Perceptions of Hong Kong Chinese women toward influenza vaccination during pregnancy

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Highlights

- Healthy pregnant women did not perceive influenza as a serious disease.
- Influenza vaccination was perceived to have a higher risk than influenza infection.
- Women would receive the vaccine if there were substantial benefits for the baby.
- Vaccination recommendations from health care providers would encourage vaccination.

1. Introduction

Influenza is a viral infection that can cause substantial morbidity, mortality, and economic disruption [1]. Pregnant women are especially vulnerable to influenza-related complications. When compared with their non-pregnant peers, pregnant women at all gestational ages have an increased risk of hospitalization and mortality due to influenza infection [2-4]. Influenza vaccine is safe and effective for pregnant women and vaccination during pregnancy also protects newborns in the first six months of life [5]. There is no evidence of pregnancy complications or adverse fetal outcomes from maternal influenza vaccination [6]. Influenza vaccination is essential to reduce the impact of influenza infection among pregnant women, and the World Health Organization (WHO) has identified pregnant women as the highest priority group for seasonal influenza vaccination [7].

Despite scientific evidence on the benefits and safety of influenza vaccination during pregnancy, uptake in this group remains low in most developed countries. A recent review of 45 studies has shown that seasonal influenza vaccination rates ranged from 1.7% to 88.4% and A/H1N1 pandemic vaccination rates ranged from 6.2% to 85.7% [8]. The lowest rates reported were in Hong Kong, where uptake of the A/H1N1 pandemic vaccine among pregnant women was 6.2% [9] and seasonal influenza vaccine was only 1.7% in 2010-11 [10]. Furthermore, in Hong Kong, infants from 0 to 6 months of age have substantially higher hospital admission rates for influenza infection when compared with older children [11].

The issue of influenza vaccination during pregnancy has been investigated largely from a quantitative perspective, primarily through the use of cross-sectional surveys [8]. In comparison, we were able to locate only a small number of qualitative studies [12-19] that have explored pregnant women's perceptions of influenza vaccine during pregnancy. Four studies were conducted in the US [12-14], two in Australia [18, 19] and one in Morocco [17], while the other was conducted in Scotland with Scottish and Polish mothers [15]. Furthermore,

all but two studies [18, 19] were conducted during the A/H1N1 pandemic, which presented different contextual challenges than incorporating routine influenza vaccination into antenatal care. Population-specific research (i.e., Hong Kong Chinese women) about why women chose not to receive the influenza vaccine is minimal, and therefore this study fills an important gap. To effectively target the antenatal Chinese population, a better understanding of the decision-making process in this population, is essential for public health planning. The purpose of this study was to explore pregnant Chinese women's perceptions of the perceived threat of influenza infection, the risks and benefits of influenza vaccination, and their decision-making processes.

2. Methods

2.1 Study design

This study was conducted as a part of a larger multi-center, cross-sectional study aimed at identifying the predictors of influenza vaccine uptake among Hong Kong Chinese pregnant women [10]. Data collection was conducted from April to June 2011. For this component, a qualitative descriptive design was used to provide an in-depth exploration not possible with quantitative research. Interview data were collected by one member of the research team (CY), enhancing the reliability of the data and stability of the process [20]. The focus of the interviews was to encourage the expression of participants' personal views and therefore, we used an emic perspective throughout the data collection process [21].

2.2 Sample

Participants were recruited from a large teaching hospital in Hong Kong. The study hospital was one of eight public hospitals in Hong Kong that provide obstetric services. The hospital has more than 300 births per month. A purposeful sampling strategy was used to

obtain a broad selection of participants with a variety of socioeconomic and educational levels in the larger study sample. Participants were recruited using the following criteria: (1) 18 years of age or older, (2) Cantonese speaking, (3) Hong Kong residents, and (4) and recent birth of a live newborn. All participants were pregnant throughout the winter influenza season; thus, vaccination had been recommended. Participants were recruited using a face-to-face invitation and no compensation was provided for their participation. Recruitment continued until saturation was achieved [21].

2.3 Data collection

An author-created semi-structured interview guide with open-ended questions based on the components of the Health Belief Model (HBM) was used to collect the data [22]. Researchers have used the HBM to identify predictors of vaccination in various populations and ethnic groups [23, 24] and to qualitatively explore perceptions toward vaccination in various populations [14, 25]. A native Cantonese-speaker (CY) conducted the interviews during the participants' postpartum hospitalization. After the completion of each interview, the audio recording was reviewed several times to enable the researcher to fine-tune the interview guide for subsequent interviews. In this way, we were able to expand the depth of the data as the study progressed. Each interview lasted approximately 45 minutes and was audio-recorded with the participants' written permission.

2.4 Data analysis

To facilitate data analysis, the audio recordings were transcribed verbatim into English and crosschecked for accuracy. We used a 2-step thematic analysis process. First, the research team repeatedly reviewed each transcribed interview and then developed an open code list derived directly from the data to provide a greater opportunity for the participants' voices to

drive the analysis [26]. All relevant textual data were coded [20, 26, 27]. The second level of the analysis grouped the codes thematically using a process of contextualizing codes into conceptually similar and overarching themes [26]. We used a manual data management strategy as this is sufficient when the data set is not overly large and the aim is to 'map out broad categories of information' [28].

Ethical approval was obtained from the Institutional Review Board of the University of Hong Kong / Hong Kong West Cluster and informed written consent was obtained from all participants.

3. Results

A total of 40 new mothers were invited to participate and 32 agreed to be interviewed. Five women refused to participate and three were ineligible because they could not communicate in Cantonese. The characteristics of the participants are presented in Table 1. Most participants were over 30 years of age, and approximately one-third had a university degree. The majority was multiparous and worked full-time during pregnancy. Two (6.3%) participants had received the influenza vaccine during pregnancy. Following data analysis, three overarching themes emerged that captured the perceptions of the participants toward maternal influenza vaccination: perceived risks of influenza infection; perceived risks of influenza vaccination, and decision-making cues (Figure 1).

3.1. Theme 1 – Perceived risk of influenza infection

3.1.1. Influenza not a serious disease

Some participants perceived that influenza was not a serious disease, and they were not aware of the potential complications to themselves or the fetus. If infected with influenza, they

believed that they could readily manage it and that the doctor would prescribe medications with fewer side effects.

> *"As I am only pregnant for nine months, I'd rather not receive it. I believe that influenza is not a serious disease. I will probably just have a fever, and I can manage it by taking medications. I believe that when the doctor knows that I am pregnant, he will prescribe me a much milder drug."*

Also, some participants believed that influenza infection would be beneficial as it would provide protective antibodies. They were not aware of the potential harm to the fetus that could result from maternal influenza infection and febrile illnesses during pregnancy.

> *"I suppose I will have the antibodies after the infection. When I recover, I will pass the antibodies to my baby. . . . If I am infected I will visit the doctor as it is just a mild illness. No big deal!"*

3.1.2. Low perceived susceptibility

Many participants were unaware that pregnant women were a high-risk group when compared with non-pregnant women. Even when health care providers (HCP)s informed them of their vulnerability, some did not believe it.

> *"But I still thought like this . . . pregnant women have the same risk from influenza infection when compared with ordinary people."*

> *"The doctor did mention that pregnant women were one of the high-risk groups . . . but I have a strong belief that pregnant women are not."*

For participants who were aware and understood their vulnerability to influenza, they accepted vaccination because they feared the potential consequences for their fetus.

> *"In fact, I agree that pregnant women should belong to the high-risk group. If we get sick, . . . we have a fetus in our womb."*

Overall, participants did not feel that influenza was a sufficient enough threat to warrant vaccination during pregnancy. Although all participants were pregnant during the peak winter influenza season, some were unaware that it was the peak. They stated that they might have chosen to receive the vaccination if it was peak influenza season and when they felt threatened by people who were infected with influenza.

"If it was a time when the disease was so serious that made vaccination an absolute need. When the influenza infection is very prevalent, I think I may need the vaccination."

In contrast, a vaccinated participant received the vaccine because she noticed that influenza was very common and that many people around her were ill.

"The reason I received the vaccination was that I was pregnant during the peak flu season. . . . A lot of people in my office were sick. Many of my colleagues got a cold and the virus was so strong. People couldn't get well even after they had visited the doctor."

3.1.3. Personal immunity

Some participants believed that their immunity was sufficient to prevent them from catching influenza and were unaware that pregnancy was an immune-compromising condition that increased their vulnerability to infection.

"If I am not sick or if I am not physically unwell or weak, I won't choose to receive the flu vaccination . . . because I am healthy enough . . . and my immunity is okay . . . so I think I can avoid the flu. I am not weak or unhealthy or get sick easily . . . so there is no need for me to receive the vaccination."

Some participants were confused about the role of vaccines and immunity in preventing influenza and taking medications to treat the infection. Those who knew that there was no cure for influenza thought that to guard against infection, all they needed to do was to stay healthy. Participants felt that as they were healthy, personal immunity was sufficient, and vaccination was not necessary. Thus, some preferred relying solely on their healthy lifestyle practices and good hygiene to boost their immunity.

"When I was young. . . the doctor told us that there was no drug to cure the flu. It all depends on your immunity to fight against it. So, all along I have insisted on keeping my health status good enough to avoid getting the flu and also not to rely on drugs. . . . I seldom rely on vaccination and taking drugs. I do rely on drinking more water and exercising more."

3.2. Theme 2 – Perceived risk of influenza vaccination

3.2.1. Vaccine safety

While the perceived risks of influenza infection were low, the perceived risks of vaccination were high. Uncertainty about the vaccine's safety was a key obstacle to influenza vaccination. Although some participants realized that vaccination may not cause outcomes like abortion or miscarriage, they chose not to be vaccinated.

> *"After all, a vaccine is a type of medication. No matter how safe it is claimed to be, no one can guarantee that. Even though the professional people explain to me that it is safe, I believe that nothing in the world is absolutely 100% safe."*

Participants also feared the process of injecting a virus into their body, especially during pregnancy.

> *"According to what I know, I receive the vaccination, and I have received the virus, that's the rationale for receiving the flu vaccination. I am receiving the virus! I think it is not worth it! I don't have any illness and so why I have to inject the virus into my body?"*

Other participants believed that while injecting a virus into a non-pregnant woman might not cause any problems, it might have more serious effects on pregnant women and that reactions after vaccination also might be more serious in pregnant women.

> *"I'm not quite sure what ingredients the vaccine has and what the reactions are after the vaccination. Even if ordinary people don't have any problem after receiving it, pregnant women may be somewhat different, and that may cause problems to the fetus."*

Even if their HCP reassured them that influenza vaccine was safe and effective, a few participants still refused as they had concerns about the potential negative effects of the vaccine on the fetus.

3.2.2. Vaccine efficacy

Participants also reported doubts about the effectiveness of influenza vaccine because of the regular mutation of the virus and because the vaccine does not cover all influenza virus

sub-types. The regular antigenic drift of the virus contributed to the perception that the vaccine had low efficacy and thus the participants' unwillingness to be vaccinated.

> *"The doctor reinforced that the vaccine did not cover all types of viruses, and it was up to me to decide if I wanted to receive it. If it [the vaccine] does not cover all viruses, why should I bother to receive it?. . . . If it covers all [virus types] . . . it is fine to take the risk. But it does not cover all . . . and I still have to take the risk, it is silly to do so."*

3.3. Theme 3 – Decision-making cues

3.3.1. Benefits to baby

Many participants stated that a deciding factor about whether or not they chose to receive the vaccine was whether or not it was beneficial to their baby.

> *"To make a decision on whether I should receive influenza vaccination during pregnancy, I will make sure it is beneficial to enhance the immunity of my baby in the future.… if you confirm that there are data showing that the baby will have these antibodies after birth, I will get it right away."*

Since the majority of Hong Kong mothers only have one child, many participants stated that first-time mothers are especially nervous during pregnancy and would prefer not to do anything that could potentially pose even a minimal risk to the fetus. Accordingly, some participants would have received the vaccination if they could be guaranteed that there was no risk to the fetus and that the vaccine was beneficial to the baby.

> *"After the vaccination, if it will not cause any problem for the baby and there is no risk of abortion and . . . if the vaccine can induce immunization to the baby . . . and more advantages to the baby than the risk of abortion, then I will receive it."*

3.3.2. Recommendation from HCPs

Although some participants were unconvinced of the safety of the vaccine, others reported that their confidence about the effectiveness of the vaccine would be enhanced if detailed explanations were given by HCPs they trusted. For vaccinated participants, their doctors'

recommendation and reassurance of the safety of the influenza vaccination was a key motivator to be vaccinated.

> *"He told me the vaccine was safe although [I thought] that was a new vaccine for the flu. He said that was not the case and that the vaccine was very safe. He reassured me not to worry. That was why I had received it . . . and I believed the doctor wouldn't lie to me. . . . He explained it very well. If he just did the explanation casually, I might not have considered it."*

Unvaccinated participants wanted more information from the HCPs they trusted to enable them to make an informed choice. The safety of the fetus was their primary concern; they wanted more information about what the vaccine contained as well as pros and cons of vaccination.

> *"Yes, of course [I will consider]! If [the doctor] can tell me more! I want more information like what the risk is. What is the risk of miscarriage after vaccination? What is the possibility? I want to know all of this! Other than that, I want to know the pros and cons after vaccination. I have to balance, to weigh whether the benefits of vaccination outweigh not getting the vaccination. . . . My first consideration is the baby's safety."*

Although some participants were aware that printed health information about influenza vaccine was available, they preferred it to be supplemented with a discussion from their HCPs. Printed information alone was perceived as insufficient, and they also preferred having in-person professional advice to help them balance the benefits and risks for themselves and their fetus. Some participants stated that they would have received the vaccination if both printed materials and the HCP's recommendation were provided.

> *"I noticed that there were promotion flyers available at the maternal and child health center (MCHC). Even if I had read it . . . my confidence would not suddenly be increased. I would still require an explanation from the professionals. Because it is my first baby, I am especially anxious. If you receive it [the vaccine] just because you have read a piece of paper, it seems like I am treating it as trivial. So, if someone has explained it to me and balanced the risks for me, I will have more trust in it."*

Nevertheless, one participant pointed out that just a recommendation was not enough; HCPs have to provide practical and logistical information (i.e., how, when and where to get the vaccine and which vaccine they should receive).

"He recommended me receiving it, but he didn't make an appointment for me. And he didn't tell me when I should get it and which vaccine I should get."

3.3.3. Media influence

During the second wave of the A/H1N1 influenza pandemic in Hong Kong early 2010, there were many media reports about pregnant mothers who received influenza vaccination and subsequently had a miscarriage or pregnancy loss. The media also reported cases of adverse events in non-pregnant patients, both of which resulted in low overall uptake of the A/H1N1 vaccination among the general population and especially among pregnant women. Participants still remembered these negative media reports, even though the reports had occurred in the previous year when participants were not pregnant. These reports reduced participants' willingness to receive the vaccination.

"Because I saw from the TV news report and the newspaper that the vaccine caused adverse reactions for some people, for example, pregnant women. I was afraid that it would also happen to me. That was why I didn't have the vaccination."

One of the two vaccinated participants pointed out that the media reports were often sensationalized and may cause the public to associate poor pregnancy outcomes, such as missed abortion, with influenza vaccination. She stated that if HCPs provided unbiased information to pregnant women about the pros and cons of vaccination, there might be higher vaccination acceptance.

"The news does not cover everything. They only give the big headlines such as 'Pregnant woman has missed abortion.' No matter what the cause is, this makes the public think that receiving the vaccination causes a missed abortion. We don't know about the pros and cons. If we have more information, I think there is a higher probability that we will get the vaccine."

The other vaccinated participant pointed out that proactive and direct information from an HCP that they trusted, specifically addressing these media stories, overcame their negative perceptions towards the media reports.

"My family doctor took the initiative to bring it up [negative media reports] and discussed it with me. We talked about it and then I still chose to get it. He asked me if I

had read the newspaper and whether I knew the negative news. He then asked if I would worry about it. He told me that it was not directly related. . . . I believe in the effectiveness of the vaccine, and I also believe my family doctor's explanation."

4. Discussion

We presented the perceptions of Hong Kong women pregnant during the peak influenza season about their decision to receive the vaccine. This information is helpful because of the low rates of immunization in this high-risk population. Our findings highlighted many areas that were of concern to public health providers and planners, as well as, individual practitioners. Participants in this study held negative beliefs about the influenza vaccine. This may have been the result of: (1) misconceptions of the seriousness of influenza and underestimation of the threats of influenza infection to themselves and their fetus, (2) confusion between preventive strategies and treatment for influenza, (3) doubts about safety and efficacy of influenza vaccination, (4) lack of obstetric HCPs' vaccination recommendations, and (5) negative impact from the media. Conversely, (1) feeling threatened by a perceived high prevalence of circulating influenza virus, (2) perceived benefits of the vaccine for the fetus, and (3) positive HCP recommendations and reassurance about the safety of maternal influenza vaccine were seen as motivating forces for vaccine acceptance.

Study participants' perception that influenza was not a serious disease could be explained by the high variance in annual influenza attack rates [29] and the higher influenza-associated mortality in the elderly and chronically ill populations [30]. Thus, young, healthy pregnant women do not see influenza as a serious disease or a disease to which they are susceptible. Other researchers have also reported that unvaccinated pregnant women are unaware of their increased susceptibility to influenza infection and believe that their risk of influenza-related complications is not heightened during pregnancy [31]. Therefore, it is important that

pregnant women, in Hong Kong and elsewhere, are informed of their increased susceptibility to influenza infection and the increased risk of morbidity and mortality [32].

The results of this study also highlight the importance of cues to action that serve as important stimuli to pregnant women's acceptance of the vaccination. Providing clients with informed choices contributes to positive health care relationships during the antenatal period [33]. The majority of participants in our study did not have sufficient knowledge related to vaccination, which was consistent with some earlier research [8, 34]. Knowledge of influenza vaccine benefits was found to be significantly associated with higher vaccination rates among pregnant women [35]. During the A/H1N1 pandemic in the US, public health education targeting pregnant women improved the uptake of both seasonal and pandemic influenza vaccines [36].

Vaccinated participants identified the vaccine benefits as a motivator to be vaccinated, and unvaccinated participants expressed a willingness to receive the vaccine if they could be convinced that there would be substantial benefits, especially for the baby. Quantitative studies had confirmed that pregnant women were more likely to receive the influenza vaccination if they knew it was beneficial for the baby [35]. Meharry et al. [14] identified this 'two-for-one benefit' of influenza vaccine as a pivotal piece of knowledge in pregnant women's vaccine decision-making. Multiple studies have shown that in addition to protecting pregnant women from influenza infection, maternal influenza vaccination does provide passive protection to the fetus and the newborn for up to six months of age [37-39]. Therefore, the benefits of the vaccine for the baby should be a prominent message in the promotion of the vaccine.

Although participants perceived the overall threat of influenza as low, the threat from maternal vaccination was thought to be high and was likely the most powerful barrier to vaccination acceptance. Doubts about the vaccine's safety were a particular concern and

participants feared that the vaccine could harm the fetus, terminate the pregnancy or cause birth defects. This fear of vaccine effects may be increased in this population because many mothers only have one child [40] and thus are more sensitive to any potential pregnancy risk. Despite compelling evidence [41-43], misperceptions about vaccine safety have been identified as a strong barrier to increasing vaccine uptake [8, 9, 44]. Therefore, all pregnant women should be reassured that influenza vaccine is safe and effective at any stage of pregnancy [37].

The media can be helpful in disseminating health information to promote positive health behavioral changes or to discourage risky health behaviors [45]. As shown in this study, however, the media can hinder positive health behaviors [46]. Excessive media coverage of negative outcomes among some pregnant women who had received the pandemic A/H1N1 vaccine was remembered by participants more than one year after the events happened. The media has played a role in several recent vaccine scares [47], the most prominent of which was the measles, mumps and rubella (MMR) vaccine and autism controversy [48]. To effectively promote the vaccine, information should be made available from reliable sources to counteract the anti-vaccination messages to enhance pregnant women's confidence in the vaccine [14].

HCP's recommendations have been repeatedly shown to be strongly associated with pregnant women's acceptance of influenza vaccination [8, 9, 35]. A recent systematic review of interventions to increase maternal influenza vaccine rates found that interventions involving provider reminders systems were associated with increases in maternal vaccination [49]. A pregnant woman's HCP is often the primary source of unbiased, evidence-based information about preventive health practices throughout pregnancy [50]. Few participants in this study, and few pregnant women overall are advised to be vaccinated despite studies showing that an HCP vaccination recommendation increases the odds of a pregnant woman

receiving the vaccine from 3- to 32-fold [35, 36, 51]. Both vaccinated participants in this study identified the recommendation from their HCPs, along with their explanation of the benefits of the vaccine, as important to their decision to be vaccinated. Unvaccinated participants were also receptive to vaccination if clear explanations of the benefits and potential risks were provided. However, HCPs themselves are also often unaware of the recommendation to vaccinate pregnant women [35], and if they are aware, many are cautious about administering influenza vaccine to pregnant women [52, 53]. Researchers also have found that HCPs often believe that their pregnant clients are not willing to be vaccinated, and so they do not make the recommendation [54]. Furthermore, HCPs may lack confidence in the effectiveness of influenza vaccine as evidenced by their low vaccination rates [23, 55]. Others have reported that some HCPs even advise pregnant clients to avoid the vaccination during pregnancy [56]. Accordingly, influenza vaccine education and promotion programs should target HCPs as well as pregnant women [35].

The Hong Kong College of Obstetricians and Gynaecologists (HKCOG) does not specifically address seasonal influenza vaccine for pregnant women and refers website visitors to the Department of Health maternal influenza vaccine information pamphlet [57, 58]. For the A/H1N1 pandemic vaccine, the HKCOG supported vaccination but was somewhat equivocal in their recommendation and advised pregnant women to discuss the pros and cons with their doctor [58]. Also, in Hong Kong, influenza vaccine is not a part of routine antenatal care and vaccination is not provided on-site. Pregnant women must obtain the vaccine at their expense from their family physician or other private clinics. Conversely, many of the public antenatal services are provided in Maternal and Child Health Centres, where essential childhood vaccines are free and uptake rates are very high [25]. Thus, vaccine accessibility may also

pose a barrier to vaccination although this was not specifically identified by any of the participants.

4.1. Strengths and limitations

To our knowledge, this was the first qualitative study to explore Chinese pregnant women's perceptions towards influenza vaccination during pregnancy and only the second study to explore pregnant women's perceptions of seasonal influenza vaccination. Therefore, it can provide some insight for policy-makers and maternal and child health professionals in understanding the complexities of the reasons for acceptance or refusal of maternal influenza vaccination. A few limitations should also be noted. We had hoped to recruit an equal number of vaccinated and unvaccinated participants. However, the vaccination rates were so low that we were only able to recruit two vaccinated participants. The small number of vaccinated participants may have limited our ability to explore factors that could promote maternal vaccination. Also, the sample size was small and participants were recruited from one hospital setting; therefore their opinions and perspectives might not reflect the perceptions of the larger population of Hong Kong pregnant women. Our study was conducted one year after the A/H1N1 pandemic and participants often referenced the pandemic. Therefore, it was sometimes not clear whether participants' perceptions were of regular seasonal influenza vaccine or the A/H1N1 pandemic vaccine.

4.2. Conclusion

Influenza vaccine is an effective strategy to protect against influenza infection and to lower the risk of influenza-related complications in high-risk groups. Results from this study showed that altered risk perceptions of both influenza infection and the influenza vaccine, failure of HCPs to recommend vaccination to their pregnant clients, and negative media

reports were impediments to influenza vaccination among pregnant women. Findings from this study can assist public health workers and policy-makers in devising education and promotion programs to enhance influenza vaccination uptake and improve health outcomes for pregnant women and young infants. A multi-layered approach to getting appropriate health messages out to the relevant audiences is needed and should involve both public and private agencies, HCPs and the media.

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Conflict of Interest

The authors have no conflicts of interest to report.

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Tables

Table 1. Characteristics of the participants

Demographic Variable	Total N (%) N=32
Age of mother	
25 – 29 years	9 (28.1)
30 – 34 years	11 (34.4)
≥35 years	12 (37.5)
Parity	
Primiparous	19 (59.4)
Multiparous	13 (40.6)
University degree	
No	21 (65.6)
Yes	11 (34.4)
Family income[†]	
Less than median income	6 (18.8)
Median income or greater	26 (81.2)
Worked full-time during pregnancy	
No	11 (34.4)
Yes	21 (65.6)
Received influenza vaccine	
No	30 (93.8)
Yes	2 (6.3)

[†]Median income of sample was $20,000 to $24,999 HKD per month (1 USD = 7.78 HKD)

Figures

Fig. 1. Thematic structure of the study findings