spreading influenza to their family and friends. The reluctance to burden their children when they are sick are also served as motivation to get vaccinated.

*"I was hoping that I will not get the flu, otherwise I will just spread it throughout everybody you know, in my family and friends or whatever."* (S05, acceptor)

*“Old folks falling sick isn’t a good thing. Because you know kids all go out la, then also not live together ah, when we fall sick it is a very troublesome issue...” (S10, defaulter)*

**Encouragement from friends and family** was cited by 4 participants as motivating factors for vaccination.

*“Because my daughter is a nurse manager...so she always wants us to go and take this vaccine because she also scared the hospital...we will get some germs and flu ah.” (S10, defaulter)*

*“Sometimes listen from friends, why not you go take the flu injection like that...he said they take already better...told me to go and take...” (S06, defaulter)*

Beyond just the initial encouragement, family and friends also helped to remind participants to have annual vaccination.

*“Like there was one year I forgot, didn’t take then later on my daughter reminded me, see that I have flu so asked me to go and take again lor.” (S11, acceptor)*

**Self-reassurance.** For 1 acceptor, getting vaccinated served to provide reassurance that efforts have been taken to protect her family and herself with the awareness that it is not a full-proof protection.

*“I mean of course la, life you don’t know alright, where you take care also if it’s in there it’s in there in the body. But if you have some sort of protection maybe can prolong, then if anything happens you have no regret. That’s why I am doing this.” (S09 acceptor)*

### 3.3. Reasons why people chose not to take influenza vaccination

**Perceived lack of vulnerability.** Seven refusers and defaulters cited being not vulnerable to influenza as a reason for not having the vaccine. Most felt they were not vulnerable because they seldom got influenza. This was reinforced by previous encounters with mild episodes of influenza.

*“Right now, I don’t even get the flu... one or two years didn’t get the flu.” (S04, refuser)*

*“Cause so far I got no problem with the flu ah. Little thing like that, sometimes I don’t need to take medicine...after that [the flu] I feel okay.” (S08, refuser)*

**Lack of experience with influenza** also caused participants to not pay much attention to the need for vaccination.

*“Sometimes in health, unless you are affected then you start having second thoughts...but so far I have been spared from this...never had the opportunity of influenza...or something like that” (S03, refuser)*

**Trivialisation of influenza.** Five participants felt, from their own experiences, that influenza is not a serious illness which warranted a vaccine. One refuser compared influenza to malignancies to reinforce its perceived low severity.

*“Well so far I see ah, flu is a...small sickness ah. Just a flu achoo achoo that’s all...” (S08, refuser)*

*“Neither have I heard of any news coming into my ears to say oh so and so...died of influenza, no. Of cancer or leukaemia or other serious illnesses yes...but not influenza.” (S03, refuser)*

**Vaccine not necessary.** Some participants felt it was not necessary for them to get vaccinated, as they observed low vaccine uptake rates around them.

*“...a lot of people not taking, as far as I know not very popular...So I think, I don’t think it is necessary.” (S01, defaulter)*

**Fear of side effects.** 4 out of 6 refusers felt that vaccines could not be trusted due to side effects. Some were worried that it could affect their ability to work.

*“Your injection will make hand ah, cannot carry everything... Because you injection, I cannot working two [or] three days.” (S02, refuser)*

Others did not want to trouble their children in case there are negative effects from the vaccine.

*“Whether it is good or not to take this injection must clarify...if it is bad for me then I am in trouble. She is working and I am alone at home, I have no money to hire a maid leh.” (S13, refuser)*

**Issue of priorities.** Participants cited more pressing issues that took precedence over influenza vaccination. 3 refusers mentioned that other chronic health problems deserved their attention over influenza.

*“Because for a long time I didn’t get the flu. I have leg pain and most of the time just care about the leg. I went to find Chinese physician to take acupuncture, go for physiotherapy...” (S04, refuser)*

*“My problem now ah, I got this thyroid ah and mild stroke. That’s all. Flu so far nothing till now.” (S08, refuser)*

Another participant felt that heavy work commitments were a barrier to being vaccinated.

*“Aiyo too busy already, working ah no time...you know I at that place at the canteen selling food ma...Saturday Sunday if not working have to go and buy ingredients...” (S10, defaulter)*

**Lack of encouragement.** For 3 refusers and 2 defaulters, a lack of encouragement from healthcare workers and family members was a reason why they did not have the vaccine.

*“Nobody has sort of err recommended that to me, whether medical personnel or be it friends...I didn’t see the need for it.” (S03, refuser)*

*“Actually it isn’t a very difficult thing to do...it’s just whether there is anyone to encourage you, to always be in your ear nagging, it’s really an important thing.” (S10, defaulter)*

**Fear of injections** due to pain or bleeding was also a reason for not getting vaccinated.

*“Like that poke in, aiyo...very pain one I scared, my entire body will jump. Blood come out, eeyer I am most afraid one.” (S13, refuser)*

**Perceived inevitability of illness in old age** led 1 refuser to think that there is no urgency to get vaccinated.

*“Mm wait until we get it, then take [the vaccine]. At our age, we may have a lot of illnesses, it can’t be helped. Ahh senile or what...old age diseases a lot ma.” (S04, refuser)*

**Fatalism.** For another refuser, the belief in predestination made him less likely to seek protection from influenza.

*“If you talk about death ah...anything can [cause] death...not because of flu. Cause death, life ah is in the hands of god, even if Bruce Lee, you see very strong, died in the sleep.” (S08, refuser)*

### 3.4. Role of healthcare workers in decision to vaccinate

Healthcare workers play a major role in participants’ decision to have influenza vaccines. There was evidence of healthcare workers influence in the decision-making for 11 out of 15 participants interviewed. With the exception of 1 refuser, all others felt that

prompts from healthcare workers, especially doctors, would have persuaded them to have the vaccine. In these refusers, the trust in doctor's advice outweighed their initial reservations about having the vaccine.

*"...if I consult with the doctor, the doctor say you got this problem, you have to [take the vaccine], then I will follow his instructions la." (S08, refuser)*

*"If doctor says it you must listen to him...if you want to be healthy then you should take." (S07, refuser)*

In the case of the 1 refuser who would not have the vaccine even if prompted to do so by the doctor, there was a mistrust in the doctor's advice.

*"I dare not because...sometimes ah doctor right, sometimes wrong one." (S02, refuser)*

Encouragement from both doctors and nurses, was cited by 4 out of 6 acceptors as a reason for having the influenza vaccine. In 2 cases, participants were encouraged by healthcare workers to be vaccinated before they travelled.

*"You want to go holiday doctor say la, two weeks before you go, you must take injection." (S15, acceptor)*

Prewarning from healthcare workers helped some participants to cope with side effects from the vaccine.

*"...they say now you take you go home, tomorrow, if there is fever for a while it is okay, for one or two days like that...then after I took it I got fever lor, but I know one or two days can recover already, then it is okay...Doctor and nurse say like that, and it is correct." (S11, acceptor)*

However, healthcare workers can also have an unintended negative impact on vaccine uptake. Three refusers took the lack of advice from doctors as an indication that they do not need to have the vaccine.

*"Doctor also didn't recommend ah...we all don't know. What the doctor recommends is what we will do ah." (S04, refuser)*

### 3.5. Ambivalence towards uptake of vaccine

Nearly all participants interviewed, with the exception of 1 refuser and 1 acceptor, expressed mixed ideas toward vaccination. It was highly evident that participants were not fully fixed in their thinking and had reasons both for and against the vaccine, albeit with one more than the other.

For refusers, advice from doctors and encouragement by family members were reasons that would persuade them to have the vaccine. In the case of 1 refuser, just being interviewed about the topic of influenza vaccine was sufficient to persuade him to change his stance on vaccination.

*"...err this question of influenza has not been bought up very strongly. And we have taken it lightly la, but now that you all are doing interviews and things like that, it's about time la you know." (S03, refuser)*

In the case of some acceptors, travel and a perceived vulnerability encouraged uptake of the vaccine but there was also expressed fear that taking the vaccine too often may weaken natural immunity.

*"Because we take a jab and we are now relying on third party immunity...our own body immune system may not function well...there could be side effects we do not know of..." (S14, acceptor)*

### 3.6. Common misconceptions

Misconceptions of influenza vaccines were common and impacted on past and future decision to have the vaccine.

**Vaccines only needed before travel.** Four participants felt vaccination was necessary only when they travel as there was little risk of locally acquired influenza. This meant that their vaccination status was linked to how recently they last travelled.

*"maybe when I travel yes as a precaution because other countries I do not know the conditions, but local no. If I am staying in Singapore I will not take..." (S14, acceptor)*

*"I would say I won't, because I have no issue, take what injection, I am also not going overseas." (S007, refuser)*

*"Not necessary...because we seldom travel to those countries again." (S01, Defaulter)*

**Interval for vaccination.** Even acceptors had misconceptions of how often they needed the influenza vaccine. This meant that some acceptors that were vaccinated recently, were likely to default in getting vaccinated the following season.

*"Before almost every year, but now they have started two years once I think..." (S12, acceptor)*

Some also found it difficult to keep track of their vaccination schedules.

*"I tend to forget, you know one year is a long time. You forget when you took it, things like that." (S05, acceptor)*

**Vaccine as a cure.** Some participants also saw vaccine as a cure instead of a preventive tool, hence would have the vaccine only when they were feeling symptoms of influenza.

*"if my body feeling unwell then I go take, if feeling well then no need lor." (S06, defaulter)*

*"If nothing wrong, go and take for what..." (S13, refuser)*

**Not suitable for vaccine.** There were also misconceptions among some refusers that due to age, their bodies were not suitable for the vaccine when in actual fact it is even more necessary for them.

*"I cannot do injection because...my body not very strong...like you young is okay la" (S02 refuser)*

**Confusion between medicine or pills.** One refuser also had the misconception that antibiotics could replace the need to have the influenza vaccine.

*"Because I eat those antibiotics, doctor give me...eat already won't get flu right?" (S04, refuser)*

**Alternative management.** Two participants felt that proper lifestyle and diet were able to replace the need for protection by influenza vaccines.

*"I don't eat spicy food, don't drink soft drinks...so I never take the injection before. If anyhow eat...then need to take the injection" (S13, refuser)*

## 4. Discussion

### 4.1. Summary of main findings

This study explored common barriers and motivators for influenza vaccine uptake. Perceived vulnerability to influenza and trust in vaccine efficacy were strong motivators while favourable vaccination experience and reminders from loved ones appeared to



encourage sustained vaccine uptake. Misconceptions were often barriers to vaccine uptake with many thinking the vaccine was only needed if they were travelling outside the country or was to be used as a cure for after they had fallen sick. Others feared that their ageing bodies would not tolerate the vaccine. The perception of flu as a trivial illness and fear of adverse effects from vaccination were common barriers. Most participants showed some ambivalence, giving reasons both for and against vaccine uptake, reflecting a potential for change in their stance towards vaccination in the future. Nearly all refusers expressed that advice from healthcare workers would have persuaded them to take the vaccine, whilst an absence of advice from health care workers reinforced the patient's impression that vaccination was not necessary.

#### 4.2. Strength and limitations of this work

This study purposefully sampled participants in a primary care setting, where vaccination is performed and initiatives to promote vaccine uptake are usually implemented. Recruitment and interviews were done on-the-spot; hence participants were not able to pre-rationalise their reasoning for refusing vaccination, allowing the interviewer to collect the most pertinent thoughts in participants' minds.

While the study was restricted to English and Mandarin speaking participants due to lack of resources to employ interviewers fluent in other languages, this limitation also allowed the interviewer to explore more thoroughly the attitudes and perception of this group.

Using self-reporting to ascertain the history of influenza vaccine uptake may be subject to recall bias. However, previous studies confirm that self-reporting can be an accurate way of assessing vaccine status in an older population [12,13]. Also, the semi-structured nature of the interview schedule enabled the interviewer to ask participants to elaborate on and confirm their vaccination history to ensure internal consistency. During the interview, whenever a new barrier or motivator was mentioned, participants are questioned further on how it impacted on their decisions about vaccine uptake.

Qualitative research studies a specific issue in a certain population or ethnic group, in a particular context. Hence generalizability of qualitative research findings is not usually an expected attribute, but findings may be transferable where there are similarities in time, place, people and other social contexts.

#### 4.3. Comparing with other studies

This study identified novel and previously unrecognized issues as well as confirm previous observations. Comparing with other local studies on attitudes and knowledge of influenza vaccines, it is evident that poor understanding and misconceptions are also prevalent in other target groups, such as people with diabetes and healthcare workers [5,14]. Some confused Avian flu with seasonal flu while others magnified side effects of the vaccine. Concerns over the vaccine's efficacy, perceived lack of vulnerability, fear of side effects, and a perception that vaccines are not necessary were common barriers to vaccination that were also reflected in our data from older adults [5,14]. The important role of advice from healthcare workers to improve vaccine uptake is consistent with work looking at diabetic patients and parents of pre-school children [13,14].

Overseas studies conducted on older adult populations show similar barriers to vaccination such as lack of perceived susceptibility, fear of adverse events, mistrust of vaccines and impression that influenza is not serious [15–17]. Reminders from healthcare workers were shown to be effective in increasing vaccine uptake rate among the older adults [18].

However, this study identified several previously undocumented barriers and facilitators to vaccination in older people. Most widely held was that vaccine was only necessary in preparation for travelling out of country. This misconception is possibly due to participants' misinterpretation of local recommendations for influenza vaccine before travel [19,20]. Participants may also have been influenced by previous outbreaks of H1N1 in 2009 and Severe Acute Respiratory Syndrome (SARS) in 2002 where national prevention controls targeted returning travellers using thermal scanners at checkpoints and screening for respiratory symptoms [21,22]. Even today, travel history remains part of the initial registration process for a consultation at any of the polyclinics nationwide.

The importance of the family unit in decision making also featured prominently in discussion. Participants valued encouragement from their loved ones and wanted to protect their family and friends from influenza. Others were fearful of troubling their children in case of adverse effects from the vaccine. Consideration of the family may be attributed to traditional values of Confucianism among our older adults, values which prioritises one's relationship with others, especially family members, and where illness is an event involving the entire family and not just the individual [23].

There were two further novel findings; both the prioritization of chronic health problems and the absence of healthcare workers advice appeared to act as deterrents of vaccination uptake. Participants cited chronic ailments, such as knee pain, were more deserving of their attention than flu prevention. This observation is of particular importance given the high prevalence of chronic disease and multi-morbidity in this age group, together with a poor understanding of the potential complications of influenza. Participants also expressed how the absence of advice from healthcare workers was interpreted as supporting their personal views that vaccination is not important, this illustrates the power of the unsaid. The importance of healthcare workers positively and directly encouraging vaccine uptake is evidenced in other studies [24,25], but the impact of an absence of advice discouraging participants from vaccine uptake has not been commented on previously.

#### 4.4. Implications for health promotion initiatives and clinical practice

The findings identified common barriers and motivators informing older adult's decisions on influenza vaccination. These may be helpful in future public health education and also to educate healthcare workers in encouraging vaccine uptake. Government policies are largely focusing towards reducing the cost of influenza vaccines for patients. Medisave, a national medical savings scheme which helps individuals put aside part of their monthly income into a medical-focused savings account to meet future healthcare needs, has been allowed as a payment method for influenza vaccination in older adults [26]. The Community Health Assistance Scheme is also available for lower to middle income individuals to subsidise the cost. Pre-discharge vaccination programs are also offered in some hospitals, with the vaccination charges included as part of the patients' hospital bills [27]. While it is useful to manage cost, this was not cited as a reason for older adults to refuse vaccination in this study.

The interview findings suggest that an effective strategy to improve vaccine uptake should include older adult targeted education programs about vulnerability to flu regardless of their own past experience or likelihood of overseas travel. Influenza needs to be portrayed as a potentially serious illness for the older adults. This could be achieved with examples of individuals who have suffered complications from influenza, since a lack of encounter with serious episodes of influenza within one's social circle had been

cited as a reason for trivialising flu. Furthermore, care should be taken to emphasize that side effects following vaccination are often mild, hence unlikely to affect activities of daily living. The introduction of an annual reminder system could prompt those who have received influenza vaccine to return for their yearly vaccination. This may be useful for older adults whose family members or caregivers lack time and attention to keep track of their vaccination schedule.

It is recommended that these educational programs are supplemented by cues from healthcare workers to encourage patients to have the influenza vaccine, given the high regard participants accorded to advice from healthcare workers. Not only are interventions needed for patients, but additional training of healthcare workers may be valuable as a recent study in Singapore identified how local healthcare workers did not trust the evidence for influenza vaccination and doubted its relevance to the local context [28]. A widely-disseminated, locally-compiled synthesis addressing specific concerns of hesitant healthcare workers was recommended.

## 5. Conclusion

This study explored the barriers and motivators influencing older adult's decisions about influenza vaccination. The contributing factors were many, extending beyond the individual to family, friends and healthcare workers. One of the novel findings was the misconception of vaccination being only a travel precaution. Most respondents shared some ambivalence giving reasons both for and against uptake. Whilst being receptive to recommendations from health care professionals, the absence of advice was interpreted as implying vaccination was unnecessary. Professionals and patients could benefit from annual prompts if uptake is to be increased and sustained amongst vulnerable older adults.

## Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

## Acknowledgements

We would like to thank respondents for their participation in this study as well as staff from Geylang Polyclinic and NHGP Clinical Research Unit for their support with study organization and recruitment. A special thanks to Professor Tham Kum Ying from Lee Kong Chian School of Medicine for her guidance in the study design.

## Funding

We wish to acknowledge the funding for this project from Nanyang Technological University under the Undergraduate Research Experience on Campus (URECA) programme.

## Ethics committee

The study was approved by Domain Specific Review Board (DSRB) of National Healthcare Group (NHG). [2017/01164]

## References

- [1] Ministry of Health Singapore. Diseases and conditions-influenza. [https://www.moh.gov.sg/content/moh\\_web/home/diseases\\_and\\_conditions/i/influenza.html](https://www.moh.gov.sg/content/moh_web/home/diseases_and_conditions/i/influenza.html) [updated July 28, 2010; accessed June 7th 2018].
- [2] Ang LW, Cutter J, James L, Goh KT. Factors associated with influenza vaccine uptake in older adults living in the community in Singapore. *Epidemiol Infect* 2016;145(4):775–86. <https://doi.org/10.1017/S0950268816002491>.
- [3] Ang LW, Lim C, Lee V, et al. Influenza-associated hospitalizations, Singapore, 2004–2008 and 2010–2012. *Emerg Infect Dis* 2014;20(10):1652–60. <https://doi.org/10.3201/eid2010.131768>.
- [4] OECD 2019. Influenza vaccination rates indicator. <https://doi.org/10.1787/e452582e-en> [accessed on 17 August 2019].
- [5] Angela C, Stefan M, Ling AE, Chew SK. Influenza-associated deaths in tropical Singapore. *Emerg Infect Dis* 2006;12(1):114–21. <https://doi.org/10.3201/eid1201.050826>.
- [6] Tan EK, Lim LH, Teoh YL, Ong G, Bock HL. Influenza and seasonal influenza vaccination among diabetics in Singapore: knowledge, attitudes and practices. *Singapore Med J*. 2010;51(8):623–30. Available from <http://smj.sma.org.sg/5108/5108a1.pdf>.
- [7] National Population and Talent Division. Strategy Group. Prime Minister's Office. Older Singaporeans to double by 2030. Available from: <https://www.population.sg/articles/older-singaporeans-to-double-by-2030>.
- [8] Nichol KL, Nordin JD, Nelson DB, Mullooly JP, Hak E. Effectiveness of influenza vaccine in the community-dwelling elderly. *N Engl J med*. 2007;357(14):1373–81. <https://doi.org/10.1056/NEJMoa070844>.
- [9] Lang PO, Mendes A, Socquet J, Assir N, Govind S, Aspinall R. Effectiveness of influenza vaccine in aging and older adults: comprehensive analysis of the evidence. *Clin Interv Ag* 2012;7:55–64. <https://doi.org/10.2147/CIA.S25215>.
- [10] Goh, C.N., Cindy, C., Alvin, C., Sabrina, L. An evolving primary care ecosystem. Annual report FY 2015. National Healthcare Group Polyclinics. Available from: [https://www.nhgp.com.sg/uploadedFiles/About\\_Us/AnnualReport\\_LowRes\\_ForWeb.pdf](https://www.nhgp.com.sg/uploadedFiles/About_Us/AnnualReport_LowRes_ForWeb.pdf) [accessed 31st March 2018].
- [11] Malterud K, Siersma VD, Guassora AD. Sample size in qualitative interview studies: guided by information power. *Sage J*. 2016;26(13):1753–60. <https://doi.org/10.1177/1049732315617444>.
- [12] Mac R, Baken L, Nelson A, Nichol KL. Validation of self-report of influenza and pneumococcal vaccination status in elderly outpatients. *Am J Prev Med*. 1999;16(3):173–7. [https://doi.org/10.1016/S0749-3797\(98\)00159-7](https://doi.org/10.1016/S0749-3797(98)00159-7).
- [13] Zemmerman RK, Raymund M, Janosky JE, Norwalk MP, Fine MJ. Sensitivity and specificity of patient self-report of influenza and pneumococcal polysaccharide vaccinations among elderly outpatients in diverse patient care strata. *Vaccine*. 2003;21(13–14):1486–91. [https://doi.org/10.1016/S0264-410X\(02\)00700-4](https://doi.org/10.1016/S0264-410X(02)00700-4).
- [14] Low MSF, Tan H, Hartman M, Tam CC, Hoo C, et al. Parental perceptions of childhood seasonal influenza vaccination in Singapore: a cross-sectional survey. *Vaccine*. 2017;35(45):6096–102. <https://doi.org/10.1016/j.vaccine.2017.09.060>.
- [15] Santos AJ, Kislaya I, Machado A, Nunes B. Beliefs and attitudes towards the influenza vaccine in high-risk individuals. *Epidemiol Infect* 2017;145(9):1786–96. <https://doi.org/10.1017/S0950268817000814>.
- [16] Weir R, Brunton C, Jennings L, Sith L, Litt J. Knowledge and attitudes about influenza vaccination: a New Zealand study of primary care practitioners and elderly people. *Int Cong Ser* 2004;2004(1263):276–80. <https://doi.org/10.1016/j.ics.2004.02.122>.
- [17] Cornford CS, Morgan M. Elderly people's beliefs about influenza vaccination. *Br J Gen Pract* 1999;49(441):281–4. PMID: 10736905.
- [18] Frank JW, Henderson M, McMurray L. Influenza vaccination in the elderly: 1. Determinants of acceptance. *Can Med Assoc J* 1985;132(4):371–5. PMID: 3971253.
- [19] Health Hub Singapore. Start your year-end vacation with a flu jab. <https://www.healthhub.sg/live-healthy/1837/start-your-year-end-vacation-with-a-flu-jab> [updated 23 Nov 2017; accessed 22 June 2018].
- [20] Ministry of Health Singapore. Public advisory on influenza. [https://www.moh.gov.sg/content/moh\\_web/home/pressRoom/pressRoomItem\\_Release/2005/public\\_advisory\\_on\\_influenza.html](https://www.moh.gov.sg/content/moh_web/home/pressRoom/pressRoomItem_Release/2005/public_advisory_on_influenza.html) [updated 25 Oct 2005; accessed 22 June 2018].
- [21] Yee SL, David CL, Timothy B, Prabha K, Eillyne S, Angela C. Pandemic (H1N1) 2009 surveillance and prevalence of seasonal influenza, Singapore. *Emerg Infect Dis* 2010;16(1):103–5. <https://doi.org/10.3201/eid1601.091164>.
- [22] Annelies WS. The severe acute respiratory syndrome: impact on travel and tourism. *Travel Med Infect Dis* 2016;4(2):52–60. <https://doi.org/10.1016/j.tmaid.2005.04.004>.
- [23] Marc HZJ, Lalit K, Radha K, Alethea YCP. Chinese familial tradition and western influence: a case study in singapore on decision making at the end of life. *J Pain Symptom Manage* 2010;40(6):932–7. <https://doi.org/10.1016/j.jpainsymman.2010.06.010>.
- [24] Song Y, Zhang T, Chen L, Yi B, Hao X, Zhou S, et al. Increasing seasonal influenza vaccination among high risk groups in China: do community healthcare workers have a role to play? *Vaccine*. 2017;35(33):4060–3. <https://doi.org/10.1016/j.vaccine.2017.06.054>.
- [25] Yi B, Zhou S, Song Y, Chen E, Lao X, Cai J, et al. Innovations in adult influenza vaccination in China, 2014–2015: leveraging a chronic disease management system in a community-based intervention. *Human Vacc Immunotherap* 2018;14(4):947–51. <https://doi.org/10.1080/21645515.2017.1403704>.



- [26] Ministry of Health Singapore. MOH establishes National Adult Immunisation Schedule; Extends use of Medisave for Vaccines under the Schedule. [https://www.moh.gov.sg/content/moh\\_web/home/pressRoom/pressRoomItem\\_Release/2017/moh-establishes-national-adult-immunisation-schedule-extends-us.html](https://www.moh.gov.sg/content/moh_web/home/pressRoom/pressRoomItem_Release/2017/moh-establishes-national-adult-immunisation-schedule-extends-us.html) [updated Oct 21, 2017; accessed June 7, 2018].
- [27] Lim, P.L., Sia, B.Y., Lay, H.G. Bridging the gap: the pre-discharge vaccination (PDV) program at Tan Tock Seng Hospital, Singapore. *Research Gate*. October 2012. Available from: [https://www.researchgate.net/publication/267906583\\_Bridging\\_the\\_Gap\\_The\\_PreDischarge\\_Vaccination\\_PDV\\_Progr-am\\_at\\_Tan\\_Tock\\_Seng\\_Hospital\\_Singapore](https://www.researchgate.net/publication/267906583_Bridging_the_Gap_The_PreDischarge_Vaccination_PDV_Progr-am_at_Tan_Tock_Seng_Hospital_Singapore) [accessed 7th June 2018].
- [28] Sudaram N, Kathryn D, Chee FY, Koh CT, Sucitro S, et al. "I wouldn't really believe statistics" – challenges with influenza vaccine acceptance among healthcare workers in Singapore. *Vaccine* 2018;36(15):1996–2004. <https://doi.org/10.1016/j.vaccine.2018.02.102>.