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Research paper

Travel health seeking behaviours, masks, vaccines and outbreak awareness of Australian Chinese travellers visiting friends and relatives – Implications for control of COVID-19

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Abstract *Background:* The COVID-19 pandemic has highlighted the role of international travel in spreading infections. Travellers visiting friends and relatives (VFR) are at higher risk of acquiring infections than other travellers, therefore improving the travel health behaviour of these travellers is important. Ethnic Chinese are one of the largest migrant groups in many countries, yet there have been no published studies regarding this population as VFR travellers. We present findings of a study of Australian Chinese VFR travellers relevant to the pandemic response.

Methods: In 2013, five focus groups were conducted with Australian Chinese VFR travellers, exploring topics such as vaccines, face masks, outbreaks and travel health seeking behaviour. Participants were aged 18 years or older and had travelled to China for VFR purposes in the preceding 18 months. Sessions were recorded and transcribed, and thematic analysis was undertaken.

Results: Participants viewed VFR travel as low risk, and underestimated the risks associated with travelling during an outbreak. However, they were generally willing to receive pre-travel vaccination specifically for an outbreak, but not otherwise. Attitudes towards face masks and other infection control measures were mixed. Multiple factors influenced their travel health behaviour, including low risk awareness, misconceptions, and cultural barriers to seeking health care.

Conclusion: Our research found that Chinese VFR travellers undertake suboptimal precautions related to VFR travel, associated with an underestimation of risks. While they share many characteristics with other VFR travellers, unique cultural health beliefs should be taken into account when developing risk communication and educational interventions as part of a pandemic response.

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Highlights

- Health education for potential VFR travellers is important for a pandemic response.
 - Chinese VFR travellers often underestimated the risks of travelling during an outbreak.
 - They have mixed attitudes to face masks, vaccination and other preventive measures.
 - They share characteristics with other VFR travellers, but also have some unique views.
 - Culturally appropriate health education and addressing barriers to health care are needed.
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Introduction

The current COVID-19 pandemic has once again reminded us that international travel plays a central role in the rapid spread of epidemics around the world [1–4]. It is therefore of utmost importance that, before international air travel gradually returns to normal, measures are taken to mitigate the risks of spreading infections associated with such travel, especially since COVID-19 is unlikely to be globally eradicated before travel increases. Furthermore, border control measures such as screening for symptoms in travellers are unlikely to be effective for infections like COVID-19 [5], where there is a high likelihood of asymptomatic transmission [6,7]. Hence, there is an important role in ensuring that travellers take adequate precautions during their travel, to reduce the risk that they will be infected during their travel, and also potentially facilitate the spread of the virus.

Adequate pre-travel preparations and suitable precautionary behaviour during travel can reduce the risk of acquiring infectious diseases during travel [8]. Travellers visiting friends and relatives (VFR) are one important and often overlooked group of travellers in this context. A study found that only a minority of Australian GPs were aware that VFR travellers are a high risk group [9]. It is known that VFR travellers in general often do not undertake adequate pre-travel preparations [10–13]. A lack of knowledge of health risks and low rates of accessing pre-travel health services [10,14–16] contribute to low uptake of appropriate precautions [12,17]. Furthermore, VFR travellers also often reside in local family settings during travel, have prolonged close contact with the local population, have a prolonged duration of travel, and have eating habits similar to the local population [17–19]. All these factors place them at increased risk of acquiring infectious diseases during travel [18,20,21] which can in turn facilitate the global spread of infections [22,23].

While some aspects of VFR traveller behaviour have been found to be generalisable to VFR travellers of multiple ethnicities, each ethnic group also has culture-specific health behaviours, for example, the use of Chinese medicine among ethnic Chinese. Ethnic Chinese are one of the largest cultural groups in many Western countries, including Australia, and account for a substantial proportion of VFR travel in these countries [24]. However, data

remains lacking on the travel health knowledge, attitudes and practices of Chinese immigrants returning to visit friends and relatives. Therefore, we sought to better understand Australian Chinese VFR travellers and their travel health-related behaviours.

This article presents findings from a qualitative study of Australian Chinese VFR travellers, aiming to inform future educational interventions for this population. Although the study was not conducted specifically regarding a global pandemic context like COVID-19, many of its findings and their implications are highly relevant for informing the development of risk communication and educational interventions for this population in the context of the current pandemic.

Methods

Five focus groups, with a total of 51 participants, were conducted among Chinese VFR travellers in Sydney, Australia, in June 2013. Eligible participants were ethnic Chinese Australians living in Sydney, aged 18 years or older, who had travelled to mainland China or Hong Kong for the purpose of visiting friends or relatives in the previous 18 months. They were recruited via Chinese newspaper advertisements, shopfront advertisements, street recruiting and snowball sampling. Ethics approval was obtained from the University of New South Wales (reference number: 2012-7-40).

Focus groups were conducted mainly in English, but Cantonese and Mandarin were also used when required. A standard focus group guide, which was also used for another related study [25], was used for all groups. The focus group guide has been included in the appendix. Focus group discussions were recorded and then transcribed manually by two transcribers fluent in Mandarin and/or Cantonese. Prior to transcription, each participant was assigned a number, and participants were referred to only by their number throughout transcription and data analysis. Conversation in Cantonese or Mandarin was directly translated into English during the transcription. Random sections of the transcripts were checked for accuracy by a third transcriber. The transcripts were then analysed using a thematic analysis approach. The data were encoded into a structure of codes, with each code representing a theme or

an idea. The codes were derived through content analysis of the data; no pre-determined codes were used. Coding was conducted using nVivo 10 software. Coded data were then analysed and summarised.

Results

Participant characteristics

A total of 51 respondents participated in five focus groups. Participants had undertaken an average of 5.5 trips to China since migrating to Australia. The demographic characteristics of the focus group participants are presented in Table 1.

Risk perception and awareness of travel-associated infectious diseases

Participants generally believed that China was a low-risk destination for travel-associated infectious diseases and a number of reasons were given for this perception. Familiarity with the destination, including spending their childhood in China, was commonly perceived by participants.

I was born and grew up there, what is there to be scared about? ... There are 1.3 billion people in China, so it's not that bad a place that you can't have people living

there. (Participant 701, lived in Australia for less than 5 years)

However, even among participants who see travel to China as low risk for themselves, concern for the potential travel risks for children who did not grow up in China was raised by participants. One participant mentioned that they were worried about their son, and had previously consulted their GP to vaccinate him against hepatitis A and B before travelling to China.

Accompanying a low perception of risk was a low awareness of potential infectious disease risks during travel to China, including during travel to rural and regional areas. For example, although regions in southern China are endemic for dengue, and parts of China are endemic for vector-transmitted Japanese encephalitis [26], participants' general awareness and concern about vector-borne diseases was poor. Proffered responses to potential infectious risks in China did not include diseases endemic in many parts of China or with a higher incidence than in Australia, such as hand, foot and mouth disease, chikungunya, typhoid, or malaria [26]. However, some participants identified rural travel as posing a higher risk than travel to cities in China, including the perceived need to carry "a little bit more medicine" as preparation for rural travel. Few participants were concerned about sanitary conditions in rural areas.

Outbreak awareness and concern

Participants were generally concerned about outbreaks in China, whether they were planning to travel to China or not. Some participants said they worry about their relatives in China when outbreaks happen, and, in general, participants appeared more concerned about outbreaks than about other infectious risks during travel. Sources of information about disease outbreaks included Chinese newspapers and websites, and family and friends who live in China. Few participants would consult their GP for advice before travel when there is an outbreak.

Some participants did not perceive themselves to be at risk because of their behavioural patterns, or their beliefs in adequately reducing their risks through certain behavioural changes.

If we were to go out I'd wear masks, but it really isn't that big an issue. We're old anyway, it's not like we would go anywhere, we usually stay at home. The most we do is just to gather together with relatives or friends. (Participant 106, regarding a potential respiratory outbreak)

Another participant, when specifically asked, said they would not see a GP before VFR travel even if there was an avian influenza outbreak. Instead they "might eat healthily and do more exercise". Several other participants also mentioned similar ideas.

Opinions differed in the discussion of cancelling or changing travel plans in the event of an outbreak. Many participants stated that they would not cancel travel to China. Circumstances around the need to travel, such as visiting sick relatives, were considered by many participants in their decision not to cancel travel during an

Table 1 Focus group participant demographics (N = 51).

Characteristic	Number (n)	Percentage (%)
Age (years)		
18–44	10	20
45–54	13	25
55–64	14	27
≥65	14	27
Gender		
Male	13	25
Female	34	67
Not reported ^a	4	8
Highest completed education		
School certificate or equivalent	2	4
High school certificate or equivalent	12	24
Certificate/diploma	13	25
University degree	22	43
Not reported ^a	2	4
Employment status		
Not employed or retired	31	61
Full-time or self-employed	11	22
Casual and part-time	6	12
Not reported ^a	3	6
Length of residence in Australia		
Less than 5 years	10	20
5–10 years	8	16
More than 10 years	32	63
Not reported ^a	1	2

^a The information in this table is derived from a demographics form that all participants completed. 'Not Reported' means the participant did not answer that question.

outbreak. Otherwise, the decision to cancel the trip or not may depend on the severity of the outbreak or the level of perceived risk. Some participants would only cancel non-essential travel when they perceived the outbreak to be severe. However, the risks of both actual and potential travel during outbreaks were often underestimated by participants. One participant described their travel to China during the Severe Acute Respiratory Syndrome (SARS) pandemic. Information from Chinese relatives prior to travel described life as normal in China and a perception that the risk was not serious. The seriousness of the outbreak was only discovered after returning to Australia.

Seeking pre-travel health advice

Few participants reported seeing a health professional before any of their trips to China.

I never go to GP to ask information. (Participant 305)

I never did. Probably just by common sense, or visit the internet to see what's the common infection diseases at the moment. (Participant 302, when asked if they ever sought pre-travel health advice)

The majority reported that they instead sought travel health information from other sources, particularly family and friends in China and online news publications from China. The kind of information participants sought before they travelled mainly related to the weather and any major disease outbreaks, for example, avian influenza outbreaks.

Just check the internet. From local internet you can check what happens there. (Participant 102)

For example you want to go to the country, you want to know what happen, you can use the internet, the video, the news. Update the news, the recent news. (Participant 109)

Usually just look for (information from) friends. I will know myself what to prepare. (Participant 610)

Familiarity with the travel destination and perceptions that VFR travel to China carried negligible health risks were important factors in participants' perception that pre-travel health preparation and seeking advice from a travel health provider on minimising infectious disease risks were not necessary. In contrast, many participants said they would seek pre-travel health advice if they were to travel to other developing countries.

Participants expressed a range of views on the need for pre-travel advice from a medical professional. There was a perception among many participants that if you are not sick, you do not need to see a doctor, or that there is no point in seeing a doctor for travel. On the other hand, a minority of participants had consulted a GP for one or more of their previous trips to China, including several participants who did so before every trip. Participants who consulted a GP before trips to China, either for some or all

trips, tended to be female, had tertiary education and had migrated to Australia 10 or more years ago. Reasons provided for consulting their GP before travel included vaccination, the need for prescription medications and a perception of a change in their immunity after an extended residence in Australia. Some also reported obtaining a prescription from their GP in case they needed to use it in China.

I scared to go get the medicine from when I travel, I always ask my GP to write the prescription so I could bring it back there to get it. (Participant 710)

I think from my knowledge or experience, for those who have been in this country for long, normally aware because our immune system is different, we've been in this country for so long, we're not used to those environment, that kind of environment, so the chance of getting any sickness is higher than here. (Participant 711, lived in Australia for more than 10 years)

I guess being healthy is very important, and before I going to China it's necessary to avoid disease or illness in China, so I guess I will seek some advice from the professional doctor. (Participant 703)

Only one participant was aware of the availability of specialist travel health clinics. After receiving information on the activities of travel clinics, many participants were interested. However, the cost associated with clinic visits remained a major concern for many participants and many were reluctant to use them for future trips to China.

Vaccination

Participants generally felt that vaccination was not specifically needed for travel to China and many had never received a vaccine for the purpose of protecting against travel-associated diseases. However, many participants were willing to receive a vaccine during an outbreak to protect them against the disease involved. One participant said they had a hepatitis B vaccine before going to China 3 years ago because there was a hepatitis B outbreak, and another had an influenza vaccine before their trip because there was an influenza outbreak. Some participants would be willing to receive a vaccine during serious outbreaks, even if they otherwise would not consider vaccinations for travel. For example, one participant said they would in general refuse vaccines recommended by their GP for travel because they were worried about vaccine safety, but when asked specifically about whether they would have had a SARS vaccine during the pandemic if there had been one, they said they would.

Apart from vaccines specifically for an outbreak illness, when asked if they would be willing to receive a vaccine for travel if recommended by their doctor, many participants said it would depend on other factors, including the seriousness of the condition, vaccine side effects and safety; others were not willing to receive travel vaccines at all.

If you're not sick you don't need the vaccination. (Participant 101)

I wouldn't really go for vaccines because I think I'm healthy. (Participant 616)

Other barriers to low uptake of pre-travel vaccination included the lack of recommendations from their GP, not having enough time to obtain such vaccinations for those travelling on short notice, and fear of allergies to vaccines affecting their ability to travel.

A few participants did assess their vaccination status prior to travel. As a consequence of the focus group discussion, several other participants have also indicated that they may ask their GP about vaccinations before their next trip. Several participants also reported a habit of getting their yearly influenza vaccines before travel. Such participants tended to be older.

Many participants demonstrated significant misconceptions about vaccination in general. Several participants thought that if they were healthy or had a strong immune system they did not need to get vaccinated, or that getting vaccinated too often would adversely affect the immune system. Some participants also had misunderstandings about particular vaccines. For example, one participant thought the influenza vaccine offers protection for SARS as well. Some participants felt that they were not well-informed about vaccines in general.

Respiratory illness and face masks

Respiratory illness was a major health concern during travel to China. For the participants, the issue of respiratory illness included both respiratory infections and the problem of pollution in China's major cities, and the two issues were considered collectively. Participants who had experienced symptoms of upper respiratory discomfort in their previous trips to China were unsure whether the cause was an infection or pollution. Some participants also attributed symptoms such as headaches and sore throat to the poor air quality in China.

When we go to China we are not used to the air quality, so you get sick. If you live there longer, like one month, two months, you get used to it, so everything still fine. (Participant 102)

Some participants reported they got an upper respiratory infection every time they returned to China. One participant from Hong Kong thought that there was a higher risk of getting influenza in mainland China than in Hong Kong. Some participants believed that 'keeping healthy' (i.e. maintaining good general health by sleeping well, eating well and exercising) can prevent regular respiratory infections.

Participants frequently associated respiratory infections with crowded areas. China is a very populous country, and many participants reported visiting crowded areas during their trips, including shopping centres. Although some participants mentioned avoiding crowded areas as a possible way to reduce the risk of respiratory infections, it

was mentioned that in Hong Kong this was difficult because 'everywhere is crowded'.

Participants had mixed attitudes to face masks as a method of reducing the risk of acquiring respiratory infections. Several reasons were given for the use of face masks, including poor air quality, cold weather and outbreaks of respiratory infections. Others preferred not to use masks because they look "weird" or were uncomfortable but noted that wearing masks in public was more socially acceptable in China than in Australia.

Most participants were willing to wear masks during outbreaks of infectious diseases, including many of those who would not wear masks outside the context of an outbreak. One participant said they carry masks in their luggage when they travel to China in case of an outbreak. Another participant said they took masks with them wherever they went when they were in China during the SARS pandemic.

We did it when SARS was going on, when we travelled. (Participant 101, when asked whether they had ever worn a mask when in China)

Several other participants, however, were not convinced about the effectiveness of masks.

Generally, masks are useless. (Participant 107)

Some participants noted that they would not wear masks if nobody around them was wearing masks. However, they would be more likely to use masks if everyone around them also wore masks, for example, during an outbreak.

Travel activities and itineraries

A majority of participants reported staying with family and friends when in China, while some participants reported living in their own houses which they still owned.

It depends. Say you're with relatives, stay with the relatives, if travel you'll have to stay in hotel. (Participant 101, when asked where they would stay in China)

Participants commonly reported undertaking activities with family and friends during their visits, such as eating outside the family home and touring other parts of China, including both urban and rural areas.

Mainly visiting relatives and friends, and also touring around, sight-seeing. (Participant 302, when asked about activities they undertake when with family and friends in China)

Some participants said they would go to China for elective dental work because it is cheaper there, even if they were aware that hygienic standards of dentists in China may not be up to Australian standards.

I have a Chinese friend with a tooth problem, who flew back to China just to get his teeth done, and it was still cheaper than doing it here. (Participant 701)

Most participants reported no animal contact during their previous trips to China, apart from the animals being

sold in the wet markets. Visiting wet markets and food preparation were not commonly reported either.

Behavioural changes during outbreaks

Some, but not all, participants reported they would change their behaviour during trips where there was an outbreak. Participants said they would avoid crowded areas, be particularly vigilant about personal hygiene and washing hands, refrain from eating certain foods, or wear masks during an outbreak. Some participants also said they would consider not going out.

Actually, this time when we go to Shanghai, there's the period of chicken flu. So we were very careful, and many of our time stay at the hotel, and we meet our friends, our colleagues in the restaurant around the hotel. (Participant 103)

There was a common idea expressed by many participants that, during outbreaks, one should 'keep healthy' to prevent getting sick. When asked what 'keep healthy' means, one participant answered "sleep well, keep exercise, and don't [get] sick". Some other participants had similar views.

Participants also reported using or considering the use of traditional Chinese medicine to protect themselves against an outbreak. One participant said they would drink a Ban Lan Gen (Isatis root) drink to protect themselves against SARS.

Other findings

Many participants reported self-medicating, using both Chinese and Western medicine, for what they perceived to be minor illnesses. Some said they would take medications to China for use as part of their travel preparations. One participant said they took antibiotics, given to them by their son, before going to China. Another participant said they took some Chinese medicine before meals "to avoid food poisoning". Some participants also said they would purchase medicines in China and bring them to Australia to use. Mostly, this involved Chinese medicine but some participants bought antibiotics in China and brought them to Australia.

Food safety was a particular concern for many participants. Since participants spent a lot of time with family and friends, their eating habits and food choices were influenced by their family and friends. Participants reported that their family and friends in China would consciously choose restaurants they perceive to be lower risk for them. Participants were divided over whether it is safe to eat street food in China. Attitudes and practices related to street food appeared to be influenced by family and friends.

Discussion

We explored the travel health beliefs and practices of Chinese VFR travellers in the pre-pandemic era, and uncovered multiple potential targets for educational interventions, many of which are especially relevant in the

current context of COVID-19. Consistent with the published literature on VFR travellers in general [10,12,17,18,27], most participants in the focus groups rarely undertook travel health preparations for VFR travel, due to both multiple barriers to health care access and a generally low risk perception of VFR travel. Among focus group participants, there was a general perception of VFR travel as low risk which was due to multiple factors, including a perception of familiarity, knowledge deficits and misconceptions. Health promotion campaigns should highlight and explain that there are still substantial risks in VFR travel, even though they have lived in their country of origin for extended periods and are 'familiar' with the country. In the context of the COVID-19 pandemic, it is also essential to highlight the importance of seeking medical attention immediately if one experiences respiratory symptoms [28,29], and not just assume that it is due to the air quality.

Although participants were generally aware of outbreaks occurring in China during previous trips, some participants underestimated the risks such outbreaks posed to their personal health. Risk estimation was often dependent on advice from family and friends residing in China, and an overly relaxed attitude to an outbreak was sometimes taken, especially during phases where it appeared to be not so serious. This has important implications for an ongoing pandemic like COVID-19, where there are concerns of a probable second wave in many countries even as cases are on the decline [30–32]. Participants' sources of information about outbreaks include Chinese newspapers and websites, their general practitioner, and family and friends who live in China. This finding is consistent with a previous study conducted in the Netherlands and the UK which found that Chinese immigrants often sought information regarding emerging infectious diseases from family and friends and Chinese language media [33]. Informal sources of information may give an underestimated or inaccurate account of the risks associated with an outbreak. This becomes a particularly important concern for the many participants who rely solely on such information, and as a result undertake inadequate precautionary behaviours. Also of concern was the common belief that the risk for acquiring the infectious agent during an outbreak was low if they 'keep healthy' or used certain Chinese medicines.

Underestimating the risks or severity of an outbreak sometimes meant that participants undertook VFR travel for non-essential reasons, for example during the SARS outbreak, when according to WHO advice, they should have cancelled the trip. These findings correlate with the Australian Bureau of Statistics international departures data, which show that the decline in travel episodes during the SARS pandemic was lower for VFR travellers compared with business and holiday travellers [34]. It is crucial that travellers understand the importance of following the advice of authorities like the WHO and the Australian government to cancel non-essential travel during outbreaks. Educational interventions should be provided on going to potential VFR travellers to impress upon them the importance of cancelling all non-essential travel during the COVID-19 pandemic. Such education should raise awareness regarding the serious risks of travelling during an outbreak and the need to be careful about any outbreak even if it

seems contained and/or not severe, and to dispel misconceptions like 'keeping healthy' or taking Chinese medicine being adequate measures to prevent one from getting sick.

Many participants were willing to receive vaccination specifically for an outbreak or pandemic, which may be relevant for a future COVID-19 vaccine. Given that this study found some confusion about whether the influenza vaccine also prevents SARS, there is a real risk that some Chinese VFR travellers may mistake the influenza vaccine to be also effective for COVID-19, which could lead to a misguided sense of complacency. It is therefore important to proactively correct this misconception. On the other hand, where Chinese VFR travellers are aware that the influenza vaccine is not effective for preventing COVID-19, they may refuse to receive it, as among study participants, there was widespread reluctance to be vaccinated for VFR travel other than for outbreaks, due to a lack of perceived need, even among those in the high risk category due to their age. This is consistent with published quantitative studies which show that VFR travellers have low rates of accepting vaccination and complying with other prophylactic measures for travel, and compare unfavourably to other travellers in this regard [13,35–37]. Importantly and encouragingly, the vast majority of participants were not strongly anti-vaccination. Specific education on the benefits of vaccination prior to VFR travel, supported by evidence of vaccine efficacy and safety, are needed to address the problem of under-vaccination. Highlighting the benefits of influenza vaccination could still encourage its uptake, despite not being specifically protective for the current pandemic.

The study revealed the impact of social norms on willingness to wear masks, with participants not comfortable wearing a mask in settings where no-one else was wearing one. This finding is especially important in the context of recent reports of ethnic Chinese experiencing racially charged attacks in Australia and other Western countries while wearing masks [38,39], which could make them even more reluctant to go against social norms. Community-wide education on the importance of ensuring adequate self-protection during outbreaks, and the protection of others if infectious, despite societal concerns, appears to be needed. Among focus group participants, there were mixed attitudes towards face masks. In contrast, a survey conducted during the SARS pandemic in Hong Kong found that 75.8% of respondents were willing to wear a mask [40]. The focus groups were conducted shortly after the 2013H7N9 outbreak, which, unlike COVID-19, usually required contact with birds or poultry for infection [41]. The participants' mixed responses may be a reflection of their views regarding the then-current outbreak, and general attitudes towards masks during a pandemic like COVID-19 may differ. However, the selective uptake of preventative measures by VFR travellers is a concern. Because of their low risk perception, VFR travellers may be particularly prone to underestimating the risks posed by outbreaks.

This study found that cultural factors are important barriers that can prevent optimal travel health practices. A major factor in the failure of study participants to attend for pre-travel health consultations was a strong belief that there is no need to see a doctor if one is not sick. This may

reflect a lack of understanding among parts of the Chinese community in Australia about the role of healthcare providers in disease prevention in the Australian healthcare system. Furthermore, there was a widespread lack of awareness of specialist travel health clinics. This is consistent with published literature regarding VFR travellers in general, which reports very low rates of using travel health services [11,14]. Specialist travel health services are usually provided in English in Australia which creates a language barrier for some VFR travellers. Linguistic and cultural appropriateness is needed to improve access to and the effectiveness of health care for migrant groups [42–44]. This study also found that those who have lived for longer in Australia were more willing to seek professional pre-travel health advice. This is consistent with other studies showing that access to health services and preventive health care increases with increasing acculturation [45,46], and highlights the special importance of reaching out to newer migrants.

The use of complementary or alternative medicines for health issues was commonly raised by participants, including in the context of outbreaks. In particular, despite many participants having resided in Australia for more than 10 years, they commonly used Chinese medicine for both curative and preventive or health maintenance purposes. This shows their continued ties to Chinese culture despite acculturation, and highlights the need for culturally relevant educational interventions even for long-term migrants.

This study also found that Australian Chinese VFR travellers share many important characteristics with what is previously known about other VFR travellers, regarding their activities during travel. These include close and prolonged contact with the local population, consumption of food that is not often consumed by tourists, using local health and social facilities, and the potential for visits to remote destinations [12,17,19]. In this study, the context in which these factors arise was also explored. The influence of family and friends was found to be a major common factor behind all these behaviours. VFR travellers living with local families by definition have prolonged close contact with the local population, which is a known risk factor for acquiring many infections, including respiratory viruses like COVID-19. Furthermore, because the family and friends of VFR travellers are likely to generally have a lifestyle similar to the rest of the local population, VFR travellers spending a lot of time with family and friends would be expected to be more similar to the local population in terms of activities, the places they go and the food they eat compared with tourist travellers. They are therefore particularly exposed to diseases that may be circulating in the local population.

This was the first study of Chinese VFR travellers living in a Western country. The study found that Chinese VFR travellers share many issues with other VFR travellers, while it was also able to explore beliefs and behaviour that are specifically related to Chinese culture. Moreover, the use of qualitative methodology has allowed the in-depth exploration of how Chinese VFR travellers actually perceive various situations, and many potential enablers and barriers influencing appropriate travel health preparation were identified. Misconceptions and knowledge deficits were also

more thoroughly explored. This rich and in-depth information can inform the development of education interventions, and compliments the quantitative data on VFR traveller enablers and barriers. The focus groups were conducted in English, but participants could also converse in Cantonese or Mandarin if they wished to, which reduced the language barrier. During transcription, conversation was translated verbatim into English, and random sections of the transcripts were checked by a third transcriber, which ensured accuracy. Demographic information was collected from participants, who were found to have a reasonable diversity in age, educational background, and length of residence in Australia. Some participants did not provide all the demographic details requested, however the amount of missing data in each category was less than 10%. There were more female than male participants, which could have influenced the observation that participants who consulted a GP before travel tended to be female. However, most findings in this study were not observed to be associated with gender. Finally, the travel health behaviour of VFR travellers in the context of outbreaks has not been previously explored in detail. The in-depth focus on outbreak-related attitudes and behaviour in this study thus represents a novel contribution to the understanding of VFR travel health.

Conclusions

This research provides new insight into the travel health-related attitudes and practices of Chinese VFR travellers. In this population, multiple factors contribute to suboptimal pre-travel health preparations, with perceptions of low health risk being a recurring theme. Knowledge deficits and misconceptions were also identified in multiple areas. Chinese VFR travellers are generally well informed of the latest outbreaks, but some appear to underestimate the risks posed by an outbreak especially in the early stages, and may thus undertake non-essential travel during outbreaks. During VFR travel, their willingness to undertake preventive behaviours varied. Low risk perception, misconceptions and other issues need to be addressed to encourage proper preventive behaviour, including pandemic awareness and application of public health messages during pandemics [47,48]. While this research was not conducted specifically in relation to a pandemic situation like COVID-19, its findings are useful in informing educational interventions for Chinese VFR travellers as part of the ongoing pandemic response.

Ethics

The study was approved by the UNSW Medical and Community Human Research Ethics Advisory Panel (reference number: 2012-7-40).

Authorship statement

Tara Ma: Conceptualization; Methodology; Formal analysis; Investigation; Data Curation; Writing - Original Draft

Anita Heywood: Conceptualization; Methodology; Formal analysis; Investigation; Writing - Review & Editing; Supervision

Raina MacIntyre: Conceptualization; Methodology; Writing - Review & Editing; Supervision

Conflict of interest

TM has no conflict of interest to declare. AH has received funding to conduct investigator-driven research from GSK and Sanofi Pasteur unrelated to this manuscript. CRM receives funding from vaccine manufacturers GSK and CSL Biotherapies for investigator-driven research unrelated to this manuscript.

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Appendix A. Supplementary data

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