Acceptance and feasibility of school-based seasonal influenza vaccination in Singapore: A qualitative study

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Abstract

Introduction

Influenza is a major cause of disease in children. School-based seasonal influenza vaccination can be a cost-effective tool to improve vaccine uptake among children, and can bring substantial health and economic benefits to the broader community. The acceptance and feasibility of school-based influenza vaccination are likely to be highly context-specific, but limited data exist from tropical settings with year-round influenza transmission. We conducted a qualitative study to assess acceptability and feasibility of a school-based seasonal influenza vaccination programme in Singapore.

Methods

We conducted qualitative in-depth interviews with key stakeholders, including healthcare professionals, representatives of relevant ministries, preschool principals and parents to understand their perspectives on a proposed school-based seasonal influenza vaccination programme. Interviews were transcribed verbatim and analysed using thematic analysis.

Results

We conducted 40 interviews. Although preschool-aged children are currently the recommended age group for vaccination, stakeholders suggested introducing the programme in primary and/or secondary schools, where existing vaccination infrastructure would facilitate delivery. However, more comprehensive evidence on the local influenza burden and transmission patterns among children is required to develop an evidence-based, locally relevant rationale for a school-based vaccination programme and effectively engage policy-makers, school staff, and parents. Extensive, age-appropriate public education and awareness campaigns would increase the acceptability of the programme among stakeholders. Stakeholders indicated that an opt-out programme with free or subsidised vaccination would be the most likely to achieve high vaccine coverage and make access to vaccination more equitable.

Conclusions

Overall, participants were supportive of a free or subsidised school-based influenza vaccination programme in primary and/or secondary schools, although children in this age group are not currently a recommended group for vaccination. However, a better informed, evidence-based rationale to estimate the programme's impact in Singapore is currently lacking. Extensive, age-appropriate public education and awareness campaigns will help ensure full support across key stakeholder groups.

Keywords: influenza, influenza vaccine, school-based vaccination

Abbreviations

SIVP	School-based influenza vaccination programme
IDI	In-depth interview
MoH	Ministry of Health
HPB	Health Promotion Board
IDS	Infectious Disease Specialist
PubPD	Public hospital Paediatrician
PriPD	Private Paediatrician
GP	Private General Practitioner
PY	Polyclinic doctor
PP	Preschool Principal
Par	Parent of child aged 18 months to 7 years

Introduction

Influenza causes an estimated 9.5 million hospitalisations and 81 million hospitalisation days worldwide each year [1]. Young children are a particularly vulnerable group, because they have lower levels of immunological protection and high levels of contact with other potentially infectious children [2]. The World Health Organization currently recommends annual vaccination of children aged 6-59 months [3]. Data from high and middle-income countries show that seasonal influenza vaccination of preschool- and school-aged children can effectively reduce the incidence of influenza among vaccines [4–10], and confer indirect protection to unvaccinated individuals in the community [11,12].

Studies investigating the acceptance of seasonal school-based influenza vaccination programmes (SIVPs), primarily conducted among parents, have identified numerous perceived benefits of such programmes, including greater convenience [13–15], increased vaccine access [15,16], reduced student and teacher absenteeism and associated costs [13–15], opportunities to incorporate health education into teaching [15], and broader benefits such as better pandemic preparedness [15]. Studies have also identified perceived harms and challenges of SIVPs, including the potential for side effects [13,14], lack of confidence in the school as an environment to receive vaccination [14], disruption to teaching time [14,15], and inadequate information about vaccination programmes [15].

In Singapore, influenza transmission occurs year-round, with two peaks of increased activity coinciding with the Northern and Southern hemisphere influenza seasons [17]. Virological surveillance indicates that a large proportion of acute respiratory illnesses seen at primary care facilities is caused by influenza [17]. Since 2014, Singaporean Citizens and Permanent Residents in influenza high-risk groups can claim for the influenza vaccine using Medisave, a mandatory medical savings scheme. However, coverage of influenza vaccine among high-risk groups, such as children [18] and elderly [19] is low (≤15%).

Introduction of a seasonal SIVP could bring substantial direct and indirect health and economic benefits in Singapore. Potential challenges related to the associated logistics, cost and public acceptance of such a programme, which are likely to be highly specific to the local context, have not been studied. This study assessed stakeholder perceptions of the feasibility and acceptability of a seasonal SIVP in Singapore.

Methods

Recruitment

Between May 2017 and November 2018, we recruited representatives from different stakeholder groups with an interest in childhood vaccination in Singapore. Among healthcare professionals, we interviewed private general practitioners (GPs), polyclinic doctors, paediatricians and infectious disease specialists. We also included representatives of the Health Promotion Board (HPB), a government agency responsible for delivery of routine immunisations in primary schools, and the Ministry of Health (MoH), as well as preschool principals and parents of children aged 18 months to seven years. Parents were eligible to participate if they were aged 21 years and above and if they were the main health decision-maker for their child. We excluded parents who were not able to complete the interview in English, and those whose children had a history of known serious allergic reaction to the influenza vaccine.

Potential interviewees from healthcare and government institutions were recruited through an invitation sent to their official e-mail addresses describing the study's aims and methods. Parents and preschool principals were sampled through convenient sampling from participants in a prospective surveillance study of respiratory infections in child care centres in Singapore [20], who had previously consented to being re-contacted for related studies.

In-depth interviews

In order to gain a detailed understanding of each individual participant's perspectives and preferences, we opted for in-person in-depth interviews (IDIs). The IDIs explored participants' attitudes and practices related to influenza and the seasonal influenza vaccine, and elicited their

views about the feasibility and acceptability of a proposed SIVP. The IDI guide was tailored to individual stakeholder groups. For example, MoH representatives were asked to elaborate more on issues of cost-effectiveness, while preschool principals were asked to expand on issues around logistics or child well-being.

Before commencing the IDI, a trained interviewer answered all questions from participants and audio-recorded their verbal consent to take part in the study. Interviewers posed probing questions until a full understanding of each participant's perspective was reached. Each IDI took approximately 20-45 minutes to complete and was audio-recorded. A note-taker took detailed notes throughout the interview. Parents were also reimbursed for their time with a S$50 voucher and given an information pamphlet on influenza and the seasonal influenza vaccine.

Sample size

We aimed to interview up to 50 participants from different stakeholder groups. The target sample size was based on the inclusion of local infectious disease specialists and relevant representatives from government institutions, and a predicted thematic saturation of approximately 10-12 interviews in each group among healthcare professionals, preschool principals, and parents [21], with some allowance for extra interviews if saturation was not reached [22]. Within each of these interviewee group, data saturation was considered achieved when no new themes emerged during the IDIs and the core meaning of existing codes remained unaltered [23,24].

Data analysis

IDIs were transcribed verbatim and analysed by thematic analysis using nVivo 11 software [25]. Potentially identifying data was removed. Two investigators (VO and SS) independently coded three transcripts and reached consensus on the codebook. Discrepancies were resolved through discussion with a third investigator (GK). One investigator (VO) subsequently coded the remaining transcripts. Emerging themes were compared within and across stakeholder groups and arranged into higher-order themes.

Ethics approval

This study was approved by the National University of Singapore Institutional Review Board (reference number: B-16-232).

Results

Main themes

We conducted a total of 40 IDIs. Among government officials, we interviewed three representatives of the MoH, as well as seven members of the HPB's School Health Services division. We also interviewed 19 primary healthcare professionals and two hospital infectious disease specialists, as well as five preschool principals and four parents (Table 1). Overall, three main themes emerged from IDIs across stakeholder groups: logistics, stakeholder engagement, and funding (Figure 1). Within each of these themes, stakeholders indicated a number of challenges to the successful implementation of a seasonal SIVP in Singapore, and put forward suggestions to address these in the SIVP's design and implementation, in order to achieve specific outcomes.

Logistics

Stakeholders indicated several logistical challenges to the successful implementation of school-based influenza vaccination in Singapore, including the need to purchase large vaccine stocks, the increased workload for school staff, and the lack of appropriate cold-chain storage facilities and vaccination venues at schools. In particular, stakeholders discussed in detail the preferred setting for a potential SIVP, and the mechanism for vaccine delivery.

SIVP setting

Although preschool-aged children are the recommended age group for influenza vaccination, most stakeholders suggested to introduce the programme in primary and/or secondary schools, where existing vaccination infrastructure would facilitate delivery (Figure 1A):

171 *"For the older children, it may be easier in terms of operation, because […] you have School*
172 *Health Services going to these schools to run other vaccination programmes, and [so it] may*
173 *be feasible."* (MoH2)

174 Singapore offers a wide range of preschool options, including public and private child care
175 centres, kindergartens, and informal play groups. This would substantially complicate the
176 recruitment of preschools for a potential SIVP:

177 "*Preschool[s] might be hard to target. Primary [and] secondary […] might be easier to do if*
178 *they have a proper mandate to roll out [the programme in] a government school, rather*
179 *than preschools that are privately owned."* (IDS2)

180 In addition, a SIVP implemented in primary and/or secondary schools would likely reach more
181 children, because school attendance is mandated from the age of six years:

182 "*There are children who are home-schooled up to primary school, [who] may not be*
183 *captured. […] The pick-up rate will be higher if we start in primary school, because [the]*
184 *majority of children in our country go to a public primary school."* (PY6)

185 A preschool principal explained that vaccine administration would also be easier among older
186 children:

187 "*I think primary school will be more appropriate. For preschool, children are still very young,*
188 *and […] if parents are not around, it would not be very easy for teachers to manage the*
189 *child's reaction to the jab, while managing all the other children."* (PP1)

190 Finally, parents of older children may worry less about potential side effects of the vaccine, and
191 thus be more inclined to accept vaccination in school settings:

192 *"I think [we] should try in primary school first. […] I think primary school parents are much*
193 *more receptive towards this, because their children are older. The tendency that their*
194 *children might fall sick because of the vaccine, or things like that, there are lesser worries*
195 *about it."* (PP4)

Vaccine delivery

Regardless of the specific school setting, there was disagreement among participants on the appropriate mechanism for vaccine delivery. Stakeholders discussed commissioning vaccination to *"a nurse or an equivalent stationed on site as part of the school infrastructure"* (PubPD1), or rotating vaccination teams:

> "*In [the] UK […] you actually have nurses who […] go around visiting all the schools […], even carrying out vaccination […]. So I think that's probably a good model to look at."* (GP1)

However, both these options would result in prolonged vaccination timelines. A school-based nurse might be able to vaccinate *"20 kids a day"* (PubPD1), requiring up to one year to administer the vaccine to all students in one school. Similarly, a rotating staff model would impede targeted cohort vaccination at the start of the peak influenza season:

> *"Because of how teams visit schools one after the other, it is difficult to vaccinate all children at once. Children from different schools will be vaccinated at different times over the year. Doing so might still give them the immunity, but [I'm] not sure it is as effective as giving them [the vaccine] before the peak season."* (HPB5)

In addition, one HPB representative argued that

> "*even though adverse events are very rare, doctors need to be there to assess if [the] child is fit for vaccination before giving the vaccination."* (HPB5)

However, doctors' participation would be conditional on their time availability and perceived benefits:

> *"Some general practitioners will be keen on it, others won't. So if general practitioners have the time, the inclination, [and] the ability to take […] a morning off to go and [vaccinate], [and if] they think it's something worthwhile for them to do, then [the programme] could be well-received. [General practitioners] would be expecting to be paid for their time."* (GP1)

Stakeholder engagement

Most interviewees agreed that the success of a proposed SIVP would strongly depend on the effective engagement of key stakeholder groups, including policy-makers, school staff, and parents (Figure 1B). According to participants, developing an evidence-based, locally relevant rationale that justifies the introduction of a seasonal SIVP in Singapore would increase its acceptability among stakeholders (Figure 1B). However, more comprehensive evidence on the local influenza burden and transmission patterns is currently needed:

> *"The problem that one would face when [going] to a policy maker with such a proposal would be: could you quantify the burden of influenza due to transmission in the school, versus transmission in the community? […] I don't know whether we actually have such granularity on where influenza exists. […] So my concern with such a proposal would be, if you go to a school, they will say: 'can you tell me what the burden of influenza [is] in the school?' And nobody would be able to give a single statistic."* (PubPD1)

Different stakeholders also highlighted the importance of complementing epidemiological data with context-specific cost-effectiveness analyses:

> *"[A SIVP is] something that would require some form of cost-effectiveness analysis. […] Is that the best use of resources? […] If it is not cost-effective, then you are in fact putting more burden on the healthcare system as a whole."* (MoH2)

In addition, participants suggested the proposed SIVP should be complemented with extensive, age-appropriate public education and awareness campaigns about influenza and the influenza vaccine. Some stakeholders specifically indicated school staff as an important target of public education:

> *"I think teachers in general are knowledgeable, but they may have incorrect ideas from social media, from the negative internet sites etc., on what […] the true, so-called utility of vaccination [is]. And um, many of them may still subscribe, or are subscribed to alternative medicine. […] I think that can be further educated, so I think that's the important bit."* (PubPD1)

In addition, persuading parents and children about the importance of vaccination would be key to ensuring high vaccination uptake (Figure 1B and 1C):

> "*I think parents need to be updated, educated, and persuaded. […] Uh, then I guess there must be education to children, […] so that they understand and don't fear, and they accept. […] Because if we roll it out and then half the population is absent, then you're stuck again."* (PrivPD1)

Improved levels of public education would also help address potential issues with vaccination-related adverse events:

> *"We need to educate people [about] what expected [adverse] events [are]. […] I think we need to have a good understanding of the background rates of events of interest, and then when we embark upon this, we will say 'Look, it is still a background rate'. Or, if [the rate] is increased, we know it's supposed to be increased to this amount, and no more. […] That's what I mean by anticipation. […] If we do vaccinate this number of people, we publicly tell people, we will probably see an increase in certain events for a while."* (PubPD1)

Funding

Stakeholders generally concurred that an opt out programme with free or subsidised vaccination would be the most likely to achieve high vaccine coverage (Figure 1C). If parents were asked to bear the cost of vaccination, a subsidy would help to increase the programme's acceptability:

> "*At the end of the day, I think it should be the parents who bear the cost, but of course some perks will always entice parents, you know. […] If you give them some form of subsidy, […] maybe [they will not] feel sober about the payment then.*" (PP3)

A free or subsidised SIVP would also make access to vaccination more equitable (Figure 1C):

> *"If you […] say 'okay, we want you to pay for [the vaccine]', [it] may be difficult for those in the lower socioeconomic groups. And then that can create a sort of a two-tier system, and parents are going to feel bad because they can't afford to pay for that for their child. […] So*

if you want to offer [the vaccine] in schools, I suspect that you either need to make it very cheap or free." (GP1)

Different interviewees suggested that the funding mechanism for the vaccine would also depend on the choice of consent model (Figure 1C):

"*Once [the programme] is opt out, then actually the government should pay. If it is going to be opt in, then probably the consumer."* (PriPD4)

Some stakeholders recognised that vaccination of large paediatric cohorts may substantially reduce the cost per dose of the vaccine. Nonetheless, a common worry among study participants was that a seasonal SIVP may consume a large amount of financial resources, stripping other, perhaps more important healthcare priorities of funding:

"*So, if such a big amount of funding [is] poured into vaccination, […] funding [for] other diseases, prevention, all that, might be much less. And I fear that the impact to other sides may be ignored."* (PY3)

For this reason, one representative from MoH recommended that the local need for a SIVP be carefully evaluated in relation to other areas of healthcare, and its value reassessed periodically:

"[An] influenza school-based programme […] may not run effectively after like two to three years down the road. Yeah, so that is a time where you need to evaluate again whether a school-based programme is still useful to keep." (MoH3)

Benefits and negative impacts of SIVP

The majority of participants viewed a SIVP as the most effective way to increase influenza vaccine coverage in the paediatric population in Singapore:

"I think it is going to be effective, because […] access gets much easier. Because one of the things parents have to do is take their children out of the school and, you know, they have to make appointments to come to the hospitals […]. Giving [the vaccine] at school might help. […] It [will] improve […] uptake." (PD03)

From the perspective of parents, major barriers to vaccinating children include the inconvenience of attending yearly vaccination appointments, as well as overly complicated reimbursement procedures for the cost of the vaccine. In addition, time constraints during patient consultations currently prevent general practitioners from promoting and administering the influenza vaccine in their practice:

> *"Because we are so busy, sometimes we don't even have time to manage the medical problems per se. So preventive medicine is not [a priority]. Not just the influenza, even the pneumococcal and cervical cancer vaccinations. […] If we have 30 minutes with one patient to go through all their medical problems, definitely by right we need to do the preventive care part right. But […] it is a time issue."* (PY06)

Participants perceived the proposed SIVP as a useful tool to help overcome these specific barriers. Most interviewees acknowledged that increased vaccination coverage would significantly reduce the health and healthcare burden due to influenza through both direct protection of school children and indirect protection among their unvaccinated contacts:

> *"[High vaccine coverage] does provide a certain proportion of herd immunity. Because all these kids are in the community. So [vaccination] protect[s] against [influenza] at home, in school, in public places."* (PY2)

This would ultimately reduce school and work absenteeism among children and adults, respectively. However, not all participants agreed that increasing influenza vaccine uptake among children would be necessary in Singapore. Some participants expressed low confidence in the vaccine's effectiveness:

> *"We need to have a better vaccine. Despite the very high rates of vaccination in developed countries, you still got thousands of influenza cases and hundreds of deaths […]. If we had a vaccine of [higher] quality, then I think people would line up to get it, and it could justify […] funding it publicly."* (IDS1)

The misconception that influenza vaccination is only required before travelling overseas was common among parents, and reflected in GPs' vaccine recommendation practices. Some participants suggested a seasonal SIVP may help curb such misconceptions by increasing public education and awareness of influenza and the influenza vaccine, because *"if you [vaccinate] in schools, it forces people to think about it."* (GP1)

However, one concern raised by participants was the possibility that parents may then direct questions about the influenza vaccine to school staff, rather than medically qualified healthcare professionals. As one polyclinic doctor suggested, this would require a proposed SIVP to include *"dedicated, trained personnel"* (PY6) to address parents' queries.

In addition, the negative publicity arising from vaccination adverse events was indicated as one possible negative impact of a proposed SIVP:

> *"By the same token of [a SIVP] being a very visible event, any negative impact would also be a very visible event."* (PubPD1)

This might cause unwarranted worry among the public, likely putting *"the whole concept of vaccination [in] negative light."* (PubPD4)

Discussion

This study evaluated the feasibility and acceptability of a seasonal SIVP in Singapore. Key stakeholders indicated a number of logistical and financial challenges to the implementation of a proposed SIVP, and suggested its feasibility would be highest in primary and/or secondary schools. Successful involvement of key stakeholders would require extensive public education campaigns, as well as the development of an evidence-based, locally relevant rationale that justifies the introduction of a SIVP in Singapore. An opt out programme with free or subsidised vaccination would achieve the highest coverage and ensure equitable access to vaccination.

While the existing evidence demonstrates that the introduction of seasonal SIVPs can have substantial health [4–10,26–28] and economic [29,30] benefits for the wider community, this and

previous studies [15,31–37] suggest that the successful implementation of such programmes may depend on more qualitative, context-specific aspects. A review of SIVPs in high-income countries identified considerable administrative and logistical challenges to the successful delivery of vaccines in schools, including the choice of organisational and funding models, the logistics of vaccine supply and distribution, issues around staff capacity and workload, and communication with parents and students [35]. The rationale for introducing school-based vaccination and the choice of vaccine target groups were indicated as main determinants of programme effectiveness [35].

The preference for vaccination in older children expressed by stakeholders in this study is challenged by current influenza vaccine recommendations in Singapore, which only include children aged five years and below [38]. The rationale underlying this recommendation is based on young children's high vulnerability to influenza infection and influenza-related complications [2,39], as well as their key role as influenza transmitters in the community [39]. However, simulation models show that school-aged children can also play a leading role in propagating influenza outbreaks [40], and that targeted vaccination of children in this age group can have the greatest impact on reducing transmission during epidemics [40]. Accordingly, influenza transmission rates have been shown to fluctuate with school opening and closure periods [41,42].

There is substantial evidence of indirect protective benefits to unvaccinated groups from vaccinating school-aged children [4–10,26–28,43–50]. However, the majority of evidence on the impact and cost-effectiveness of seasonal SIVPs comes from studies in North America and Europe, which have different vaccine financing mechanisms and influenza epidemiology compared to Singapore. Few studies have been conducted in tropical settings, which have the added complication of experiencing biannual transmission seasons. A comprehensive assessment of the influenza burden and transmission patterns among young age groups would be essential to understand children's role in propagating influenza in the local context and develop a locally relevant rationale for the implementation of a seasonal SIVP. In Singapore, an integrated national influenza surveillance programme administered by the MoH includes community surveillance of

374 acute respiratory infections through public hospitals and polyclinics, virological surveillance of
375 influenza viruses, veterinary surveillance of poultry and bird populations, and external
376 surveillance of regional and global infectious disease incidents [51]. However, there are no
377 dedicated influenza surveillance mechanisms that capture disease and transmission patterns
378 specifically in children.

379 Most participants were forthcoming during the IDIs, and individual stakeholders demonstrated a
380 deep understanding of issues related to influenza and the influenza vaccine. However, our study
381 population displayed a general disinterest in the topic of influenza vaccination. Parents were only
382 marginally interested in discussing a potential SIVP, and did not engage in more detailed
383 conversations on issues directly relevant to them, such as consent procedures or child well-being
384 on the day of vaccination. No new themes emerged among parents after four interviews. Factors
385 potentially increasing parents' willingness to consent to a SIVP mostly emerged from IDIs with
386 preschool principals and GPs. Parents' inertia towards influenza vaccination and a proposed SIVP
387 is in contrast to previous findings from the USA, showing that parents who are relatively
388 knowledgeable with regards to influenza and the influenza vaccine can be very cognizant of the
389 public health benefits associated with SIVPs [14,52]. Misconceptions on influenza and the
390 influenza vaccine, such as the belief that the vaccine is only required before travel, were common
391 among all stakeholder groups. One participant pointed to the need to quantify and compare the
392 intensity of influenza transmission in schools versus other locations in the community, in order
393 to justify nation-wide vaccination of school children. However, the view that vaccination should
394 occur where transmission is most intense is misguided, because an immunised individual
395 exposed to influenza might be protected regardless of where vaccination occurred. The observed
396 indifference and misinformation in our study population reflect the need for more
397 comprehensive, targeted education and awareness efforts among providers and the public in
398 Singapore.

399 *Limitations*

Representatives of the Ministry of Education (MoE) and Early Childhood Development Agency were not available to participate in this study. This prevented a more thorough investigation of aspects that might be relevant to the educational sector, such as the potential disruption of lessons or reduced absenteeism at schools. We were also unable to include stakeholders from the primary school sector, which is overseen and centrally managed by the MoE. This study does not include the perspectives of non-English speaking stakeholders. However, the vast majority of young parents and all other stakeholder groups included in this study are fluent in English in Singapore. Because we did not interview parents of children older than seven years, we were unable to corroborate other stakeholders' statements on parental acceptance of vaccination in the primary and/or secondary school setting, or parents' concerns about potential side effects among older children. Finally, our sample of healthcare professionals, parents, and teachers might be skewed towards pro-vaccine individuals, or those who are generally more interested in vaccine-related topics. Thus, the opinions and attitudes expressed in this analysis may reflect those of stakeholders who are more supportive of vaccination.

Conclusions

Understanding context-specific barriers and facilitators of childhood influenza vaccination can help shape interventions to increase influenza vaccine coverage among young children. This study evaluated the feasibility and acceptability of a seasonal SIVP in Singapore, providing essential evidence to inform policy for future programmes. Overall, participants were supportive of a proposed seasonal SIVP in Singapore. However, a better informed, evidence-based rationale is required to gain full support across stakeholder groups and estimate the programme's impact in Singapore.

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Declarations of Competing Interests

None

Contribution to Authorship

All authors attest they meet the ICMJE criteria for authorship. CCT conceived the idea for this study and provided input for data collection, as well as analysis and interpretation of findings. ML, SS and VO collected the data. VO conducted the analysis. GK provided expert advice during data analysis and interpretation of research findings. CCT and VO wrote the manuscript. All authors contributed to critically revising the manuscript and approved the final article.

Details of ethics approval

The study was approved by the National University of Singapore Institutional Review Board on March 6th, 2017 (reference number: B-16-232).

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Colour figures

For Figure 1, colour scale is required online, but not in print.

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Figure Legends

Figure 1. Main Themes Three main themes emerging from in-depth interviews with stakeholders, including A) Logistics, B) Stakeholder engagement, and C) funding; trapezoids: challenges to implementation of a seasonal school-based influenza vaccination programme in Singapore; ovals: stakeholders' suggestions to overcome these challenges; rectangles: possible outcomes if specific suggestions were followed.

Tables

Table 1. Number of participants interviewed in this study by stakeholder group

Stakeholder group	Acronym	Number of interviewees
Ministry of Health	MoH	3
Health Promotion Board[a]	HPB	7
Public hospital infectious disease specialists	IDS	2
Public hospital paediatricians	PubPD	4
Private paediatricians	PriPD	4
Private general practitioners	GP	5
Polyclinic[b] doctor	PY	6
Preschool principals	PP	5
Parents of children aged 18 months to 7 years	Par	4
Total		**40**

[a] Health promotion agency of the Singapore government, responsible for delivery of routine immunisations in primary schools

[b] Government clinic providing subsidised outpatient care, health screenings and pharmacy services