



Title	Perceptions of Hong Kong Chinese women toward influenza vaccination during pregnancy
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1 **Perceptions of Hong Kong Chinese women toward influenza vaccination during**
2 **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.

31 **1. Introduction**

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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,

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

66

67 **2. Methods**

68 *2.1 Study design*

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

77

78 *2.2 Sample*

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

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

89

90 *2.3 Data collection*

91 An author-created semi-structured interview guide with open-ended questions based on
92 the components of the Health Belief Model (HBM) was used to collect the data [22].

93 Researchers have used the HBM to identify predictors of vaccination in various populations
94 and ethnic groups [23, 24] and to qualitatively explore perceptions toward vaccination in
95 various populations [14, 25]. A native Cantonese-speaker (CY) conducted the interviews
96 during the participants' postpartum hospitalization. After the completion of each interview,
97 the audio recording was reviewed several times to enable the researcher to fine-tune the
98 interview guide for subsequent interviews. In this way, we were able to expand the depth of
99 the data as the study progressed. Each interview lasted approximately 45 minutes and was
100 audio-recorded with the participants' written permission.

101

102 *2.4 Data analysis*

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

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

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

115

116 **3. Results**

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

126

127 *3.1. Theme 1 – Perceived risk of influenza infection*

128

129 *3.1.1. Influenza not a serious disease*

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

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

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

138
139 Also, some participants believed that influenza infection would be beneficial as it would
140 provide protective antibodies. They were not aware of the potential harm to the fetus that
141 could result from maternal influenza infection and febrile illnesses during pregnancy.

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

145

146 3.1.2. Low perceived susceptibility

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

150 *“But I still thought like this . . . pregnant women have the same risk from influenza*
151 *infection when compared with ordinary people.”*

152

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

155

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

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

160

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

166 *“If it was a time when the disease was so serious that made vaccination an absolute*
167 *need. When the influenza infection is very prevalent, I think I may need the vaccination.”*
168

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

171 *“The reason I received the vaccination was that I was pregnant during the peak flu*
172 *season. . . . A lot of people in my office were sick. Many of my colleagues got a cold and*
173 *the virus was so strong. People couldn’t get well even after they had visited the doctor.”*
174

175 3.1.3. Personal immunity

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

179 *“If I am not sick or if I am not physically unwell or weak, I won’t choose to receive the*
180 *flu vaccination . . . because I am healthy enough . . . and my immunity is okay . . . so I*
181 *think I can avoid the flu. I am not weak or unhealthy or get sick easily . . . so there is no*
182 *need for me to receive the vaccination.”*
183

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

190 *“When I was young. . . the doctor told us that there was no drug to cure the flu. It all*
191 *depends on your immunity to fight against it. So, all along I have insisted on keeping my*
192 *health status good enough to avoid getting the flu and also not to rely on drugs. . . . I*
193 *seldom rely on vaccination and taking drugs. I do rely on drinking more water and*
194 *exercising more.”*
195

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198

199 3.2. Theme 2 – Perceived risk of influenza vaccination

200

201 3.2.1. Vaccine safety

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

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

209
210 Participants also feared the process of injecting a virus into their body, especially during
211 pregnancy.

212 *“According to what I know, I receive the vaccination, and I have received the virus,
213 that’s the rationale for receiving the flu vaccination. I am receiving the virus! I think it is
214 not worth it! I don’t have any illness and so why I have to inject the virus into my
215 body?”*

216
217 Other participants believed that while injecting a virus into a non-pregnant woman might
218 not cause any problems, it might have more serious effects on pregnant women and that
219 reactions after vaccination also might be more serious in pregnant women.

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

223
224 Even if their HCP reassured them that influenza vaccine was safe and effective, a few
225 participants still refused as they had concerns about the **potential negative effects** of the
226 vaccine on the fetus.

227

228 3.2.2. Vaccine efficacy

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

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

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

237

238 *3.3. Theme 3 – Decision-making cues*

239

240 *3.3.1. Benefits to baby*

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

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

247

248

249 Since the majority of Hong Kong mothers only have one child, many participants stated that

250 first-time mothers are especially nervous during pregnancy and would prefer not to do

251 anything that could potentially pose even a minimal risk to the fetus. Accordingly, some

252 participants would have received the vaccination if they could be guaranteed that there was no

253 risk to the fetus and that the vaccine was beneficial to the baby.

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

257

258 *3.3.2. Recommendation from HCPs*

259 Although some participants were unconvinced of the safety of the vaccine, others reported

260 that their confidence about the effectiveness of the vaccine would be enhanced if detailed

261 explanations were given by HCPs they trusted. For vaccinated participants, their doctors'

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

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

269
270 Unvaccinated participants wanted more information from the HCPs they trusted to
271 enable them to make an informed choice. The safety of the fetus was their primary concern;
272 they wanted more information about what the vaccine contained as well as pros and cons of
273 vaccination.

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

279
280 Although some participants were aware that printed health information about influenza
281 vaccine was available, they preferred it to be supplemented with a discussion from their HCPs.
282 Printed information alone was perceived as insufficient, and they also preferred having
283 in-person professional advice to help them balance the benefits and risks for themselves and
284 their fetus. Some participants stated that they would have received the vaccination if both
285 printed materials and the HCP’s recommendation were provided.

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

292
293 Nevertheless, one participant pointed out that just a recommendation was not enough;
294 HCPs have to provide practical and logistical information (i.e., how, when and where to get
295 the vaccine and which vaccine they should receive).

296 *“He recommended me receiving it, but he didn’t make an appointment for me. And he*
297 *didn’t tell me when I should get it and which vaccine I should get.”*
298

299 3.3.3. Media influence

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

308 *“Because I saw from the TV news report and the newspaper that the vaccine caused*
309 *adverse reactions for some people, for example, pregnant women. I was afraid that it*
310 *would also happen to me. That was why I didn’t have the vaccination.”*
311

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

317 *“The news does not cover everything. They only give the big headlines such as*
318 *‘Pregnant woman has missed abortion.’ No matter what the cause is, this makes the*
319 *public think that receiving the vaccination causes a missed abortion. We don’t know*
320 *about the pros and cons. If we have more information, I think there is a higher*
321 *probability that we will get the vaccine.”*
322

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

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

328 *had read the newspaper and whether I knew the negative news. He then asked if I would*
329 *worry about it. He told me that it was not directly related. . . . I believe in the*
330 *effectiveness of the vaccine, and I also believe my family doctor's explanation."*
331

332

333 **4. Discussion**

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

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

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

356 The results of this study also highlight the importance of cues to action that serve as
357 important stimuli to pregnant women's acceptance of the vaccination. Providing clients with
358 informed choices contributes to positive health care relationships during the antenatal period
359 [33]. The majority of participants in our study did not have sufficient knowledge related to
360 vaccination, which was consistent with some earlier research [8, 34]. Knowledge of influenza
361 vaccine benefits was found to be significantly associated with higher vaccination rates among
362 pregnant women [35]. During the A/H1N1 pandemic in the US, public health education
363 targeting pregnant women improved the uptake of both seasonal and pandemic influenza
364 vaccines [36].

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

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

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

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

396 HCP's recommendations have been repeatedly shown to be strongly associated with
397 pregnant women's acceptance of influenza vaccination [8, 9, 35]. A recent systematic review
398 of interventions to increase maternal influenza vaccine rates found that interventions
399 involving provider reminders systems were associated with increases in maternal vaccination
400 [49]. A pregnant woman's HCP is often the primary source of unbiased, evidence-based
401 information about preventive health practices throughout pregnancy [50]. Few participants in
402 this study, and few pregnant women overall are advised to be vaccinated despite studies
403 showing that an HCP vaccination recommendation increases the odds of a pregnant woman

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

417

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

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

430

431 *4.1. Strengths and limitations*

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

447

448 *4.2. Conclusion*

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

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

459

460

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465

466

467 **Conflict of Interest**

468 The authors have no conflicts of interest to report.

469

470

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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)

Fig. 1. Thematic structure of the study findings

