Caregivers' Knowledge, Attitude, and Practice (KAP) to Pneumococcal Conjugate Vaccines (PCV) for Children in Hanoi, Vietnam

by

Ema Hui-Hsin Hsiao

DKU Global Health Program
Duke University

Date: April 3rd, 2024
Approved:

Shenglan Tang, Supervisor

Marius Wamsiedel

Lijing Yan

Thesis submitted in partial fulfillment of
the requirements for the degree of
Master of Science in the
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ABSTRACT

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Abstract

Due to a high burden of disease of pneumonia in Vietnam, the country not including the pneumococcal conjugate vaccine (PCV) in its National Expanded Programme of Immunization (EPI), and the scarce data on PCV vaccine coverage or caregivers' behavior within the country, it is imperative to assess the Knowledge, Attitude and Practice (KAP) of the caregivers' community, to further explore ways to increase PCV uptake. The purpose of this study is to understand the KAP of caregivers towards PCV inoculation for children in Hanoi, Vietnam

Methodology: 338 respondents fulfilled the Qualtrics questionnaire and 26 respondents (16 caregivers and 10 health workers) were interviewed in Hanoi, Vietnam, using semi-structured interviews in June-December 2023. Materials and data were transcribed between Vietnamese and English, and analyzed according to selected themes.

Discussion/Conclusions: Although the findings suggest that caregivers in Hanoi have limited knowledge on PCV, support for attitude and practice on accepting PCV exists, especially from caregivers with high socio-economic status. This study wished to contribute to a better understanding of the KAP factors regarding childhood vaccines, which may support decision-making about vaccine policies, and be utilized for creating suitable vaccine promotion materials for child caregivers.

Dedication

This work is dedicated to my parents, who have been giving me strength and support since forever.

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1. Introduction

Pneumococcal disease is a leading cause of mortality and morbidity in children under five years old, accounting for 14% of all deaths of children under 5 years old (WHO, 2022b). In Vietnam, the burden of pneumococcal disease is heavy as well. According to a systematic analysis of pneumonia morbidity and mortality between 2000 and 2015, the incidence of pneumonia in Vietnam in 2015 was more than 200 per 1000 population in children under 5 (McAllister et al., 2019). Also, pneumonia is a major cause of pediatric hospital admissions in Vietnam (T. K. P. Nguyen et al., 2017). Childhood pneumococcal conjugate vaccine (PCV) was proved to be significantly efficient and cost-effective in controlling the transmission of the pneumococcus and lowering the burden of disease among population (Chen et al., 2019; Madhi, 2008; Zakiyah et al., 2020). It is not part of the national immunization program in Vietnam but self-funded (WHO, 2021a).

Regarding the key influence of the vaccine uptake among children under the age of five, previous studies has shown that it is positively associated with caregivers' vaccine knowledge (Cooper et al., 2021). In Vietnam, the knowledge, attitude and practice (KAP) assessment has been conducted to investigate the Ministry of Health's maternal and child health handbook intervention, as well as the service vaccine for human papillomavirus (HPV) (Aiga et al., 2016; Dinh Thu et al., 2017; Tran et al., 2018). The KAP assessment is a common method to understand and measure the extent of a

situation, to and reveal misunderstandings that may be potential barriers to implementation activities we would like to achieve (Médicins du Monde, 2011). However, such analysis or reports in the country have been scarce in relation to caregivers' KAP knowledge on childhood vaccines such as PCV. The aim of this study is to identify the caregivers' KAP factors associated with childhood PCV uptake in Hanoi, Vietnam.

1.1 City profile of Hanoi, Vietnam

Hanoi is the capital city of the Socialist Republic of Vietnam, a country located in Southeast Asia with a total population of 99.46 million (GSO Vietnam, 2022). It has been developing successfully from being one of the world's poorest to a lower middle-income economy in one generation (World Bank, 2023), with a monthly income per capita estimated to be at 4.67 million VND (US$189) (GSO Vietnam, 2022). The municipality of Hanoi formed from the Red River Delta located in the north, with an area of 3,359.82 km2 and a population of estimated 8,435,700 in 2022. More than half of the Hanoi population resides in urban metro area. It consists of 12 urban districts, 17 rural districts, and 1 district-level town. The city is a political, economic, cultural and science center and an important transportation hub of Vietnam (Hanoi Tourism Department, 2018).

Vietnam has a life expectancy at birth of 73.6 and under five mortality rate of 20.5 in 2021, while Hanoi people enjoy a life expectancy of 75.2, and under five deaths (per 1000 live births) at 15.3 (GSO Vietnam, 2022). Hanoi has 579 health clinics citywide by

June, 2023. Remarkably, all of these facilities have doctors on site, and the majority (86.3%) have primary care doctors; those without doctors have additional support from health centers and district hospitals (Hai Yen, 2023, p. 15).

The public health system in Vietnam is organized following an administrative hierarchy, the Ministry of Health manages three to four levels of health service delivery: primary level in districts and communes, secondary level in provinces, and tertiary level in national institutions under central government control (GSO Vietnam, 2022; Quan & Taylor-Robinson, 2023; WHO, 2018). Commune health centers (CHCs) are referred to as "grassroots health care systems" for primary health service delivery (Vietnam MoH & Health Partnership Group, 2015).

Vietnam utilize a national Expanded Programme on Immunization (EPI) with UNICEF support, where vaccinations deemed necessary for children are financed by the government and international donors such as GAVI ((Ministry of Health Vietnam, 2015). It is providing immunization to 12 vaccine preventable diseases in Vietnam, including Tuberculosis, Hepatitis B, Diphtheria, Pertussis, Tetanus, Polio, Hib, Measles, Rubella, Japanese Encephalitis, Cholera (in high-risk areas), and Typhoid (in high-risk areas) (Ministry of Health Vietnam, 2015; WHO, n.d.). These vaccines are usually administered in the grassroot CHC levels.

In the last 25 years, vaccines have protected 6.7 million Vietnamese children and prevented 42,000 deaths from deadly childhood diseases such as diphtheria, pertussis,

polio and tetanus (*Immunization | UNICEF Viet Nam*, n.d.). Nationally, 87.6% of infants (children under 1 year old) were fully vaccinated in 2022; while at the provincial level in Hanoi, full vaccination rate of the vaccines in EPI for infant has been maintained at over 90% prior to the Covid-19 pandemic (GSO Vietnam, 2022). It has led to the successful eradication of polio, elimination of neonatal tetanus and control of measles. The vaccines not included in the national routine immunization schedule usually result in out-of-pocket cost for patients, and may be offered in general hospitals or vaccination centers.

1.2 Pneumococcal disease in children in Hanoi, Vietnam

There has also been shown that pneumonia was the leading cause of prolonged hospitalization and death in a tertiary hospital in Hanoi, Vietnam (N. T. T. Nguyen et al., 2017). WHO listed PCV coverage as an indicator for its impact goal in the Immunization Agenda 2030 (IA2030), yet the coverage data in Vietnam has been perceived to be inadequately collected and patients' willingness to accept the vaccine insufficiently assessed (Ministry of Health Vietnam, 2015; WHO, 2021b). The importance of childhood PCV should be further stressed in Vietnam.

Two types of childhood PCV are licensed in Vietnam, PCV10 (Synflorix) and PCV13 (Prevenar), at least 3 doses of PCV are required to fulfill a complete series for a child under 5 years old, the younger the infant, the more doses it needs to protect itself. PCV is yet to be included in the national EPI in Vietnam (WHO, 2021a) despite WHO's recommendation, but the Hanoi Ministry of Health has announced that PCV will be

prioritized to join EPI in 2025 (Ministry of Information and Communications, 2023). Consumers have to pay for PCV out-of-pocket and the vaccine is considered expensive (Darus et al., 2014). According to the latest update of PCV prices from City Department of Health of Ho Chi Minh City and Hanoi City, one dose of PCV10 ranges from 950,000 – 1,100,000 VND (US$38.4 - 44.5) and a dose of PCV13 is 1,220,000 - 1,290,000 VND (US$49.3 – 52.1) in a public health center; in the major private-owned vaccination center VNVC, the price per dose is 1,045,000 VND (US$42.2) and 1,290,000 VND (US$52.1) respectively (HCMC Department of Health, n.d.; VNVC, 2022). No other fee for injection service has to be paid.

1.3 General objective

The purpose of this study is to understand the knowledge, attitude and practice (KAP) of caregivers and its association towards PCV inoculation for children in Hanoi, Vietnam. In order to improve PCV routine uptake in Hanoi, this study aims use a mixed-method (quantitative + qualitative) approach to provide insights to PCV interventions that may be applied in the area.

AIM 1: To examine caregivers' knowledge towards childhood pneumonia diseases and PCV.

AIM 2: To examine caregivers' attitude on childhood pneumonia diseases and PCV.

AIM 3: To examine caregivers' practice on deciding to enable PCV for their child.

2. Methodology

2.1 Study setting and participants

The study selected to use the mixed-method with support of our local research partner from Hanoi Medical University, with aspirations to not only analyze caregivers KAP with components of scores, but also grounded with social and cultural context of the situations in the study (Priscilla R. Ulin, 2005). There is no limit in exploring people's knowledge, attitude and practice. Adopting the qualitative method in analysis enabled an immense space to explain the findings that resulted from unstructured conversations in answering the question to what people know, how people think, and why people do.

For all of the survey, caregiver interview and health worker interview parts, data were designed to be collected equally in 2 clinics similar in scale, chosen in the research city of Hanoi to the main study sites, Hanoi Medical University Hospital immunization (HMU) clinic and Le Van Thiem (LVT) clinic. Both clinics are part of the Hanoi Medical University Hospital immunization service: HMU clinic is located inside the university hospital around the heart of Hanoi, while LVT clinic is in a urban general health center located 3.3 kilometers further away from the center. Two clinics are similar in scale, each equipped with at least 1 doctor and 2 nurses on duty at a time. HMU clinic receives 100~150 visits from caregivers with a kid under the age of 5 each week, while LVT clinic receives over 100 visits from clients with kids under 5.

The population targeted is likely to have a demographic construction to pay for the PCV vaccine, that costs around one-fourth of the average monthly income per capita in Vietnam per dose for their children (Zakiyah et al., 2020). The inclusion criteria and exclusion criteria are adapted (Li et al., 2022) as the following:

The same criteria for survey and interview caregiver participants: 1) being Vietnamese, living in Hanoi; 2) being older than 18 years; 3) being a caregiver of at least one child under five years old; 4) having some decision-making power in the child's vaccination; and 5) having no communication barriers. After the observation that most caregivers already have their child vaccinated with PCV or have a strong intention to, we purposefully recruited several caregivers with low intent to get PCV for their children as interview participants.

The inclusion criteria for health worker interview participants: 1) being a health worker directly involved in PCV administration; and 2) working based in Hanoi. Two health workers who work in rural areas of Hanoi were recruited at a later stage to extend the variety of participants.

Convenience sampling was first used to recruit participants for survey data, caregiver interview data, and health worker interview data at the two vaccine clinics the researchers work at. Caregiver participants were approached and invited during their visits at the immunization clinics, usually at their observation stay for 30 minutes after

their child receive a vaccine. Health workers were recruited by local researchers based on requirements.

However, this may contribute to biased results with limited diversity. 6 purposeful sampling data were added to increase diversity in participants' experiences essential to the study in Hanoi, Vietnam.

2.2 Study design

This was a concurrent mixed-method study consisted of a web-based survey and semi-structured interviews being administered inside the vaccination clinics. The knowledge, attitude, and practice (KAP) is an assessment commonly used by public health researchers (Andrade et al., 2020; Ibrahim, 1995) to lay foundations for suitable intervention program design, covering factors regarding routine childhood vaccination (Cooper et al., 2021), and can be adapted into quantitative or qualitative studies. The KAP methodology was adopted and defined: knowledge (existing knowledge on childhood pneumonia infections and PCV vaccination), attitude (on childhood pneumonia infections and PCV vaccination), and practice (decision to have the child undergo PCV vaccination).

The study included a structured, web-based quantitative questionnaire used to denote the general KAP assessment of targeted caregivers, a one-to-one interview guide conducted with selected questionnaire participants, and a one-to-one health worker key informant interview conducted with health providers directly involved in PCV

administration. All instruments were validated through pilots among a small population and circulation among experts from the researcher's institution and local partner institution, after which the researcher revised the instruments based on the suggestions, and gained approval.

2.2.1 Web-based survey

The web-based survey was designed for caregivers and was constructed by 4 parts: the demographic information of participants, and their knowledge, attitude and practice towards the PCV vaccines. Convenience sampling was used to recruit the survey participants.

2.2.2 Semi-structured interviews

Two sets of semi-structured interviews (appendix C & D) were conducted applying the following design: Each participant was invited to a one-to-one interview conducted by a local research partner who has been trained in qualitative interviewing methods. The sample size of interview participants were determined after consulting the availability of the local health care professionals and feasibility of the research. An interview guide was used to ensure that similar topics were being covered in each interview. Follow-up questions and targeted probes were used by interviewers to provide clarification and/or collect more informative responses as needed.

2.2.2.1 Caregiver interview

The caregiver interview was carried out semi-structured, aimed to communicate with the parents of children under 5 eligible to receive PCV vaccines and understand their knowledge, attitude and practice on a deeper level. Each interview took 15-20 minutes.

2.2.2.2 Health worker key informant interview

The aim of key informant interviews with health workers directly involved in administrating childhood PCV is to increase the depth of the research by adding evidence from another key stakeholder of the immunization process. Health workers' observation of children and their caregivers provides a different view and opinion on the PCV inoculation program. Each health worker interview took 10-15 minutes.

2.3 Data collection

The instruments used in this research include 3 sections: a caregiver web-based survey, a caregiver interview, and a health worker key informant interview. During the pilot stage, 40 web-based questionnaire surveys, 4 caregiver interviews and 1 health worker key informant interview were done prior to the official data collection stage. The pilot tests were all conducted in HMU clinic, local researchers and the health worker key informant were engaged in finalizing the instrument design.

2.3.1 Web-based survey

The web-based questionnaire data was collected via local researchers using the survey tool Qualtrics provided by Duke University. Considering the possibility of selection bias and the availability of survey takers, the web-based questionnaire planned for a sample size of 400. Local researchers provided a brief introduction on the research project and provide a QR code of the survey to visitors who were deemed eligible at the immunization clinic sites by local researchers. Participants were asked to read and check the box for informed consent before the process. When researchers observe some participants busy attending to their children or have trouble filling in the survey, help was provided, sometimes by reading the questions out loud and filling in the survey for them. Compensation were paid in cash after each participant finished submission, response rate wasn't recorded. All data collected was based on self-report.

There were 4 parts of questionnaire. Questions were adapted from How et al. and BeSD guidance from WHO (How et al., 2016; WHO, 2022a). The first part including demographic information such as age, education, occupation, relationship to the child and such. The second part was consisted of 13 single and multiple selection questions regarding the caregivers' knowledge, with final scores in the range of 0-65. Themes of the knowledge section included the awareness of the pneumococcal disease and vaccines in children, the actions to take to prevent and treat if a child is sick due to pneumococcal disease. In the attitude part, 10 questions were selected with responses

designed using a 5-point Likert scale scored from strongly agree = 5 to strongly disagree =1. The practice section was designed as the same with 6 questions selected.

2.3.2 Semi-structured interviews

For semi-structured interviews, the face-to-face interview approach delegated by local researchers was adopted for data collection. Participant group consisted a total sample size of 26 one-to-one interviews, including web-based questionnaire responder-caregivers (16) and health workers who directly administer PCV immunization (10) in the analysis. Researchers asked questions based on the designed questionnaire and interview guides for both caregiver interview and key informant interview.

The introductory page of the research instruments described the purpose, objectives and approximate duration of each participation, and included a section for informed consent from participants. Participants can proceed for the subsequent sections upon giving consent. Participants' identities and data will be accessible only to the researchers via encrypted service provided by Duke university - Duke Box, and assurances of anonymity will be provided to the participants. The study was carried out from June to December.

2.4 Data analysis

2.4.1 Quantitative data analysis

After initial data collection (n = 433), data from Qualtrics were downloaded as a csv file and put into Stata/SE 15.0 for data management and analysis. Entries showing

participants that didn't fulfill the inclusion criteria (42) and missing data (53) were deleted. Multiple-selection questions were separated to different variables to prepare for analysis.

There were two study groups: caregivers who visited the HMU clinic and performed the study there, and caregivers who visited and therefore took part in the study at the LVT clinic. Descriptive analysis were carried out to describe the demographic characteristics of the participants.

In table 1., ANOVA regressions were used to make comparisons of mean scores of caregivers' KAP based on their demographics and socio-economic factors, and p-values were denoted using univariate linear regression. Multivariate regressions were used to quantify the extent to which demographic factors influenced the knowledge, attitude and practice results. Ordinal outcomes (5-point Likert scale information in part 3 "Attitude" and part 4 "Practice") were converted into a cumulative grading: For example, when the statement is correct or incorrect by evidence or recommendations from international guidelines, values were considered as "1" to "5" based on participant's response from "Strongly Disagree" to "Strongly Agree", values were cumulated as points. The KAP scores were designated based on the subjective judgment of the principal investigators of this study and the literature recommendations (Andrade et al., 2020), and analyzed as continuous data. Stata/SE 15.0 was used to denote the quantitative data. Coefficient, standard errors and p-values were calculated.

KAP scores of PCV vaccination among caregivers in Hanoi were analyzed in association between socio-economic factors. Finally, Spearman correlation analysis is used to find the correlation between the three variables of KAP scores.

2.4.2 Qualitative data analysis

Interviews were recorded, transcribed in Vietnamese and then translated to English. All qualitative data was analyzed by NVivo 14 with a thematic analysis approach. There were three stages in this process: text reduction, exploration of text and integration of exploration. First, material was coded using deductive coding method referencing a qualitative research on PCV in Indonesia (Harjaningrum et al., 2013), and the BeSD Childhood Vaccination Qualitative Framework Analysis Template (WHO, 2022a), themes were identified and thematic networks were constructed in order to reduce text. Thematic networks were then described and summarized. Finally, the thematic patterns were interpreted. Intelligent verbatim was being used in data presentation to preserve the original messages with greater readability.

2.5 Ethical approval

The study protocol and research instruments were approved by the Institutional Review Board of Duke Kunshan University (2023EH124). All participants provided informed consent forms.

3. Results

In the quantitative analysis, 338 completed questionnaires were included in total, with 154 (45.6%) from Hanoi Medical University clinic and 184 (54.4%) from Le Van Thiem clinic. 16 caregivers and 10 health workers equally provided from the two clinics were included in the qualitative analysis.

3.1 Description of the sample

For the quantitative part, the demographic and social-economic characteristics of the study population in the two clinics were similar (Table 1). Mean of age was 31.8 and 77.51% (n = 262) are mothers of the child. The age group showed that the percentage of caregivers visiting the immunization clinics during the study period was largely the 30-39 year group (61.54%), following by the 18-29 year group (31.66%).

A high percentage of caregivers revealed having no religion (92.60%) and showcased a substantial representation of professionals (46.15%), healthcare workers (23.67%), university graduates (60.65%) and postgraduates (25.15%). Further regarding household monthly income, most caregivers have an average at 6 ~ 12 million VND (US$42.54 - 485.08, 32.84%) and 12 ~ 24 million VND (US$485.08 - 970.17, 34.62%).

The mean number of children under 5 years old is 1.29 ± 0.52 per household, and over half of the caregivers have their youngest child less than 1 year old (52.66%) at the time they took the questionnaire. As for the gender of the youngest children, the sex ratio was shown as 118:100. Parents, especially the mother (75.44%) was considered the

key decision maker on whether or not to have the child vaccinated. Caregivers generally perceived their child as healthy when asked (75.44% Strongly agree, 17.75% Moderately agree), and their children received other vaccinations (84.62%). Around a third of the caregivers reported that their child had experienced adverse reactions due to vaccination (31.66%), while a quarter of the caregivers themselves or another family member had (25.15%). 62.43% of caregivers have at least one family member receiving PCV and 47.34% knew someone who had experienced pneumonia.

Table 1: Demographic and social-economic characterestics of the study population in Hanoi, Vietnam 2023

Characteristics	Total N = 338 (%)	HMU Clinic N = 154 (%)	LVT Clinic N = 184 (%)
Caregiver			
Mother	*262 (77.51)*	*128 (83.12)*	*134 (72.83)*
Father	*73 (21.60)*	*26 (16.88)*	*47 (25.54)*
Others[1]	*3 (0.89)*	*0 (0.00)*	*3 (1.63)*
Age, years, mean (SD)	*31.76 (4.84)*	*32.20 (4.32)*	*31.40 (5.23)*
18 - 29	*107 (31.66)*	*45 (29.22)*	*62 (33.70)*
30 - 39	*208 (61.54)*	*99 (64.29)*	*109 (59.24)*
> 40	*23 (6.80)*	*10 (6.49)*	*13 (7.07)*
Religion			
No religion	*313 (92.60)*	*143 (92.86)*	*170 (92.39)*
Buddism	*16 (4.73)*	*7 (4.55)*	*9 (4.89)*
Christianity	*8 (2.37)*	*4 (2.60)*	*4 (2.17)*
Education			
High school or below	*18 (5.33)*	*6 (3.90)*	*12 (6.52)*
Vocational school[2]	*29 (8.58)*	*11 (7.14)*	*18 (9.78)*
Bachelor's degree	*205 (60.65)*	*94 (61.04)*	*111 (60.33)*
Master's degree or above	*85 (25.15)*	*42 (27.27)*	*43 (23.37)*

No formal education	*1 (0.30)*	*1 (0.65)*	*0 (0.00)*
Occupation			
Blue-collar[3]	*10 (2.96)*	*1 (0.65)*	*9 (4.89)*
White-collar[4]	*156 (46.15)*	*90 (58.44)*	*66 (35.87)*
Health worker[5]	*80 (23.67)*	*26 (16.88)*	*54 (29.35)*
Others	*92 (27.22)*	*37 (24.03)*	*55 (29.89)*
Average household monthly income (million VND)			
< 6	*24 (7.10)*	*9 (5.84)*	*15 (8.15)*
6 ≤ income < 12	*111 (32.84)*	*48 (31.17)*	*63 (34.24)*
12 ≤ income < 24	*117 (34.62)*	*59 (38.31)*	*58 (31.52)*
> 24	*86 (25.44)*	*38 (24.68)*	*48 (26.09)*
Number of children under 5, Mean (SD)	1.29 (0.52)	1.29 (0.50)	1.29 (0.53)
Age of child[6] (years)			
< 1 year old	*178 (52.66)*	*84 (54.55)*	*94 (51.09)*
1 ≤ age < 2	*47 (13.91)*	*20 (12.99)*	*27 (14.67)*
2 ≤ age < 5	*113 (33.43)*	*50 (32.47)*	*63 (34.24)*
Child gender			
Female	*152 (44.97)*	*73 (47.40)*	*79 (42.93)*
Male	*180 (53.25)*	*79 (51.30)*	*101 (54.89)*
Decision maker on vaccine-uptake (multi-selection)			
Mother	*255 (75.44)*	*125 (81.17)*	*130 (70.65)*
Father	*174 (48.52)*	*75 (48.70)*	*99 (53.80)*
Grandmother	*3 (0.89)*	*2 (1.30)*	*1 (0.54)*
Grandfather	*2 (0.59)*	*1 (0.65)*	*1 (0.54)*
Perception if child is healthy			
Strongly agree	*255 (75.44)*	*113 (73.38)*	*142 (77.17)*
Moderately agree	*60 (17.75)*	*27 (17.53)*	*33 (17.93)*
Neutral	*16 (4.73)*	*10 (6.49)*	*6 (3.26)*
Moderately disagree	*2 (0.59)*	*2 (1.30)*	*0 (0.00)*
Strongly disagree	*5 (1.48)*	*2 (1.30)*	*3 (1.63)*
Child received other vaccinations			
Yes	*286 (84.62)*	*124 (80.52)*	*162 (88.04)*
No	*52 (15.38)*	*30 (19.48)*	*22 (11.96)*

Child experienced adverse reactions due to vaccination			
Yes	*107 (31.66)*	*42 (27.27)*	*65 (35.33)*
No	*231 (68.34)*	*112 (72.73)*	*119 (64.67)*
Family member received PCV			
Yes	*211 (62.43)*	*104 (67.53)*	*107 (58.15)*
No	*127 (37.57)*	*50 (32.47)*	*77 (41.85)*
Family member experienced adverse reactions due to vaccination			
Yes	*85 (25.15)*	*34 (22.08)*	*51 (27.72)*
No	*253 (74.85)*	*120 (77.92)*	*133 (72.28)*
Know people having pneumonia			
Yes	*160 (47.34)*	*65 (42.21)*	*95 (51.63)*
No	*178 (52.66)*	*89 (57.79)*	*89 (48.37)*

[1]Others include 2 grandparents and 1 uncle/aunt; [2]Vocational education (TVET) are part of the national plan in Vietnam, ranging from Elementary TVET to College training that was placed between high school and bachelors (UNESCO-UNEVOC, 2018); [3]Blue-collar worker perform manual labor, often non-office like construction or farming; [4]White-collar perform in-office work including administration or education; [5]A number of participants were identified as health workers, thus it was decided to be shown in occupation to clarify a biased result; [4]The youngest child's age was asked if the caregiver had more than 1 child under 5 years old, data categorized based on the required dose of PCV based on the age of a child's first injection.

3.2 KAP on childhood pneumonia disease and PCV vaccination

3.2.1 Knowledge

The mean score of knowledge was 38.54 (out of 65). The univariate regression model showed knowledge results significantly different between age group 30-39 and other age groups, and with white-collar or other workers and the occupation health worker (Table 2). It also indicated an significantly higher score when the child is female, when they had experienced adverse reactions due to vaccination before, and when the caregiver know someone who had pneumonia (Table 2).

Questions in knowledge part included the general risk, vaccination, symptoms, prevention and treatment of PCV. More than 1 out of 4 participants (61, *26.75%*) didn't know that childhood pneumonia rarely spread through handshake. Yet even more participants (301, *89.05%*) didn't know that pneumonia disease may spread through blood circulation, especially during and shortly after birth (WHO, 2022b).

Table 2: Comparison of the mean scores of caregivers' knowledge based on demographics and socio-economic factors

Characteristics	Knowledge		
	Mean	SD	P*
Whole sample	38.54	9.65	
Relationship to child			0.406
Mother	38.95	9.45	
Father	37.37	10.05	
Age, years			**0.018**
18 - 29	36.85	10.16	
30 - 39	39.68	9.38	
> 40	36.09	8.28	
Education			0.364
High school or below	40.19	8.41	
Vocational school	37.66	8.54	
Bachelor's degree	37.87	9.73	
Master's degree or above	40.16	10.02	
No formal education	30.00	-	
Occupation			**<0.001**
Blue-collar	38.75	11.37	
White-collar	37.32	9.94	
Health worker	42.09	8.76	
Others	37.51	9.09	
Average household monthly income (million VND)			0.427
< 6	36.21	7.35	

6 ≤ income < 12	37.99	9.42	
12 ≤ income < 24	38.66	10.80	
> 24	39.74	8.80	
Age of child (years)			0.436
< 1 year old	39.00	9.40	
1 ≤ age < 2	39.11	10.19	
2 ≤ age < 5	37.58	9.83	
Child gender			**0.026**
Female	39.18	9.21	
Male	37.97	9.92	
Perception if child is healthy			0.063
Strongly agree	38.95	9.20	
Moderately agree	38.70	9.45	
Neutral	32.22	14.30	
Moderately disagree	29.50	21.92	
Strongly disagree	39.80	7.39	
Child experienced adverse reactions due to vaccination			**0.009**
Yes	40.49	9.71	
No	37.64	9.51	
Family member received PCV			0.345
Yes	38.95	9.10	
No	37.87	10.52	
Know people having pneumonia			**<0.001**
Yes	40.85	8.77	
No	36.46	9.96	

* P-value was denoted from univariate linear regression.

3.2.2 Attitude

The attitude score was presented as 37.64 out of 50, which is considerably high. The mean scores of caregivers' attitude showed significant difference when caregivers are mother other than father (*p=0.025*, Table 3), and when they strongly agree or disagree with the perception if the child is healthy (*p=0.002*, Table 2). Although other results were

not statistically significant, caregivers' age, average household monthly income, and child's age could indicate a positive relation to caregivers' attitude on childhood pneumonia disease and PCV vaccination.

Table 3: Comparison of the mean scores of caregivers' attitude based on demographics and socio-economic factors

Characteristics	Attitude		
	Mean	SD	P*
Whole sample	37.64	4.43	
Relationship to child			0.120
Mother	37.83	4.36	
Father	37.17	4.59	
Age, years			0.340
18 - 29	37.17	4.69	
30 - 39	37.79	4.32	
> 40	38.45	4.07	
Education			0.655
High school or below	39.11	5.44	
Vocational school	37.40	4.80	
Bachelor's degree	37.65	4.35	
Master's degree or above	37.36	4.29	
No formal education	38.50	-	
Occupation			0.576
Blue-collar	38.23	5.69	
White-collar	37.34	4.05	
Health worker	37.60	4.28	
Others	38.12	5.02	
Average household monthly income (million VND)			0.092
< 6	36.98	5.03	
6 ≤ income < 12	37.13	4.50	
12 ≤ income < 24	37.52	4.30	
> 24	38.63	4.25	

Age of child (years)			0.187
< 1 year old	37.29	4.25	
1 ≤ age < 2	37.49	4.71	
2 ≤ age < 5	38.25	4.55	
Child gender			0.285
Female	38.01	4.55	
Male	37.39	4.33	
Perception if child is healthy			**0.002**
Strongly agree	37.81	4.21	
Moderately agree	36.71	4.85	
Neutral	35.89	4.84	
Moderately disagree	42.50	3.54	
Strongly disagree	43.60	2.41	
Child experienced adverse reactions due to vaccination			0.155
Yes	37.44	4.85	
No	37.72	4.23	
Family member received PCV			0.186
Yes	37.87	4.43	
No	37.25	4.41	
Know people having pneumonia			0.066
Yes	38.19	3.95	
No	37.14	4.77	

* P-value was denoted from univariate linear regression.

Caregivers reflected on their Attitude on childhood pneumonia infections and PCV vaccination (Figure 1). A notable percentage of caregivers believed there were too many childhood vaccines and doses for a child to take, nonetheless the cost of PCV was perceived to be too high (Figure 1).

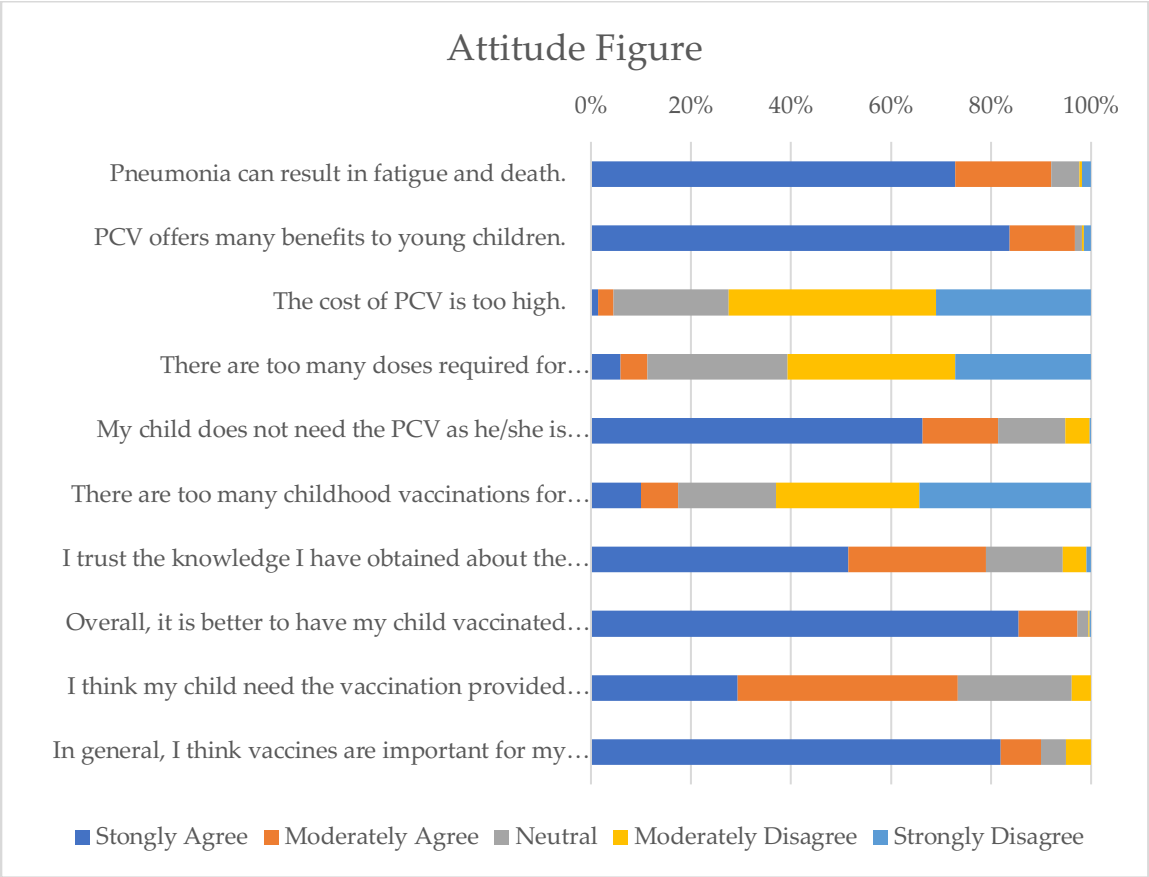


Figure 1: Attitude of the caregivers towards childhood pneumonia infections and PCV vaccination

3.2.3 Practice

The practice score showed 26.92 out of 30, with mother caregivers' practice score significantly higher than fathers of the child ($p < 0.001$, Table 4). Similar to results for knowledge score, the score for practice depicted a significant relationship with the gender of the child, caregivers' perception of whether the child is healthy, and whether the child had experienced adverse reactions due to vaccination before (Table 4).

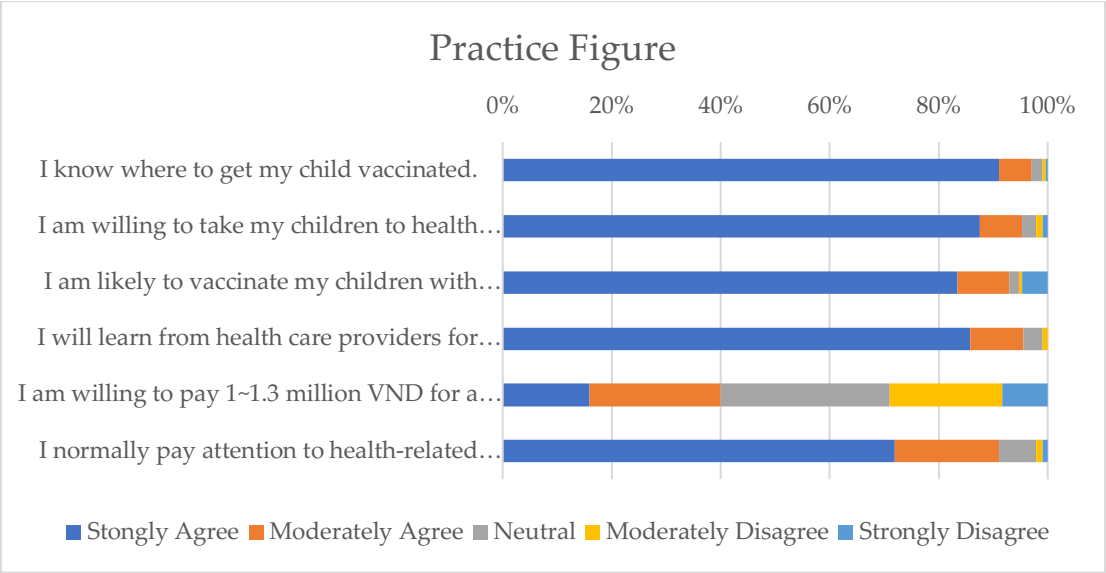
Table 4: Comparison of the mean scores of caregivers' practice based on demographics and socio-economic factors

Characteristics	Practice		
	Mean	SD	P*
Whole sample	26.92	2.47	
Relationship to child			**<0.001**
Mother	27.23	2.07	
Father	25.93	3.35	
Age, years			0.594
18 - 29	26.75	2.83	
30 - 39	26.99	2.29	
> 40	27.17	2.33	
Education			0.163
High school or below	27.78	1.48	
Vocational school	27.86	1.53	
Bachelor's degree	26.72	2.67	
Master's degree or above	26.91	2.31	
No formal education	28.00	-	
Occupation			0.805
Blue-collar	27.50	1.78	
White-collar	26.90	2.29	
Health worker	26.76	2.52	
Others	26.04	2.79	
Average household monthly income (million VND)			0.143
< 6	26.92	3.12	
6 ≤ income < 12	26.53	2.67	
12 ≤ income < 24	27.20	2.03	
> 24	27.06	2.53	
Age of child (years)			0.771
< 1 year old	26.87	2.35	
1 ≤ age < 2	26.94	2.59	
2 ≤ age < 5	27.00	2.62	

Child gender			**0.002**
Female	27.08	2.54	
Male	26.79	2.41	
Perception if child is healthy			**0.008**
Strongly agree	26.90	2.47	
Moderately agree	27.15	2.41	
Neutral	26.25	2.49	
Moderately disagree	25.50	6.36	
Strongly disagree	28.20	1.78	
Child experienced adverse reactions due to vaccination			**0.005**
Yes	26.75	2.70	
No	27.00	2.36	
Family member received PCV			0.828
Yes	26.94	2.42	
No	26.90	2.56	
Know people having pneumonia			0.573
Yes	27.06	2.46	
No	26.80	2.48	

* P-value was denoted from univariate linear regression.

As shown in Figure 2, caregivers gave highly positive responses to the study questions regarding practice. Caregivers demonstrated trust in health care providers they encountered, understood and were willing to have their child vaccinated.



[1]The question was modified to fit better into the figure, the original question was "How much are you willing to pay for your child to be vaccinated with a dose of PCV?" with answers "> 1.5 million VND", "1.3 ~ 1.5 million VND", "1 ~ 1.3 million VND", "0.6 ~ 1 million VND", and "< 0.6 million VND", modified in accordance to the Likert scale.

Figure 1: Practice of the caregivers towards decision to let the child undergo PCV vaccination

3.2.4 Spearman correlation analysis

Spearman correlation analysis showed that knowledge was positively correlated with attitude ($r = 0.285$, $P < 0.001$) and practice ($r = 0.041$), and attitude was positively correlated with practice ($r = 0.273$, $P < 0.001$) (Table 5).

Table 5: Spearman correlation analysis of KAP scores

	Knowledge	Attitude	Practice
Knowledge	1		
Attitude	0.285*	1	
Practice	0.041	0.273*	1

*P < 0.001.

3.3 Association between KAP and socio-economic factors

It is shown (Table 5) that significant association existed between caregivers' KAP when they moderately disagree with healthy perception of their child's health. With caregivers' strongly agreeing on their child's healthy status as the reference group, the coefficients from the multivariate regression analysis suggests that caregivers who do not know people who had pneumonia were associated with a lower (-3,25, *p=0.002*) knowledge score, yet the positive coefficient indicates that the same group are more likely to score higher in attitude scores (4.30, *p=0.033*) with attitude scores and lower (-1.82, *p=0.047*) in practice scores. This may be due to a lack of access to accurate or rememberable information, or that they are working hard to improve their poor knowledge and rather unhealthy state of their child. Whether a family member has received PCV vaccination before was also shown to be significantly (*p=0.002*) related to caregivers' knowledge in a positive way. Moreover, mothers seemed to have a better attitude on the topic of pneumonia disease and PCV vaccination than fathers (*p=0.049*).

Table 5: Association between socio-economic factors and KAP of PCV vaccination among caregivers in Hanoi

Characteristics	Knowledge		Attitude		Practices	
	Coefficient (95% CI)	P	Coefficient (95% CI)	P	Coefficient (95% CI)	P
Relationship to child (ref=Mother)						
Father	-1.35 (-4.13, 1.43)	0.340	-1.41 (-2.64, -0.18)	**0.025**	-1.74 (-2.55, -0.92)	**<0.001**
Age (ref= 18 - 29)						
30 - 39	2.22 (-0.09, 4.52)	0.059	0.44 (-0.58, 1.46)	0.399	0.07 (-0.61, 0.75)	0.838
> 40	-0.84 (-5.42, 3.74)	0.719	0.49 (-1.54, 2.53)	0.634	1.03 (-0.32, 2.37)	0.135
Religion (ref=No religion)						
Buddhism	1.83 (-2.81, 6.48)	0.438	-0.67 (-2.73, 1.39)	0.522	-1.37 (-2.74, -0.01)	**0.049**
Christianity	-3.33 (-10.11, 3.45)	0.334	-1.82 (-4.83, 1.18)	0.234	-0.25 (-2.25, 1.74)	0.801
Education (ref=High school or below)						
Vocational school	-2.80 (-8.63, 3.03)	0.346	-1.09 (-3.68, 1.50)	0.407	0.74 (-0.98, 2.45)	0.399
Bachelor's degree	-2.86 (-8.63, 3.03)	0.264	-1.30 (-3.54, 0.93)	0.251	-0.92 (-2.40, 0.56)	0.223
Master's degree or above	-1.28 (-6.71, 4.14)	0.642	-1.55 (-3.96, 0.86)	0.206	-0.48 (-2.08, 1.11)	0.551
No formal education	-5.98 (-24.75, 12.79)	0.531	-0.90 (-9.23, 7.43)	0.831	-0.32 (-5.84, 5.20)	0.989
Occupation (ref=Blue-collar)						
White-collar	-3.68 (-10.69, 3.32)	0.301	-0.38 (-3.49, 2.73)	0.810	-0.72 (-2.78, 1.34)	0.492
Health worker	1.10 (-5.96, 8.16)	0.759	0.15 (-2.99, 3.28)	0.927	-0.99 (-3.07, 1.08)	0.347
Others	-3.72 (-10.65, 3.20)	0.291	0.12 (-2.95, 3.19)	0.938	-0.83 (-2.87, 1.20)	0.421
Average household monthly income (million VND, ref= < 6)						
6 ≤ income < 12	-0.11 (-4.38, 4.16)	0.959	0.33 (-1.57, 2.22)	0.736	-0.61 (-1.87, 0.64)	0.336

12 ≤ income < 24	0.38 (-3.96, 4.71)	0.864	0.33 (-1.59, 2.25)	0.735	0.50 (-0.77, 1.77)	0.440
> 24	1.11 (-3.32, 5.54)	0.623	1.09 (-0.87, 3.05)	0.275	0.22 (-1.08, 1.52)	0.742
Number* of children under 5	0.13 (-2.03, 2.29)	0.904	-0.35 (-1.30, 0.61)	0.478	-0.25 (-0.88, 0.39)	0.440
Age of child* (ref= < 1 year old)						
1 ≤ age < 2	-1.26 (-4.36, 1.83)	0.423	0.31 (-1.07, 1.68)	0.660	0.09 (-0.82, 1.00)	0.849
2 ≤ age < 5	-1.12 (-3.44, 1.20)	0.343	0.91 (-0.12, 1.94)	0.082	0.12 (-0.56, 0.80)	0.724
Child gender (ref=female)						
Male	-0.37 (-2.42, 1.68)	0.726	-0.33 (-1.24, 0.58)	0.471	-0.14 (-0.74, 0.46)	0.654
Perception if child is healthy (ref=Strongly agree)						
Moderately agree	1.07 (-1.67, 3.82)	0.444	-1.04 (-2.26, 0.18)	0.094	0.29 (-0.51, 1.10)	0.476
Neutral	-4.47 (-9.25, 0.31)	0.067	-1.16 (-2.26, 0.18)	0.283	-0.06 (-1.46, 1.35)	0.934
Moderately disagree	-6.88 (-19.73, 5.98)	0.293	4.09 (-1.61, 9.79)	0.159	-2.16 (-5.94, 1.62)	0.161
Strongly disagree	3.00 (-5.47, 11.48)	0.486	4.67 (0.91, 8.43)	**0.015**	0.58 (-1.92, 3.07)	0.648
Child received other vaccinations (ref=Yes)	-1.13 (-4.04, 1.78)	0.444	-0.62 (-1.91, 0.67)	0.344	-0.25 (-1.11, 0.60)	0.565
Child experienced adverse reactions due to vaccination (ref=Yes)	-1.52 (-4.04, 1.78)	0.220	0.39 (-0.69, 1.47)	0.477	0.42 (-0.30, 1.13)	0.254
Family member received PCV (ref=Yes)	-1.56 (-3.65, 0.54)	0.145	-0.70 (-1.63, 0.23)	0.142	-0.16 (-0.78, 0.45)	0.606
Family member experienced adverse reactions due to vaccination (ref=Yes)	1.53 (-1.00, 4.06)	0.236	0.39 (-0.73, 1.51)	0.493	0.31 (-0.44, 1.05)	0.420
Know people having pneumonia (ref=Yes)	-3.25 (-5.33, -1.17)	**0.002**	-0.79 (-1.71, 0.14)	0.094	-0.26 (-0.87, 0.36)	0.410

* If a caregiver respondent takes care of more than 1 child, the questions were referred to the youngest child.

3.4 Qualitative insights

Interview participants included 15 mothers and 1 grandmother aged between 28 and 66 years in urban Hanoi, and 10 healthcare workers with working experience from 6 months to 8 years (Table 6 and 7) located in both urban and rural districts. The study results are structured along WHO's BeSD framework (WHO, 2022a) based on the investigator's judgement on the theme. 8 themes were identified among the study group (caregivers and healthcare workers), difference in KAP between caregivers from rural and urban areas was observed.

Table 6: Demographics of interview participants in the caregivers group (n=16)

Characteristics	HMU Clinic N = 8 (%)	LVT Clinic N = 8 (%)
Relationship to child		
Mother	7 (87.5)	8 (100.0)
Grandma	1 (12.5)	0 (0.0)
Age		
18 - 29	2 (25.0)	2 (25.0)
30 - 39	3 (37.5)	5 (50.0)
> 40	3 (37.5)	1 (12.5)
Decision maker on vaccine-uptake		
Yes	8 (100.0)	7 (87.5)
No	0 (0.0)	1 (12.5)
Age of child (years)		
< 1	0 (0.0)	5 (50.0)
1 ≤ age < 2	2 (25.0)	2 (25.0)
2 ≤ age < 5	6 (75.0)	0 (0.0)
Child PCV vaccinated		
Yes	6 (75.0)	5 (50.0)
No	2 (25.0)	3 (37.5)

Table 7: Demographics of interview participants in the healthcare workers group (n=10)

Characteristics	N = 10 (%)
Gender	
Female	9 (90.0)
Male	1 (10.0)
Base	
HMU Clinic	2 (20.0)
LVT Clinic	2 (20.0)
Others (in Hanoi)	6 (60.0)
Position	
Doctor	4 (40.0)
Nurse	6 (60.0)
Working experience	
< 1 year	5 (50.0)
1 - 5 years	2 (20.0)
> 5 years	3 (30.0)

3.4.1 Caregivers and health workers perceived knowledge on PCV

All of the caregiver interview participants live in the urban districts of Hanoi at the time of the study, and had a moderate degree of knowledge about PCV and pneumonia diseases on average. Even if some responders do not have knowledge for the specific diseases, for example the symptoms and treatments, children were vaccinated under caregivers' good understanding of immunization:

> "The pneumococcal vaccine prevents diseases like pneumonia, meningitis, and septicemia, right? Currently, my child is receiving the 13-valent vaccine." – (Vaccinated/CG11)

"I've thoroughly researched all the vaccines beforehand for my child's vaccination." – (Vaccinated/CG3)

"It's for disease prevention. For example, if my child gets sick today, there would be many harmful effects and treatment would be difficult. It's better to prevent than to treat." – (Vaccinated/CG11)

They usually learned about the vaccine through health clinics, medias or people around them, then seek knowledge about the vaccine on the internet and/or from people around. Health workers working in urban areas observed the same results:

"Nowadays, most mothers that just gave birth are very knowledgeable, especially in urban areas. They join mothers' groups, became well-informed, and almost 100% get their children vaccinated [with PCV] after consulting with doctors." – (HW3, urban)

All healthcare worker participants were directly administrating in PCV immunization, part of their work is to provide consultation regarding the production and strains of different types of PCV and the vaccine schedule for children of different ages. According to health workers in the rural areas, rural caregivers have a more limited knowledge on PCV and pneumonia diseases:

"Most people only become aware [of PCV] when they visit here for consultation." – (HW10, rural)

3.4.2 Caregivers and health workers on PCV price

Price was mentioned to be the biggest barrier in PCV uptake for children under 5 in Hanoi, Vietnam, especially in rural areas. All respondents reacted positively to the government of Hanoi's plan to include PCV in EPI in 2025 (Ministry of Information and Communications, 2023). Mothers hesitate to back out of PCV schedule with inadequate funds, and healthcare workers observed the situation, especially in rural areas:

"I have to consider all the costs for clinic visits." – (Unvaccinated/CG2)

"The first thing is the price. Many people are concerned, especially for young children who need multiple doses. The price is compared to be quite high in rural areas." – (HW10, rural)

At the same time, many urban caregivers do not mind the price at all:

"I don't care much for the vaccine price, I go for the one with higher effectiveness." – (Vaccinated/CG8)

And some caregivers expressed their willingness to pay the high price or manage money to secure their children's health in the future:

"If the price is reasonable, good. If it's not, I'm willing to protect my child and pay to vaccinate." – (Vaccinated/CG11)

"Generally, if it's expensive, I will have to manage somehow." – (Unvaccinated/CG14)

"I prepare money specifically for vaccinating my child or when my child is sick or in pain. I budget a separate amount for that." – (Unvaccinated/CG15)

Currently, vaccination in Vietnam is covered by neither private health insurance, or social insurance. Therefore, if all insurance sectors could support vaccination costs, it would be excellent.

3.4.3 Caregivers attitude on PCV and general vaccination

Since PCV has not been included in EPI, some caregivers had a neutral attitude:

"I haven't heard or researched about it [PCV], but I haven't given it to my child either." – (Unvaccinated/CG4)

Caregivers may not have the habit to actively look for preventive measures to avoid possible pediatric complications for children, yet they generally demonstrated high attitude in professional health workers and national EPI vaccines:

"I believe all vaccines produced are effective, and the diseases they prevent are all dangerous. So when doctors schedule vaccination, I'm ready to take my child." – (Vaccinated/CG5 & CG6)

"I'm not overly concerned about vaccine side effects because all vaccines undergo rigorous research, clinical trials, and community trials before being approved by the Ministry of Health and the WHO." – (Vaccinated/CG3)

"They're the same for me, PCV or another vaccine, all important, to prevent diseases for my child." – (Vaccinated/CG16)

"I think general vaccines [in the vaccine schedule] are necessary. I have 3 children and used to go to commune health center for the free vaccines. She [the youngest kid, is the only one who] completed the vaccinations [schedule]. There are many strange diseases nowadays, so we vaccinate to prevent them for children. As for PCV specifically, I want more information about it." – (Unvaccinated/CG2)

3.4.4 Caregivers practice on perceived benefits of PCV and general vaccination

All caregivers perceived benefits of PCV, the biggest reason is its function to make sure of the child's health, allow it to be protected.

"He [my child] should be healthier. If a child get sick, it directly affects our family's activities, work, needing to take care of the child at home." – (Vaccinated/CG5)

"It feels like the child has something [to protect him]". – (Vaccinated/CG7)

"I just want my child to be healthy. .. when she got sick, both she and I were really sick." – (Vaccinated/CG13)

3.4.5 Caregivers practice on perceived barriers to vaccinating PCV

Possible side effects and safety issues were shown as the largest concern for urban caregivers when prompted about which factor(s) influence her decision the most to practice on adopting PCV:

"Safety is important." – (Vaccinated/CG1)

"It depends on the current situation of the epidemic. If it's unstable, then I want to ensure my children are fully vaccinated." – (Unvaccinated/CG2)

"After vaccination, the child's face changes, the fever rises. When vaccinating for prevention, I choose the ones that I think are best and most necessary for my child." – (Unvaccinated/CG9)

"I'm just worried about whether she can handle them all." – (Vaccinated/CG13)

Several caregivers mentioned the procurement of EPI vaccines:

"I am concerned about free vaccines. People say there are improper storage and will affect the effectiveness of the vaccine when administered to the child." – (Unvaccinated/CG15)

3.4.6 Caregivers source of information on PCV

All caregivers mentioned doctors as the reliable source, yet half of the group found it influential receiving vaccine information through medias like TV, social medias, booklets as well as opinions from people around:

"We would consult doctors to see what's better to administer to the children about the additional vaccines." – (Unvaccinated/CG2)

"Doctors have the most influence on whether I decide to vaccinate my child or not." – (Vaccinated/CG5)

"Positive information is more accessible, but for side effects, I rely on instructions provided in booklets and vaccine schedules." – (Vaccinated/CG1)

"First of all, it will be the media. Then I start researching those vaccines, and have doctors further advise me. … I've seen information on TV talked about the necessity of vaccines, especially during the Covid pandemic. Now I really want to vaccinate everyone in the family." – (Vaccinated/CG8)

"Family and friends influence me more." – (Unvaccinated/CG9)

"The doctor, also information on social media or other breastfeeding mothers around me." – (Vaccinated/CG11)

"Traditional channels of the media." – (Vaccinated/CG16)

"I just listened to everyone's opinions. My uncle is a doctor, he said that pneumococcus is not very important." – (Unvaccinated/CG9)

3.4.7 Health workers perceived PCV situation

PCV is one of the most commonly administered vaccines in service vaccine centers according to the health worker interviews, constituting 20% up till 50% of the vaccines administered in a fee-for-service (service) center each day. Among the 10 health worker participants, a number of 5 PCV doses were reported to be administered per person per day on average:

"If they are very young kids, sometimes 10 out of 10 who come in will get PCV vaccination." – (HW8, urban)

"Doctors do not benefit financially when people receive PCV. 5-10 children and adults receive a dose each day, and the clinic doesn't have special goals." – (HW1, urban)

"Service centers do earn money from administering PCV, our clinic has a monthly goal of 1,200 doses, though there is only one vaccination room. However, it depends on how many customer come at times." – (HW7, urban)

Almost all health workers believed that the current price for a dose of PCV, especially PCV13, is higher than reasonable. A note of the tough economy at this time was expressed. And a desire to improve the clinic interior space, including setting up a baby's playground to keep children safe and occupied, was mentioned while being asked what the caregiver most wanted to do in the work.

3.4.8 Caregivers and health workers on PCV adherence

Text notifications was the most convenient reminder for caregivers' to take their child back for immunization, and patients' adherence for PCV was 95% on average according to the health workers' reports:

"I find vaccination reminders effective, especially through text." – (Vaccinated/CG1)

Location, transportation and service quality were shown to satisfy caregiver participants at the two clinics, which may contribute to the high adherence of vaccines:

"Every time I come [to the vaccination clinic], the doctor would answer all my questions before vaccinating my child. I trust them." – (Vaccinated/CG5)

"I am satisfied with every aspect of the vaccination process, from the welcoming to the professional care provided. All my family members receive advice from doctors regarding appropriate vaccines." – (Vaccinated/CG6)

Reasons for missing vaccine schedule were slightly different in urban and rural districts despite the common reasons of sickness and finance: the urban population consists of more migrants, thus an infant may be late for vaccination due to family travels; in rural districts, health workers reported caregivers experiencing perceived ineffectiveness of another child catching the disease that was supposed to be prevented by the vaccination, and stopped following the schedule. This was due to a lack of understanding in the immunization and requires more advocacy.

Regarding the news of including PCV into EPI, all were delighted, despite some doubts on its source of fund and the time it will take.

4. Discussion

This finding is valuable for its attempt to better understand the barriers to childhood PCV uptake in Hanoi, Vietnam. The study discovered that young child caregivers with high socio-economic status in Hanoi may have limited knowledge, but relatively high attitude and practice of PCV, with caregivers in urban area and caregivers aged 30-39 presenting slightly better knowledge than their counterparts. Moreover, it can be shown that caregivers in Hanoi have high trust in local health professionals, which is a discovery that can be perceived as an essential component of prosperous healthcare (Østergaard, 2015).

Study results confirmed with previous studies that caregivers' willingness to vaccinate children with the pneumococcal vaccine was highly influenced by cost concerns but positively associated with sufficient vaccine knowledge (Li et al., 2022). Safety issues and side effects were shown to be the major concerns for urban caregivers in vaccinating their kids. On the other hand, the cost was the main barrier for caregivers to accept PCV living in rural households (Harjaningrum et al., 2013).

Key discoveries include:

1) Caregivers from the Hanoi metropolitan area who pay visits to vaccination centers regularly for kids under 5 tend to possess a high socio-economical score, paying less attention to the price of PCV vaccine but more to its safety, including possible vaccine side effects. They believe the price of 1~1.3million VND per dose for PCV is an

investment in children's future health as well as their time, other than viewing as a burden to the household.

In general, the caregivers trust the professionals in healthcare centers, relying on them to instruct the vaccination schedule and PCV types. On the other hand, young caregivers rely a lot on their friends and families (e.g. a relative who is a doctor, or a group of women who just gave birth like oneself).

2) PCV immunization adherence is high within Hanoi, Hanoians who enter a service vaccination center generally possess a positive attitude towards vaccines, with 9 out of 10 people receiving a vaccine after the entrance. Most caregivers with a higher socio-economic score feel safe with their choice after reading review blogs and information posted on the web. In terms of adopting routine immunization within EPI and service vaccines (OOP), some caregivers trust the EPI vaccines more due to their confidence in the government, other caregivers, usually the ones who earn more, research more thoroughly to obtain knowledge on the vaccine. These were observed to be the caregivers who would want more options and prefer the service vaccines (eg. taking the 6-in-1 vaccine instead of getting 6 separate dose for free for their kids), partly due to perceived reputation of less side effects and better procurement systems. During our interviews, some caregivers expressed their concerns of vaccine storage in public health centers.

Overall, the data showed similar results to previous survey conducted in Ho Chi Minh City with parents of children under 36 months of age, indicating the positive attitude that children should be vaccinated no matter the service of EPI vaccines (C.T.T. Nguyen1 et al., 2019).

3) Service vaccine clinic health workers in Hanoi observed a positive attitude towards PCV vaccination among Hanoian caregivers as well. They believe that allowing the government to subsidize PCV will strongly improve the coverage of the vaccine, as the price is still a major concern for many. Yet they also emphasized a desire to upgrade the facilities and environment of the vaccine center to provide better care for caregivers.

However, for the knowledge part of the KAP assessment, "how much of knowledge related to PCV and pneumonia diseases" is enough remains a question to be further discussed. Health literacy on a disease is possessing the knowledge enough for patients to take the desired actions to prevent disease for their own and family member's health. If a caregiver has a high compliance in ensuring their children to be vaccinated, the necessity of acquiring accurate knowledge to the disease may be questioned.

4) This study indicated that communication was shown to be impactful outside the information source of healthcare workers. This was in accordance with previous articles acknowledging the influence of media in the country of Vietnam (C.T.T. Nguyen1 et al., 2019). In accordance with caregivers' concern on safety, out-reach

campaigns and social network can be used to increase caregivers' knowledge (Libwea et al., 2014).

4.1 Implications for further practice

Vietnam exploring more ways to pay for the vaccine was shown to be a potential effective way in Hanoi, Vietnam. As the city government announced to include PCV in EPI, other programs such as private insurance can be looked into as well. Hanoi, as a big city with people from different places, can invest in a system to connect immunization clinics for caregivers to keep up with their children's vaccine adherence. Above that, the data registration for childhood immunization can be improved by the Ministry of Health and General Statistic Office. A more digitalized public system with adequate technology support would boost the local healthcare practice and research (Quan & Taylor-Robinson, 2023).

In general, the study observed the service vaccine clinics in Hanoi improving and maintaining the childhood PCV uptake in the region. Future researches may look deeper into how the system of PCV vaccination was built and whether it may be up-scaled to more regions. Furthermore, when PCV is shortly introduced into Hanoi, more studies and analysis can be conducted (e.g. the program feasibility and sustainability, whether there is a strong preference to using domestically produced products.) to establish a comprehensive strategy to enable the vaccine introduction in the country (Athiyaman et al., 2023).

4.2 Study strengths and limitations

The study has certain limitations. As caregiver participants were recruited when they visit the two vaccine clinics under urban hospital settings, and the sample size was small, results may overestimate the KAP of PCV and pneumonia disease as compared to the general Hanoian population. The biased group of participants in this study creates bias in results, thus have limited contribution to the socioeconomic inequalities in vaccination coverage in Hanoi and Vietnam (C.T.T. Nguyen1 et al., 2019; Vo et al., 2019).

While the KAP assessment has been proposed and used for decades (Ibrahim, 1995), there has not been a mature form, definition or categorization developed for users (Aiga et al., 2016; Ho et al., 2022). Researchers around the world utilize the model in their own interpretations and differ drastically. Although validation was performed, certain misunderstandings may exist in this study regarding the understanding of questionnaire questions between the investigator, local researchers and caregivers. Producing a good KAP questionnaire not only require extensive research in time and energy, but also detailed inspections and matching it to potential outcome presentation. The study could have a better mixed-method design to fully utilize participants' time and produce triangulated outcomes. Nevertheless, data on the knowledge and behaviors of caregivers on PCV in Hanoi, Vietnam was valuable for its uniqueness, and presented a strength in contributing to the decrease of parental barriers to vaccines. It may become part of the foundation for future studies to fight pediatric vaccine-preventable diseases.

Another limitation is the integration of quantitative and qualitative components. The study design could be formulated more deliberate to align the data from two components, for example a sequence can be set to perform different parts of data collection more logically. The data collection could also be improved in details. During the semi-structured interviews, it was realized during the data analysis stage that more follow-up questions could be ask to obtain detailed information on the themes identified. Moreover, the were some repetitive questions and answers in caregiver interviews that could be simplified in the material guide. As the transcriptions and translations were produced altogether after the interviews were done, the primary investigator was not able to understand what could have been added to the interview guide to continuously better the results.

5. Conclusions

In conclusion, the findings of the current study suggest that knowledge regarding PCV may not be high in Hanoi, yet strong support of attitude and practices from caregivers exists. The urban immunization clinics in Hanoi, Vietnam have been effectively educating and serving the caregivers of children under 5 on PCV vaccination. In order to boost the vaccine understandings and uptake, policy-makers and professionals should continue to explore utilizing more traditional medias and social media friend groups to strongly advocate for the disease prevention program.

Introducing PCV into the national EPI program would be the best support to cover more children under 5 with PCV, and lower the under-5 mortality rate. In the meantime, it is crucial to emphasize the promotion for educating all caregivers on the vaccine-preventable disease, to understand the effectiveness in vaccines, prepare for the immunization, and "leave no one behind" (WHO, 2021b).

Appendix A

Research Instrument – Web-based survey [English + Vietnamese]

Informed consent:

Dear participant,

Thank you for your interest in our online survey for the research study on "Parental Knowledge, Attitude and Practice on Pneumococcal Conjugate Vaccines". This is an anonymous survey conducted by the Global Health Research Center at Duke Kunshan University. Before you proceed with the survey, we would like to provide you with detailed information on the purpose, content, process of the study, as well as the related benefits and risks. We hope that you will carefully review and agree to the following information before participating.

Research Purpose: The purpose of this survey is to understand the parents' with at least one child under 5 years old's knowledge, attitudes, and practices (KAP) of the pneumococcal conjugate vaccines.

Survey Content: The questionnaire will collect demographic information, and knowledge, attitudes, and practices related to pneumococcal vaccines through an online survey. The survey will not involve any ethical or legal issues, nor will it have any impact on your personal safety, property, or other aspects. The research findings will be used for academic research and may be published in academic journals, conferences, or other academic forums.

Process: The online survey consists of 50 questions and is expected to take approximately 10 minutes to complete. Please answer the questions based on your own actual situation.

Benefits and Risks: There are no particular benefits or risks declared. However, participating in this survey may benefit you in: understanding relevant vaccine knowledge, promoting you and your family's wellbeing, and providing references for related policies. We protect all every participant's privacy and ensure that the information and responses are not disclosed to any unauthorized party. Participants also have the right to drop out any time during the whole process.

If you agree to the above information, please check the boxes below to take part in this online survey.

Thank you for your participation!

☐ I have read and understood the information above, and I agree to participate in this research.

☐ I am over 18, I voluntarily participate in this study and agree to provide true, complete, and accurate information during the survey process.

☐ I understand my rights and risks and have no objections to participating in this survey.

Inclusion Criteria questions:

Are you the parent or primary caregiver of any children who are younger than 5 years old?

A. Yes

B. No

[IF "NO": Thank you for your response. We wish you a nice day! END SURVEY]

Welcome!

Thank you again for your interest in this survey.

This survey aims to understand your knowledge, awareness and perceptions of the pneumococcal conjugate vaccine (PCV).

Please provide answers based on your actual situation and personal feelings. It will take approximately 10 minutes.

Part 1: Personal situation and that of your kid(s). Please select the option that best reflects your actual situation.

0. Which clinic are you visiting?
   A. Le Van Thiem Clinic
   B. HMU Clinic

1. How old are you?
   _____ [slide bar](>=18)

2. What is your religion?

A. No
B. Buddhism
C. Christianity
D. Others____

3. What is your highest education level?
   A. Below high school
   B. High school
   C. Vocational school/secondary school
   D. Bachelor's degree
   E. Master's degree or above
   F. Uneducated

4. What is your occupation?
   A. Farmer
   B. Blue-collar workers
   C. White-collar workers
   D. Health care workers
   E. Freelancers
   F. Students
   G. Others ____

5. What is your average household monthly income in the past 12 months?
   A. < 3 million VND
   B. 3-<6 million VND
   C. 6-<12 million VND
   D. 12-<24 million VND
   E. 24-<48 million VND
   F. >48 million VND

6. How many people are there in your household?
   _____ [numerical value]

7. How many children you care for are **younger** than 5 years old?
   _____ [numerical value]

8. What is your relationship to your child? Would you say…
   A. Mother
   B. Father
   C. Grandparent

D. Uncle or aunt
E. Brother or sister
F. Other____

9. How old is the youngest child you care for?
   A. Less than 1 year old
   B. 1 year old
   C. 2 years old
   D. 3 years old
   E. 4 years old

10. Is the youngest child…?
   A. Female
   B. Male
   C. Non-binary
   D. Prefer not to say

11. Who generally decides whether to have the child receive self-funded vaccines? [multiple selection]
   A. Child's father
   B. Child's mother
   C. Grandmother
   D. Grandfather
   E. Other____

12. The child is healthy?
   A. Strongly agree
   B. Moderately agree
   C. Neutral
   D. Moderately disagree
   E. Strongly disagree

13. Has your child received the pneumococcal conjugate vaccine (e.g. Synflorix/Prevenar, PCV10/PCV13)?
   A. Yes
   B. No
   [IF "YES": SKIP QUESTION 19, IF "NO", SKIP QUESTION 15]

14. Have you heard of the 2 types of PCV that are currently available?
   A. I have heard of both Synflorix and Prevenar

B. I have heard of Synflorix
C. I have heard of Prevanar
F. I don't know/I don't remember

15. Which type of PCV vaccine did your child receive?
    A. PCV10 (Synflorix, usually cheaper)
    B. PCV13 (Prevenar 13, more expensive)
    C. I'm not sure, the health care worker choose for me

16. Have your child receive other vaccinations?
    A. Yes
    B. No

17. Have your child ever experienced any adverse reactions due to vaccination?
    A. Yes
    B. No
    [IF "NO": SKIP QUESTION 18]

18. What kind of treatments do you adopt when your child experience adverse reactions?
    A. Go to healthcare center
    B. Self-treatment
    C. Do nothing
    D. Others _____

19. Do you intend to let your child receive the PCV?
    A. Yes
    B. No

20. Have you yourself or your family member received the pneumococcal conjugate vaccine?
    A. Yes
    B. No

21. Have you or your family member ever experienced adverse reactions due to vaccination in person?
    A. Yes
    B. No

22. Do you know anyone who ever had pneumococcal-related diseases (such as pneumonia, meningitis, bacteremia, or otitis media) in person?

A. Yes
B. No

23. Do you smoke?
    A. Yes
    B. Occasionally
    C. No

24. How often did you have a drink containing alcohol in the past year?
    A. Never
    B. Monthly or less
    C. 2-4 times a month
    D. 2-3 times a week
    E. 4 or more times a week
    [IF "NEVER": SKIP NEXT 2 QUESTIONS]

25. How many drinks did you have on a typical day when you were drinking in the past year?
    A. 1 or 2
    B. 3 or 4
    C. 5 or 6
    D. 7 or 9
    E. 10 or more

26. How often did you have six or more drinks on one occasion in the past year?
    A. Never
    B. Less than monthly
    C. Monthly
    D. Weekly
    E. Daily or almost daily

Part 2: Knowledge towards the pneumococcal conjugate vaccine. You may choose multiple selections if the question option boxes are squares.

27. Have you heard about pneumococcal disease (eg. lung infection)?
    A. Yes
    B. No
    F. I don't know/I don't remember

28. Are babies at risk of developing pneumococcal disease?

A. Yes
B. No
F. I don't know

29. Can vaccination prevent pneumococcal disease?
    A. Yes
    B. No
    F. I don't know

30. The chance of your child catching pneumococcal disease is
    A. Very likely
    B. Moderately likely
    C. Neither likely nor unlikely
    D. Moderately unlikely
    E. Very unlikely
    F. I don't know

31. The consequences of pneumococcal disease for a child are
    A. Very severe
    B. Moderately severe
    C. Neither severe or mild
    D. Moderately mild
    E. Very mild
    F. I don't know

32. Have you heard about pneumococcal conjugate vaccine (PCV)?
    A. Yes
    B. No
    F. I don't know/I don't remember

33. Is PCV included in the EPI (Expanded Program of Immunization) in Vietnam?
    The Expanded Program of Immunization (TCMR) led by the National Institute of Hygiene and Epidemiology, has been implemented in Vietnam since 1981 with the goal of providing free immunization services for children under 1 year of age, ensuring protect children from some common and highly fatal infectious diseases. To date, the TCMR Program has had 11 vaccines.
    A. Yes
    B. No
    F. I don't know/I don't remember
    [Ans: B]

34. Vietnam has a recommended vaccination schedule for children. What are your child's vaccination needs?
    A. No vaccines of any kind
    B. Receive some vaccines
    C. Receive all vaccines

35. What are the symptoms of the pneumococcal disease? [multiple selection]
    A. Fever
    B. Trouble breathing, wheezing (increasing whistling sounds)
    C. Cough that lasts longer than 2 days
    D. Cough that produces mucus
    E. Chills
    F. I don't know/I don't remember
    [Ans: ABCDE]

36. How do childhood pneumonia possibly infect others? [multiple selection]
    A. Through bacteria 4
    B. Through viruses 8
    C. Through coughing, sneezing or talking 9
    D. Through handshake 10
    E. Through blood circulation 11
    F. I don't know/I don't remember 12
    [Ans: ABCE]

37. What are general treatments for pneumonia? [multiple selection]
    A. Fever control
    B. Drink plenty of water
    C. Take cough medicines directly
    D. Antibiotics for bacterial pneumonia
    F. I don't know/I don't remember
    [Ans: ABD]

38. How to prevent pneumonia in children? [multiple selection]
    A. Immunization, take vaccines
    B. Adequate nutrition
    C. Good indoor air quality
    D. Good hygiene
    F. I don't know/I don't remember
    [Ans: ABCD]

39. Do you know the current price of a dose of Pneumococcal Conjugate Vaccine (PCV)?
    A. > 1.5 million VND
    B. 1.3 ~ 1.5 million VND
    C. 1 ~ 1.3 million VND
    D. 0.6 ~ 1 million VND
    E. < 0.6 million VND
    F. I don't know/I don't remember
    [Ans: C]

Part 3: Attitude towards the pneumococcal conjugate vaccine

40.

Statement	Strongly Agree	Moderately Agree	Neutral	Moderately Disagree	Strongly Disagree
1. Pneumonia can result in fatigue and death.	○	○	○	○	○
2. PCV offers many benefits to young children.	○	○	○	○	○
3. The cost of PCV is too high.	○	○	○	○	○
4. There are too many doses required for vaccination with the PCV.	○	○	○	○	○
5. My child does not need the PCV as he/she is strong enough to cope with pneumococcal disease.	○	○	○	○	○
6. There are too many childhood vaccinations for my child to take.	○	○	○	○	○
7. I normally pay attention to health-related news.	○	○	○	○	○

8. I trust the knowledge I have obtained about the pneumococcal vaccine.	○	○	○	○	○
9. Overall, it is better to have my child vaccinated against pneumococcus than not.	○	○	○	○	○

41. In general, how important do you think vaccines are for your child's health? Would you say...
    A. Not at all important
    B. A little important
    C. Moderately important
    D. Very important

42. Do you think most of your close family and friends want you to get your child vaccinated?
    A. Yes
    B. No

43. Who recommended that your child receive the PCV [multiple selection]?
    A. Doctor
    B. Nurse
    C. Community healthcare worker
    D. Friends or Family
    E. Kindergarten teacher
    F. No one recommended
    G. Myself
    H. Others_____

44. Which of the following sources of information would you consider most influential to your decision making regarding vaccination with PCV [multiple selection]?
    A. Healthcare professional
    B. TV, loud speaker
    C. Newspapers, magazines
    D. Social media
    E. Friend, family members
    F. Kindergarten teachers

G. Brochures, leaflets, posters in health clinics
H. The internet
I. Others _____

Part 4: Practices towards the pneumococcal conjugate vaccine

45.

Statement	Strongly Agree	Moderately Agree	Neutral	Moderately Disagree	Strongly Disagree
1. I know where to get my child vaccinated.	○	○	○	○	○
2. I am willing to take my children to health clinics if they feel sick.	○	○	○	○	○
3. I am likely to vaccinate my children with PCV after learning about it.	○	○	○	○	○
4. I will learn from health care providers for explanation during a vaccination process.	○	○	○	○	○
5. I understand the out of pocket payment if my child fall sick of pneumonia.	○	○	○	○	○

46. How much are you willing to pay for your child to be vaccinated with **a dose of PCV**?
    A. > 1.5 million VND
    B. 1.3 ~ 1.5 million VND
    C. 1 ~ 1.3 million VND
    D. 0.6 ~ 1 million VND
    E. < 0.6 million VND

47. In what way(s) do you think PCV can be paid? [multiple selection]
    A. By government

B. By national (social) health insurance
C. By private health insurance
D. By myself

48. In general, how easy is it to receive vaccination for the kid? When you think about the cost, please consider any payments to the clinic, the cost of getting there, plus the cost of taking time away from work. Would you say...
    A. Not at all easy
    B. A little easy
    C. Moderately easy
    D. Very easy

49. Please leave your phone number
    _____[numerical value]

50. Would you be willing to speak with a representative from the research team about your response? We will contact you by phone.
    A. Yes
    B. No

Thank you for taking the time to answer our questions.
[redirected link to participant info form for compensation payment]

Participant Info form

This form is for financing purposes solely. Information collected will be accessible by limited personnel only, and will be destroyed at once when the process is over.

1. Please provide your full name:

2. Please provide your ID:

3. Please provide your phone number:

4. Please provide your signature:
   [e-signature page]

We thank you for your time taking this survey.
After validating your response, we will distribute some compensation as our thanks.

Thông tin Chấp thuận tham gia Khảo sát trực tuyến

Kính gửi người tham gia,

Cảm ơn anh/chị vì quan tâm đến cuộc khảo sát trực tuyến của chúng tôi cho nghiên cứu về "Kiến thức, Thái độ và Thực hành của Phụ huynh về Vắc-xin Phế cầu". Đây là một cuộc khảo sát ẩn danh do Trung tâm Nghiên cứu Y tế Toàn cầu tại Đại học Duke Kunshan tiến hành. Trước khi anh/chị tiếp tục với cuộc khảo sát, chúng tôi muốn cung cấp cho anh/chị thông tin chi tiết về mục đích, nội dung và quy trình của nghiên cứu, cũng như những lợi ích và rủi ro liên quan. Chúng tôi hy vọng anh/chị sẽ xem xét cẩn thận và đồng ý với các thông tin sau trước khi tham gia.

Mục đích nghiên cứu: Mục đích của cuộc khảo sát này là để hiểu kiến thức, thái độ và thực hành (KAP) của các phụ huynh có ít nhất một trẻ em dưới 5 tuổi về vắc-xin Phế cầu.

Nội dung khảo sát: Bảng câu hỏi sẽ thu thập thông tin dân số học, kiến thức, thái độ và thực tiễn liên quan đến vắc xin phế cầu thông qua một cuộc khảo sát trực tuyến. Khảo sát sẽ không liên quan đến bất kỳ vấn đề đạo đức hay pháp lý nào, cũng như không ảnh hưởng đến sự an toàn cá nhân, tài sản hoặc các khía cạnh khác. Kết quả nghiên cứu sẽ được sử dụng cho nghiên cứu học thuật và có thể được xuất bản trên các tạp chí học thuật, hội nghị hoặc các diễn đàn học thuật khác.

Quá trình: Cuộc khảo sát trực tuyến bao gồm 50 câu hỏi và dự kiến sẽ mất khoảng 10 phút để hoàn thành. Vui lòng trả lời các câu hỏi dựa trên tình huống thực tế của riêng bạn.

Lợi ích và Rủi ro: Không có lợi ích hoặc rủi ro đặc biệt được tuyên bố. Tuy nhiên, tham gia khảo sát này có thể giúp bạn hiểu rõ hơn về kiến thức vắc xin liên quan, thúc đẩy sức khỏe và sự phát triển của gia đình bạn, và cung cấp tham khảo cho các chính sách liên quan. Chúng tôi bảo vệ sự riêng tư của tất cả các thí sinh và đảm bảo rằng thông tin và câu trả lời không được tiết lộ cho bất kỳ bên thứ ba nào không được ủy quyền. Thí sinh cũng có quyền rút lui bất kỳ lúc nào trong suốt quá trình khảo sát.

Nếu bạn đồng ý với thông tin trên, vui lòng nhấp vào "Tôi đồng ý" để tham gia cuộc khảo sát trực tuyến này. Cảm ơn anh/chị đã tham gia!

☐ **Tôi đã đọc và hiểu thông tin trên, và tôi đồng ý tham gia vào nghiên cứu này.**

☐ **Tôi hiểu quyền lợi và rủi ro của mình và không có bất kỳ ý kiến nào đối với việc tham gia khảo sát này.**

☐ **Tôi đã trên 18 tuổi, tôi tự nguyện tham gia vào nghiên cứu này và đồng ý cung cấp thông tin đúng, đầy đủ và chính xác trong quá trình khảo sát.**

Tiêu chí bao gồm câu hỏi:

Anh/chị có phải là cha mẹ hoặc người chăm sóc chính của bất kỳ trẻ em nào dưới 5 tuổi không?

A. Có B. Không

[NẾU "KHÔNG": Cảm ơn anh/chị đã trả lời. Chúng tôi xin chúc anh/chị một ngày tốt lành! KẾT THÚC KHẢO SÁT]

Chào mừng anh/chị!

Cảm ơn anh/chị một lần nữa vì quan tâm đến cuộc khảo sát này.

Cuộc khảo sát này nhằm mục đích hiểu về kiến thức, nhận thức và quan điểm của anh/chị về vắc-xin phế cầu (PCV).

Xin anh/chị vui lòng trả lời dựa trên tình hình thực tế và cảm nhận cá nhân của anh/chị. Thời gian hoàn thành khảo sát khoảng 10 phút.

Phần 1: Các mục sau liên quan đến tình hình cá nhân của bạn và con của bạn. Vui lòng chọn phương án phù hợp nhất với tình huống thực tế của bạn.

0. Anh/chị đang đi khám ở phòng khám nào?
   A. Le Van Thiem
   B. Đại học Y Hà Nội

1. Bạn bao nhiêu tuổi?
   _____ [thanh trượt] (>=18)

2. Tôn giáo của anh/chị?
   A. Không
   B. Phật giáo
   C. Thiên chúa giáo

D. Khác____

3. Trình độ học vấn cao nhất của anh/chị là gì?
   A. Thấp hơn trung học phổ thông
   B. Trung học phổ thông
   C. Cao đẳng/trung cấp nghề
   D. Đại học
   E. Thạc sĩ hoặc cao hơn
   F. Không đi học

4. Nghề nghiệp của anh/chị là gì?
   A. Nông dân
   B. Công nhân
   C. Nhân viên văn phòng
   D. Nhân viên y tế
   E. Nghề tự do
   F. Sinh viên
   G. Khác [____]

5. Thu nhập trung bình hàng tháng của gia đình anh/chị trong năm vừa qua là bao nhiêu?
   A. Dưới 3 triệu đồng
   B. 3-<6 triệu đồng
   C. 6-<12 triệu đồng
   D. 12-<24 triệu đồng
   E. 24-<48 triệu đồng
   F. >48 triệu đồng

6. Số người trong hộ gia đình của anh/chị là bao nhiêu?
   _____ [giá trị số]

7. Anh/chị có bao nhiêu con dưới 5 tuổi?
   _____ [giá trị số]

8. Quan hệ của anh/chị với con là gì?
   A. Mẹ
   B. Cha
   C. Ông bà
   D. Chú hoặc cô
   E. Anh hoặc chị em
   F. Khác_____

9. Con út của anh/chị bao nhiêu tuổi?
   A. Dưới 1 tuổi
   B. 1 tuổi
   C. 2 tuổi
   D. 3 tuổi
   E. 4 tuổi

10. Giới tính của con út của anh/chị là...
   A. Con gái
   B. Con trai
   C. Giới tính khác
   D. Không muốn tiết lộ

11. Ai là người thường quyết định trả tiền cho con của anh/chị có tiêm vắc-xin? (Có thể chọn nhiều đáp án)
   A. Cha của trẻ
   B. Mẹ của trẻ
   C. Bà ngoại
   D. Ông ngoại
   E. Khác____

12. Anh/chị có cảm thấy con út của anh/chị khỏe mạnh không?
   A. Rất đồng ý
   B. Đồng ý một phần
   C. Trung lập
   D. Không đồng ý một phần
   E. Hoàn toàn không đồng ý

13. Con của anh/chị đã tiêm vắc-xin phế cầu (PCV) (ví dụ: PCV10 / PCV13, Synflorix / Prevenar) chưa?
   A. Rồi
   B. Chưa
      [NẾU "RỒI": BỎ QUA CÂU HỎI 19, NẾU "CHƯA", BỎ QUA CÂU 15]

14. Anh/chị đã nghe về hai loại vắc-xin phế cầu (PCV) hiện đang có sẵn chưa?
   A. Đã nghe về cả Synflorix (PCV10) và Prevenar (PCV13)
   B. Đã nghe về Synflorix (PCV10)
   C. Đã nghe về Prevenar (PCV13)

D. Không biết/Không nhớ

15. Loại vắc-xin phế cầu (PCV) nào mà con anh/chị đã tiêm?
    A. PCV10 (Synflorix, thường có giá rẻ hơn)
    B. PCV13 (Prevenar 13, đắt hơn)
    C. Tôi không chắc, nhân viên y tế chọn giúp tôi

16. Con anh/chị đã tiêm các loại vắc-xin khác chưa?
    A. Có
    B. Không

17. Anh/chị có biết ai đó từng gặp phải phản ứng sau khi tiêm vắc-xin không?
    A. Có
    B. Không

18. Khi con anh/chị gặp phản ứng phụ, anh/chị thường áp dụng phương pháp nào?
    A. Đi đến trung tâm y tế
    B. Tự điều trị
    C. Không làm gì
    D. Khác_____

19. Anh/chị có dự định để con anh/chị tiêm vắc-xin phế cầu (PCV) không?
    A. Có
    B. Không

20. Anh/chị hoặc thành viên trong gia đình của anh/chị đã tiêm vắc-xin phế cầu chưa?
    A. Có
    B. Không

21. Anh/chị hoặc thành viên trong gia đình của anh/chị đã từng gặp phản ứng phụ do tiêm chủng không?
    A. Có
    B. Không

22. Anh/chị có biết ai đó đã từng mắc các bệnh liên quan đến phế cầu (như viêm phổi, viêm màng não, nhiễm khuẩn máu hoặc viêm tai giữa) không?
    A. Có
    B. Không

23. Anh/chị có hút thuốc không?

A. Có
B. Thỉnh thoảng
C. Không

24. Tần suất mà anh/chị uống đồ có chứa cồn trong năm vừa qua như thế nào?
    A. Không bao giờ
    B. Tháng hoặc ít hơn
    C. 2-4 lần mỗi tháng
    D. 2-3 lần mỗi tuần
    E. 4 lần hoặc nhiều hơn mỗi tuần
    [NẾU "KHÔNG BAO GIỜ": BỎ QUA 2 CÂU HỎI TIẾP THEO]

25. Thông thường, anh/chị uống bao nhiêu ly trong năm vừa qua?
    A. hoặc 2 ly
    B. 3 hoặc 4 ly
    C. 5 hoặc 6 ly
    D. 7 hoặc 9 ly
    E. 10 ly trở lên

26. Tần suất anh/chị uống sáu ly hoặc nhiều hơn trong một lần trong năm vừa qua như thế nào?
    A. Không bao giờ
    B. Ít hơn hàng tháng
    C. Hàng tháng
    D. Hàng tuần
    E. Hàng ngày hoặc gần như hàng ngày

Phần 2: Kiến thức về vắc-xin phế cầu, một số câu hỏi có thể chọn nhiều đáp án.

27. Anh/chị đã nghe về bệnh phế cầu khuẩn (ví dụ: nhiễm trùng phổi) chưa?
    A. Có
    B. Không
    F. Không biết/Không nhớ

28. Theo anh/chị, trẻ em có nguy cơ mắc bệnh phế cầu không?
    A. Có
    B. Không
    F. Không biết

29. Theo anh/chị, việc tiêm chủng có thể ngăn ngừa bệnh phế cầu khuẩn không?

A. Có
B. Không
F. Không biết

30. Anh/chị đánh giá khả năng con anh/chị bị nhiễm phế cầu như thế nào?
A. Rất có khả năng
B. Có khả năng một phần
C. Chẳng có khả năng cũng chẳng không
D. Khá ít khả năng
E. Rất ít khả năng
F. Không biết

31. Theo anh/chị, hậu quả của bệnh phế cầu đối với trẻ em như thế nào?
A. Rất nghiêm trọng
B. Khá nghiêm trọng
C. Chẳng nghiêm trọng cũng chẳng nhẹ
D. Khá nhẹ
E. Rất nhẹ
F. Không biết

32. Anh/chị đã nghe về vắc-xin phế cầu (PCV) trước đây chưa?
A. Có
B. Không
F. Không biết/Không nhớ

33. Chương trình Tiêm chủng mở rộng (TCMR) tại Việt Nam có bao gồm vắc-xin phế cầu (PCV) không?
Chương trình Tiêm chủng mở rộng (TCMR) do Viện Vệ sinh Dịch tễ Trung ương làm đầu mối thực hiện được triển khai ở Việt Nam từ năm 1981 có mục tiêu cung cấp dịch vụ tiêm chủng miễn phí cho trẻ em dưới 1 tuổi, bảo vệ trẻ khỏi một số bệnh truyền nhiễm phổ biến và gây tử vong cao. Đến nay, Chương trình TCMR đã có vắc-xin cho 11 bệnh.
A. Có
B. Không
F. Không biết/Không nhớ
[Đáp án: B]

34. Chương trình tiêm chủng mở rộng (TCMR) khuyến cáo tiêm chủng cho trẻ em. Nhu cầu tiêm vắc-xin cho con của anh/chị như thế nào?
A. Không tiêm bất kỳ loại nào

B. Tiêm một số loại vắc-xin
C. Tiêm tất cả các loại vắc-xin
D. Tiêm tất cả các loại vắc-xin và một vài loại vắc-xin khác

35. Các triệu chứng của bệnh phế cầu khuẩn là gì? (Có thể chọn nhiều đáp án)
A. Sốt
B. Khó thở, thở khò khè (tăng âm thanh huýt sáo)
C. Ho kéo dài hơn 2 ngày
D. Ho có đờm
E. Ớn lạnh
F. Không biết/Không nhớ
[Đáp án: ABCDE]

36. Hình thức lây nhiễm bệnh viêm phổi ở trẻ em là gì? (Có thể chọn nhiều đáp án)
A. Thông qua vi khuẩn
B. Thông qua virus
C. Thông qua ho, hắt hơi hoặc nói chuyện
D. Thông qua bắt tay
E. Thông qua đường máu
F. Không biết/Không nhớ
[Đáp án: ABCE]

37. Cách điều trị viêm phổi là gì? (Có thể chọn nhiều đáp án)
A. Hạ sốt
B. Uống đủ nước
C. Uống thuốc ho trực tiếp
D. Kháng sinh cho viêm phổi do vi khuẩn
F. Không biết/Không nhớ
[Đáp án: ABD]

38. Cách thức để phòng ngừa bệnh viêm phổi ở trẻ em? (Có thể chọn nhiều đáp án)
A. Chích ngừa, tiêm vắc xin
B. Dinh dưỡng đầy đủ
C. Duy trì chất lượng không khí trong nhà tốt
D. Khuyến khích vệ sinh tốt
F. Không biết/Không nhớ
[Đáp án: ABCD]

39. Anh/chị có biết giá hiện tại của một liều vắc-xin phế cầu (PCV) là bao nhiêu?
A. > 1.5 triệu đồng

B. 1.3 ~ 1.5 triệu đồng
C. 1 ~ 1.3 triệu đồng
D. 0.6 ~ 1 triệu đồng
E. < 0.6 triệu đồng
F. Không biết/Không nhớ
[Đáp án: C]

Phần 3: Thái độ đối với vắc-xin phế cầu

40.

Tuyên bố	Hoàn toàn Đồng ý	Đồng ý một phần	Trung lập	Một phần Không đồng ý	Hoàn toàn Không đồng ý
1. Bệnh phế cầu có thể gây mệt mỏi và tử vong.	○	○	○	○	○
2. Vắc-xin phế cầu (PCV) mang lại nhiều lợi ích cho trẻ nhỏ.	○	○	○	○	○
3. Giá của vắc-xin phế cầu (PCV) quá cao.	○	○	○	○	○
4. Cần quá nhiều liều tiêm để tiêm vắc-xin phế cầu (PCV).	○	○	○	○	○
5. Con của tôi không cần tiêm vắc-xin phế cầu (PCV) vì sức đề kháng của con đã đủ mạnh để đối phó với bệnh phế cầu.	○	○	○	○	○
6. Có quá nhiều mũi tiêm dành cho trẻ em mà con tôi phải tiêm.	○	○	○	○	○
7. Thông thường, tôi chú ý đến tin tức liên quan đến sức khỏe.	○	○	○	○	○
8. Tôi tin tưởng kiến thức mà tôi đã tìm hiểu về vắc-xin phế cầu.	○	○	○	○	○

9. Tổng thể, việc tiêm chủng giúp bảo vệ con khỏi bệnh phế cầu tốt hơn so với việc không tiêm.	○	○	○	○	○

41. Theo anh/chị, vắc-xin có ý nghĩa như thế nào đối với sức khỏe của trẻ?
    A. Hoàn toàn không quan trọng
    B. Một chút quan trọng
    C. Quan trọng mức độ trung bình
    D. Rất quan trọng

42. Anh/chị có nghĩ rằng hầu hết gia đình và bạn bè thân thiết muốn anh/chị tiêm chủng cho con?
    A. Có
    B. Không

43. Ai là người đã đề nghị việc tiêm vắc-xin phế cầu (PCV) cho con của anh/chị? (Có thể chọn nhiều đáp án)
    A. Bác sĩ
    B. Y tá
    C. Cán bộ y tế cộng đồng
    D. Bạn bè hoặc người thân
    E. Giáo viên mẫu giáo
    F. Không ai đề nghị
    G. Tự thân
    H. Khác_____

44. Trong số các nguồn thông tin sau đây, anh/chị sẽ xem xét nguồn thông tin nào ảnh hưởng nhất đến quyết định của anh/chị về việc tiêm chủng vắc-xin phế cầu (PCV)? (Có thể chọn nhiều đáp án)
    A. Chuyên gia y tế
    B. Truyền hình, loa phát thanh
    C. Báo chí, tạp chí
    D. Mạng xã hội
    E. Bạn bè, người thân
    F. Giáo viên mẫu giáo
    G. Tờ rơi, phong bì, áp phích tại các cơ sở y tế
    H. Internet
    I. Nguồn khác_____

Phần 4: Thực hành đối với vắc-xin phế cầu (PCV)

45.

Tuyên bố	Hoàn toàn Đồng ý	Đồng ý một phần	Trung lập	Một phần Không đồng ý	Hoàn toàn Không đồng ý
1. Tôi biết nơi để tiêm vắc-xin cho con tôi.	○	○	○	○	○
2. Tôi sẵn lòng đưa con tôi đến các phòng khám nếu chúng cảm thấy ốm.	○	○	○	○	○
3. Tôi có khả năng tiêm vắc-xin phế cầu (PCV) cho con tôi sau khi tìm hiểu về nó.	○	○	○	○	○
4. Tôi sẽ học hỏi từ lời giải thích của nhà cung cấp chăm sóc sức khỏe trong quá trình tiêm chủng.	○	○	○	○	○
5. Tôi hiểu về chi phí tự túc nếu con tôi mắc bệnh viêm phổi.	○	○	○	○	○

46. Anh/chị sàng chi trả bao nhiêu tiền để tiêm vắc-xin phế cầu (PCV) cho con?
    A. > 1.5 triệu đồng
    B. 1.3 ~ 1.5 triệu đồng
    C. 1 ~ 1.3 triệu đồng
    D. 0.6 ~ 1 triệu đồng
    E. < 0.6 triệu đồng

47. Anh/chị nghĩ rằng vắc-xin phế cầu (PCV) có thể được chi trả bằng cách nào? (Có thể chọn nhiều đáp án)
    A. Thông qua chính phủ
    B. Thông qua bảo hiểm xã hội
    C. Thông qua bảo hiểm tư nhân
    D. Tự chi trả

48. Nói chung, việc trả tiền cho việc tiêm chủng có dễ dàng không? Khi anh/chị nghĩ về chi phí, xin vui lòng xem xét bất kỳ khoản thanh toán nào cho phòng khám, chi phí di chuyển đến đó, cộng với chi phí cơ hội. Anh/chị có nói rằng...

A. Hoàn toàn không dễ dàng
B. Một chút dễ dàng
C. Dễ dàng mức độ trung bình
D. Rất dễ dàng

49. Xin vui lòng để lại số điện thoại của anh/chị

50. Anh/chị có sẵn lòng nói chuyện với một đại diện từ nhóm nghiên cứu về câu trả lời của anh/chị không? Chúng tôi sẽ liên hệ với anh/chị qua điện thoại.
    A. Có
    B. Không

Cảm ơn anh/chị đã dành thời gian để trả lời những câu hỏi của chúng tôi.
[Liên kết chuyển hướng đến biểu mẫu thông tin người tham gia để nhận khoản bồi thường]

Biểu mẫu Thông tin Người tham gia

Biểu mẫu này chỉ dùng cho mục đích tài chính. Thông tin thu thập sẽ chỉ được tiếp cận bởi nhân viên hạn chế và sẽ bị hủy ngay sau khi quá trình kết thúc.

1. Vui lòng cung cấp họ và tên đầy đủ của anh/chị:

2. Vui lòng cung cấp số điện thoại của anh/chị:

3. Vui lòng cung cấp chữ ký của anh/chị:
   [Trang ký tên điện tử]

Chúng tôi xin cảm ơn anh/chị đã dành thời gian để tham gia khảo sát này.
Sau khi xác nhận phản hồi của anh/chị, chúng tôi sẽ phân phối một số khoản bồi thường như lời cảm ơn của chúng tôi.

Appendix B

Research Instrument – Interview Informed Consent (English + Vietnamese)

Informed Consent Form for Research Interview Participants

Dear Interview Participant,

Thank you for your willingness to participate in the research interview on "Parental Knowledge, Attitude and Practice on Pneumococcal Conjugate Vaccines" conducted by the Global Health Research Center of Duke Kunshan University. Before conducting the interview, we need to provide you with detailed information on the purpose, content, procedures, as well as the terms of conditions of the research. We hope you can carefully read the following information before signing the agreement to participate in the interview.

Research purpose: The aim of this interview is to communicate in-depth with the parents in Hanoi and Thai Binh City, Vietnam who has at least one child under 5 years old's knowledge, attitudes, and practices (KAP) of the pneumococcal conjugate vaccines.

Interview content: We will collect information on what factors influence you, a parent's decision on whether to vaccinate your child. The information collected will include your knowledge, attitude and practice towards pneumococcal conjugate vaccines, as well as the factors influencing your decision-making process. The interview process will not involve any ethical or legal issues, nor will it have any impact on your personal safety or property. The research results will be used for academic research and may be published in academic journals, conferences, and other academic venues.

Interview procedures: If you agree to participate in this research, we will invite you for a one-on-one interview. We will arrange the interview time and method according to your needs. The interview is expected to take approximately 15-30 minutes. During the interview, we will protect your privacy and ensure that your information is not disclosed to any unauthorized third parties. You also have the right to drop out any time during the process if feeling uncomfortable.

Benefits and Risks: There are no particular benefits or risks declared. However, participating in this survey may benefit you in: understanding relevant vaccine knowledge, promoting you and your family's wellbeing, and providing references for related policies. The interview content will be strictly confidential. We protect every

participant's privacy and ensure that the information and responses are not disclosed to any unauthorized party.

I have read and understood the information above and agree to participate in this research interview. I am aware of my rights and risks and have no objections to participating in this research interview. I voluntarily agree to participate in this research interview and agree to provide true, complete, and accurate information during the interview.

If you agree to the information above, please sign your name and date below:

Name: _____ Date: _____

Phiếu Đồng ý Tham Gia Phỏng Vấn Nghiên cứu

Kính gửi người tham gia,

Cảm ơn anh/chị đã sẵn sàng tham gia phỏng vấn nghiên cứu về "Kiến thức, Thái độ và Thực hành của Phụ huynh về Vắc-xin Phế cầu (PCV)" được tiến hành bởi Trung tâm Nghiên cứu Sức khỏe Toàn cầu thuộc Đại học Duke Kunshan. Trước khi thực hiện phỏng vấn, chúng tôi cần cung cấp cho anh/chị thông tin chi tiết về mục đích, nội dung, thủ tục cũng như các điều khoản của nghiên cứu. Chúng tôi mong anh/chị có thể đọc kỹ các thông tin dưới đây trước khi ký hợp đồng đồng ý tham gia phỏng vấn.

Mục đích nghiên cứu: Mục đích của cuộc phỏng vấn này là để trao đổi sâu hơn với các phụ huynh ở các tại Hà Nội và Thành phố Thái Bình, Việt Nam có ít nhất một trẻ em dưới 5 tuổi về kiến thức, thái độ và thực hành (KAP) của vắc-xin phế cầu (PCV).

Nội dung phỏng vấn: Chúng tôi sẽ thu thập thông tin về những yếu tố ảnh hưởng đến quyết định của anh/chị, một phụ huynh, về việc tiêm chủng cho con em của mình. Thông tin thu thập sẽ bao gồm kiến thức, thái độ và thực hành của anh/chị đối với vắc-xin phế cầu, cũng như các yếu tố ảnh hưởng đến quá trình ra quyết định của anh/chị. Quá trình phỏng vấn sẽ không liên quan đến bất kỳ vấn đề đạo đức hay pháp lý nào, cũng như sẽ không ảnh hưởng đến an toàn cá nhân hay tài sản của anh/chị. Kết quả nghiên cứu sẽ được sử dụng cho mục đích nghiên cứu học thuật và có thể được xuất bản trên các tạp chí, hội nghị và các diễn đàn học thuật khác.

Thủ tục phỏng vấn: Nếu bạn đồng ý tham gia nghiên cứu này, chúng tôi sẽ mời bạn tham gia phỏng vấn một cách riêng tư. Chúng tôi sẽ sắp xếp thời gian và phương pháp phỏng vấn phù hợp với nhu cầu của bạn. Thời gian dự kiến cho cuộc phỏng vấn là khoảng 15-30 phút. Trong quá trình phỏng vấn, chúng tôi sẽ bảo vệ sự riêng tư của bạn và đảm bảo thông tin của bạn không được tiết lộ cho bất kỳ bên thứ ba nào không được ủy quyền. Bạn cũng có quyền rút lui bất cứ lúc nào trong quá trình phỏng vấn nếu bạn cảm thấy không thoải mái.

Lợi ích và rủi ro: Không có lợi ích hoặc rủi ro cụ thể nào được công bố. Tuy nhiên, tham gia cuộc khảo sát này có thể giúp bạn hiểu được kiến thức về vắc-xin phế cầu (PCV), đồng thời giúp nâng cao sức khỏe cho bạn và gia đình, và cung cấp các tài liệu tham khảo về chính sách liên quan. Nội dung cuộc phỏng vấn sẽ được bảo mật nghiêm ngặt. Chúng tôi bảo vệ sự riêng tư của mỗi người tham gia và đảm bảo thông tin và phản hồi không được tiết lộ cho bất kỳ bên thứ ba nào.

Tôi đã đọc và hiểu thông tin trên và đồng ý tham gia cuộc phỏng vấn nghiên cứu này. Tôi nhận thức được quyền lợi và rủi ro của mình và không có bất kỳ sự phản đối nào về việc tham gia cuộc phỏng vấn nghiên cứu này. Tôi tự nguyện đồng ý tham gia cuộc phỏng vấn nghiên cứu này và cam kết cung cấp thông tin chân thật, đầy đủ và chính xác trong quá trình phỏng vấn.

Nếu bạn đồng ý với thông tin trên, vui lòng ký tên và ngày tháng dưới đây:

Họ và tên: _____ Ngày: _____

Appendix C

<u>Research Instrument – Caregiver's Interview Guide (English + Vietnamese)</u>

Research Topic:

In-depth learning of Caregivers's knowledge, attitudes, and practices (KAP) of pneumococcal conjugate vaccines (PCV) in Hanoi, Vietnam

Interview Flow and question list:

1. Background introduction of the research and written consent
2. Basic demographic collection (collected in survey)
   Tell me a little about yourself and your family.
   Probe:
   a) Children's gender, age and health status (any malnutrition or pre-existing illnesses?)
   b) How old is the youngest child you're taking care of?
   c) How experienced/well do you think you are at ensuring your child's health?
   d) Are your child(ren) up to date with vaccines?
   e) Have they received PCV?
   f) Are you the key decision maker in the family on Children's vaccination?

3. Different questions based on children's PCV vaccination status

	PCV vaccinated	PCV not (yet) vaccinated
I. General attitude toward vaccines	1. Think about the times (first time) you had your child vaccinated, tell me why and how you decided that you would go ahead. a) What do you think about the vaccines? b) Who usually takes your child(ren) to take vaccines? 2. Do people talk about vaccination? (You talk to them / others suggest you?) What do they say?	

	a) Do you pay attention to health-related news (eg. Information, policies)? 3. What do you usually do for the optional/self-funded pediatric vaccines? Will you get your children vaccinated as much as possible, or you are more selective in the type of vaccines for your children? What is your reason behind? 4. What do you think about the adverse effects of vaccines? How concerned were you with them? Why?	
II. Knowledge about PCV vaccines and pneumonia	1. As You've Vaccinated your children with PCV vaccines, what do you know about PCV vaccines? 2. If you know about the types (different valent) of PCV available, do you have a preference? *Probes:* about the different valent, price range, the disease it covers, the required dose for full vaccination, the right age to vaccinate 3. Do you have any ideas about pneumonia, meningitis, otitis media? Do you know that the vaccine can also protect children from these diseases?	1. Have you ever heard of PCV vaccines before this survey? What do you know about it? *Probes:* about the different valent, price range, the disease it covers, the required dose for full vaccination, the right age to vaccinate 2. Do you have any ideas about pneumonia, meningitis, otitis media? Do you know that the vaccine can also protect children from these diseases?
III. Practices	1. What made you choose to get your children vaccinated with PCV? a) Is the vaccine cost an important factor for you to make the vaccination decision? How do you weigh it with the efficacy/safety of the vaccines?	1. What made you choose not to get your children vaccinated with PCV? a) If a cheaper schedule (1+1 schedule – Synflorix + Prevenar) is available, will you accept?

	b) What are important factors for you to make vaccination decisions? 2. What kind of reminders do you use for the following dose of vaccination for your child? Will you follow the reminders?	2. Why do you think that other parents do not vaccinate their children with PCV vaccines? 3. Does your child vaccinate other vaccines? If yes, why? What is different for PCV?
	1. Will you receive all government-recommended vaccines [tiêm chủng mở rộng (TCMR)] for your child(ren)? Why or Why not?	
IV. Practices – vaccination day practice	**1. Thinking about vaccination day for your child, tell me about what happens before you arrive at the place where your child gets the vaccine. Start with** before you leave home. *Probe:* a) What do you need to do to prepare before you leave home? b) How do you travel to the vaccination place? **2. Once you arrive at the clinic, tell me what happens next.** *Probe*: a) Who do you talk to when you get there? b) What happens in the waiting room or queue? c) Do you need to pay a fee? (cost of the vaccine + potential injection / check-up fee?) d) Are other health checks done while you're there? **3. What happens when it's your child's turn to get the vaccine?** *Probe*: a) What happens first? [Probe for each step until the vaccination is completed.]	

	b) What do the health workers talk to you about while you're there? How do you feel when you talk with them? **4. After your child has had the vaccine, tell me what happens next.** *Probe:* a) What happens when you leave the vaccination place? How do you travel home? b) What happens after you arrive home?
V. Attitudes	**1.** What do you like about what happens on vaccination day? a) Ask about each steps above. Ask Why. **2.** What don't you like about what happens on vaccination day? a) Ask about each steps above. Ask Why. b) Is there anything you find difficult? Why do you find it difficult? **3.** In general, tell me how you feel about childhood vaccination? *Probe:* a) Why do you feel this way? b) Do you think it's a good thing? Why? c) Do you think it's important? Why? d) Is there anything you feel isn't good about vaccination? Can you tell me more about it? **4.** How do you feel when your child is vaccinated with PCV? *Probe:* a) Do you think it's good for your child? Why? b) Is there anything that worries you? c) Why does it worry you?

VI. Additional information	**1.** Who do you think impacts you the most? Doctors, online media, or family and friends around you? Please elaborate. **2.** In what way(s) do you think PCV can be paid? Eg. Government, national (social) health insurance, private health insurance, yourself. Why?	
	1. To what extent do you think that media, doctors, and clinics should clearly provide the vaccine's adverse effect information?	(For those knowing little about PCV vaccines, present PCV vaccine introduction information page[1], then ask the following questions) **1.** What do you find about the information? **2.** By knowing this information, do you think your willingness to vaccinate your child with the vaccine have increased? If so, by how much? (WTP)

Is there anything else you'd like to say?

[1] Source: VNVC PREVENAR information page. https://vnvc.vn/prevenar-13-vac-xin-phong-benh-viem-phoi-viem-mang-nao-viem-tai-giua-nhiem-khuan-huyet-phe-cau-khuan/ or SYNFLORIX https://vnvc.vn/synflorix-vac-xin-phong-viem-nao-viem-phoi-nhiem-khuan-huyet-viem-tai-giua-h-influenzae-khong-dinh-tuyp/ Present vaccine clinic PCV booklet if possible, scan the page and send it to me.

Đề tài nghiên cứu:
Phỏng vấn sâu về kiến thức, thái độ và thực hành (KAP) về vắc-xin phế cầu (PCV) tại Hà Nội và Thành phố Thái Bình, Việt Nam

Danh sách các câu hỏi và luồng phỏng vấn:

1. Giới thiệu về nghiên cứu nghiên cứu và yêu cầu sự đồng ý tham gia nghiên cứu của đối tượng tham gia bằng văn bản.
2. Thu thập đặc điểm cá nhân cơ bản của đối tượng nghiên cứu.

Sau đây, tôi sẽ hỏi một số thông tin cơ bản của anh/chị:
a) Tuổi, giới tính và tình trạng sức khỏe của trẻ em (có bị suy dinh dưỡng hoặc bệnh mãn tính không?)
b) Trẻ nhỏ nhất mà anh/chị đang chăm sóc bao nhiêu tuổi?
c) Anh/chị cho rằng mình có kinh nghiệm/tốt trong việc đảm bảo sức khỏe cho con mình không?
d) Con của anh/chị có được tiêm chủng đầy đủ không?
e) Con của anh/chị đã được tiêm vắc-xin phế cầu (PCV) chưa?
f) Anh/chị có phải là người quyết định chính trong gia đình về việc tiêm chủng cho trẻ em không?

3. Các câu hỏi dựa trên tình trạng chủng ngừa vắc-xin phế cầu (PCV) của trẻ em:

	Đã tiêm vắc-xin phế cầu (PCV)	Chưa tiêm vắc-xin phế cầu (PCV)
I. Thái độ chung của họ đối với vaccine (general)	1. Hãy suy nghĩ về những lần (lần đầu tiên) con của anh/chị được tiêm vắc-xin, tại sao và làm thế nào anh/chị quyết định tiêm cho trẻ. a) Anh/chị nghĩ gì về các loại vắc-xin trong những lần đầu tiên? b) Ai thường đưa con anh/chị đi tiêm vắc-xin? 2. Mọi người có nói chuyện về việc tiêm vắc-xin không? (Anh/chị nói chuyện với họ / người khác gợi ý cho anh/chị?) Họ nói gì? a) Anh/chị chú ý đến tin tức liên quan đến sức khỏe thế nào (ví dụ: thông tin, chính sách)? 3. Thông thường, ý kiến của anh/chị thế nào về các vắc-xin cho trẻ, loại vắc-xin không bắt buộc và tự chi	

	trả? Anh/chị sẽ cho con anh/chị tiêm vắc-xin càng nhiều càng tốt, hay anh/chị lựa chọn kỹ trong loại vắc-xin cho con? Lý do của anh/chị là gì? 4. Anh/chị nghĩ gì về tác dụng phụ của vắc-xin? Anh/chị quan tâm đến chúng đến mức nào? Tại sao?	
II. Kiến thức về vắc-xin phế cầu (PCV) và bệnh viêm phổi do pneumococcal	1. Sau khi anh/chị đã tiêm vắc-xin phế cầu (PCV) cho con anh/chị, anh/chị biết gì về vắc-xin phế cầu? 2. Nếu anh/chị biết về các loại vắc-xin phế cầu (PCV) có sẵn (khác nhau về valent), anh/chị có mong muốn tiêm loại vắc xin hơn nào không? *Giải thích:* về các loại valent khác nhau, khoảng giá, các bệnh mà nó bảo vệ, liều lượng cần thiết cho việc tiêm đầy đủ, độ tuổi phù hợp để tiêm vắc-xin. 3. Anh/chị có ý kiến gì về viêm phổi, viêm màng não, viêm tai giữa? Anh/chị có biết rằng vắc-xin cũng có thể bảo vệ trẻ em khỏi những bệnh này không?	1. Trước khi tham gia khảo sát này, anh/chị đã từng nghe về vắc-xin phế cầu (PCV) chưa? Anh/chị biết gì về nó? *Giải thích*: về các loại valent khác nhau, khoảng giá, các bệnh mà nó bảo vệ, liều lượng cần thiết cho việc tiêm đầy đủ, độ tuổi phù hợp để tiêm vắc-xin. 2. Anh/chị có ý kiến gì về viêm phổi, viêm màng não, viêm tai giữa? Anh/chị có biết rằng vắc-xin cũng có thể bảo vệ trẻ em khỏi những bệnh này không?
III. Thực hành	1. Anh/chị quyết định tiêm vắc-xin phế cầu (PCV) cho con anh/chị vì những yếu tố gì? (giá cả, liều lượng, độ tuổi, mức độ an toàn,…) a) Giá vắc-xin có phải là yếu tố quan trọng để anh/chị đưa ra quyết định tiêm vắc-xin hay	3. Anh/chị quyết định không tiêm vắc-xin phế cầu (PCV) cho con anh/chị vì những lý do gì? (giá cả, liều lượng, độ tuổi, mức độ an toàn,…) a) Nếu có một gói tiêm rẻ hơn (gói1+1 - Synflorix + Prevenar) có sẵn, anh/chị có chấp

<table>
<tr><td></td><td>không? Anh/chị đánh giá nó như thế nào so với hiệu quả/an toàn của vắc-xin?
b) Các yếu tố quan trọng nào khiến anh/chị đưa ra quyết định tiêm vắc-xin?

2. Anh/chị sử dụng những hình thức nhắc nhở nào cho liều tiếp theo của vắc-xin cho con anh/chị? Anh/chị có tuân thủ theo những nhắc nhở đó không?</td><td>nhận không?

1. Anh/chị nghĩ tại sao các bậc phụ huynh khác không tiêm vắc-xin phế cầu (PCV) cho con của họ?

2. Con anh/chị có tiêm các loại vắc-xin khác không? Nếu có, tại sao? Điều gì khác biệt đối với vắc-xin phế cầu (PCV)?</td></tr>
<tr><td></td><td colspan="2">1. Anh/chị có tiếp nhận tất cả các vắc-xin được khuyến nghị bởi chính phủ cho con anh/chị không? Tại sao?</td></tr>
<tr><td>IV. Thực hành - Thực hành ngày tiêm chủng</td><td colspan="2">1. Sau đây, chúng tôi sẽ hỏi một số thông tin liên quan về ngày tiêm vắc-xin cho con anh/chị. Đầu tiên, về những thông tin trước khi anh/chị đến trung tâm tiêm chủng để tiêm vắc-xin cho con của anh/chị.
Bắt đầu từ trước khi anh/chị rời khỏi nhà.
Probe:
a) Anh/chị cần làm gì để chuẩn bị trước khi rời khỏi nhà?
b) Anh/chị di chuyển đến nơi tiêm vắc-xin như thế nào?

2. Khi anh/chị đến phòng khám, hãy kể cho tôi biết những gì xảy ra tiếp theo.
Probe:
a) Anh/chị nói chuyện với ai khi đến đó?
b) Sau khi đến phòng chờ hoặc đợi đến lượt tiêm, điều gì xảy ra?
c) Anh/chị cần phải trả phí không? (chi phí vắc-xin + tiền tiêm / tiền khám nếu có?)
d) Lúc đó, con của anh/chị có phải kiểm tra sức khỏe khác không?

3. Sau đây tôi sẽ hỏi một số thông tin khi đến lượt tiêm vắc-xin cho con anh/chị, điều gì xảy ra?
Probe:</td></tr>
</table>

	a) Tiến trình tiêm diễn ra như thế nào? (các bước khi tiêm vaccine) [Probe cho từng bước cho đến khi tiêm vắc-xin hoàn tất.] b) Nhân viên y tế nói chuyện/tư vấn với anh/chị như thế nào? Anh/chị cảm thấy như thế nào khi nói chuyện với họ? **4. Sau khi con anh/chị đã tiêm vắc-xin, hãy kể cho tôi biết những gì xảy ra tiếp theo.** *Probe:* a) Khi anh/chị rời khỏi nơi tiêm vắc-xin, có điều gì bất thường xảy ra không? Anh/chị di chuyển về nhà như thế nào? b) Sau khi đến nhà, điều gì xảy ra?
V. Thái độ	**1.** Điều gì anh/chị hài lòng về những gì xảy ra trong ngày tiêm chủng? a) Hỏi về từng bước trên. Hỏi tại sao. (chuẩn bị và di chuyển đến tiêm, đến phòng khám, khi tiêm, sau khi tiêm và về nhà) **2.** Điều gì anh/chị không hài lòng về những gì xảy ra trong ngày tiêm chủng? a) Hỏi về từng bước trên. Hỏi tại sao. (chuẩn bị và di chuyển đến tiêm, đến phòng khám, khi tiêm, sau khi tiêm và về nhà) b) Có điều gì anh/chị cảm thấy khó khăn không? Tại sao anh/chị cảm thấy khó khăn? **3.** Nói chung, anh/chị cảm thấy thế nào về việc tiêm chủng cho trẻ em? *Probe:* a) Tại sao anh/chị cảm thấy như vậy? b) Anh/chị nghĩ rằng đó là một điều tốt không? Tại sao? c) Anh/chị nghĩ rằng đó là một điều quan trọng không? Tại sao? d) Có điều gì anh/chị cảm thấy không tốt về tiêm chủng? Anh/chị có thể giải thích thêm về điều đó không?

<table>
<tr><td></td><td colspan="2">4. Khi con anh/chị được tiêm vắc-xin phế cầu (PCV), anh/chị cảm thấy như thế nào?
Probe:
a) Anh/chị có nghĩ rằng việc tiêm vắc-xin này tốt cho con anh/chị không? Tại sao?
b) Có điều gì làm anh/chị lo lắng không?
c) Tại sao điều đó làm anh/chị lo lắng?

5. Anh/chị nghĩ rằng vắc-xin phế cầu (PCV) có thể được chi trả bằng cách nào?
Probe: Thông qua chính phủ, Thông qua bảo hiểm xã hội, Thông qua bảo hiểm tư nhân, Tự chi trả

6. Nói chung, việc trả tiền cho việc tiêm chủng có dễ dàng không? Khi anh/chị nghĩ về chi phí, xin vui lòng xem xét bất kỳ khoản thanh toán nào cho phòng khám, chi phí di chuyển đến đó, cộng với chi phí cơ hội.</td></tr>
<tr><td>VI. Thông tin bổ sung</td><td colspan="2">1. Bạn nghĩ ai là người ảnh hưởng đến bạn nhiều nhất? Bác sĩ, phương tiện truyền thông trực tuyến, hoặc gia đình và bạn bè xung quanh bạn?
Xin hãy giải thích.

2. Anh/chị nghĩ rằng vắc-xin phế cầu (PCV) có thể được chi trả bằng cách nào? (Thông qua chính phủ, bảo hiểm xã hội, bảo hiểm tư nhân, tự chi trả)
Tại sao?</td></tr>
<tr><td></td><td>1. Anh/chị nghĩ gì trong việc phương tiện truyền thông, bác sĩ và phòng khám nên cung cấp thông tin về tác dụng và tác dụng phụ của vắc-xin? (rõ ràng? Đầy đủ? dễ dàng tìm kiếm)</td><td>(Đối với những người biết ít về vắc-xin phế cầu (PCV), giới thiệu trang thông tin về vắc-xin phế cầu (PCV), sau đó đặt các câu hỏi sau đây) [Xuất</td></tr>
</table>

		trình tập sách / thông tin phòng khám vắc-xin phế cầu (PCV) cho khách hàng][1] **1.** Anh/chị cảm thấy thông tin này như thế nào? **2.** Sau khi biết thông tin này, anh/chị có nghĩ rằng ý muốn tiêm chủng vắc-xin cho con anh/chị đã tăng lên không? Nếu có, tăng lên bao nhiêu? (WTP)

Có điều gì khác anh/chị muốn nói thêm không?

[1] Quét trang và gửi cho tôi (Scan the page and send it to me)
Supplementary source: VNVC PREVENAR information page. https://vnvc.vn/prevenar-13-vac-xin-phong-benh-viem-phoi-viem-mang-nao-viem-tai-giua-nhiem-khuan-huyet-phe-cau-khuan/ or SYNFLORIX https://vnvc.vn/synflorix-vac-xin-phong-viem-nao-viem-phoi-nhiem-khuan-huyet-viem-tai-giua-h-influenzae-khong-dinh-tuyp/

Appendix D

<u>Research Instruments – Health Worker's Interview Guide (English + Vietnamese)</u>

Topic:

In-depth learning of **health worker's views** on pneumococcal conjugate vaccines (PCV) immunization for children in Hanoi, Vietnam.

Interview Flow and question list:

0. <u>Background introduction of the research and written consent</u>

1. <u>Basic demographic collection</u>

   Interviewer please note:

   Participant is male / female, workplace in urban / rural area, has the title: head of clinic / pediatrician / nurse / _____.

   1. Tell me a little bit about yourself and about your work. *(Probe as below:)*

   1.1.1 What are your work/responsibilities for this position?

   1.1.2 How long have you been in this role?)

2. <u>Questions based on health worker's involvement with PCV vaccination.</u>

1. To what extent does your role involve immunization?

2.1.1 What parts of your job involve immunization?

2.1.2 Do you offer vaccines people need to pay Out-of-Pocket [OOP]?

2.1.2.1 What are the major ones?

2.1.2.2 Is PCV one of the major ones?

2.1.3 Can you tell me more about that?

2.1.3.1 How many doses of PCV vaccinations do you give a day on average?

2.1.3.2 Do you know that among 10 children visiting your clinic, how many do they get PCV vaccination? ?

*Does your clinic have a target for PCV vaccination (e.g. number/percentage)?

*Will you or your clinic be benefited financially when people asked to receive PCV vaccination?

*How much Vietnamese dong do each child need to pay out of pocket for PCV vaccination per dose?

2.1.3.3 Do people generally know about PCV? (Only a few, many, majority, or vast majority of people know)

2.1.3.4 Where do you think they learn about PCV vaccine?

2.1.3.5 What do you think are the reasons when caregivers decide to **vaccinate/not vaccinate** their children PCV?

2.1.4 Do you offer free vaccines included in Expanded Program for Immunization [EPI]?

2. If people decide to get PCV vaccination,

2.2.1 What percentage of them will stick with the PCV vaccination schedule (e.g. PCV13 needs 3 doses)?

3. If people decide not to take the advice of giving their children PCV vaccine, what are the main reasons for refusing the vaccination for their children?

2.3.1 What do you think of the barriers/obstacles people face for immunization?
Probe: What do you think of the billing for PCV? (Hanoi government announced to include PCV in Expanded Program on Immunization [EPI], what do you think about it?)

2.3.2 If price is a big issue, do you think more methods of billing should be involved? (e.g. private insurance. for vaccines in general?)

4. Do you know any community influencers or program managers that involve in immunization- related activities?
Can you tell me more about them (Any social media influencers, patient advocates, specific organizations…)

5. If you have a chance, what would you do to improve PCV immunization services in your area?
Lastly, is there anything else you'd like to say?

Đề tài nghiên cứu:
Phỏng vấn sâu về kiến thức, thái độ và thực hành (KAP) về vắc-xin phế cầu (PCV) tại Hà Nội, Việt Nam

Danh sách các câu hỏi và luồng phỏng vấn:

0. Giới thiệu về nền tảng nghiên cứu và sự đồng ý bằng văn bản.

1. Thu thập thông tin cơ bản về đối tượng nghiên cứu
   Lưu ý cho người phỏng vấn:
   Người tham gia là nam / nữ, làm việc ở khu vực đô thị / nông thôn, có chức vụ: trưởng phòng khám / bác sĩ nhi khoa / y tá / _____.
   1. Sau đây, tôi sẽ hỏi về đặc điểm cá nhân cũng như công việc của bạn:
      1.1.1 Các công việc/vị trí bạn đảm nhận liên quan đến công việc này là gì?
      1.1.2 Anh/chị đã làm công việc này bao lâu?

2. Các câu hỏi dựa trên sự tham gia của nhân viên y tế trong việc tiêm chủng vắc-xin phế cầu (PCV).

1. Công việc của anh/chị liên quan đến tiêm chủng ở mức độ nào?
   2.1.1 Công việc việc của anh/chị liên quan đến tiêm chủng thế nào?
   2.1.2 Anh/chị có cung cấp các loại vắc-xin mà người dân phải tự trả tiền không? (Out-of-Pocket [OOP])
      2.1.2.1 Theo anh/chị, các loại vắc-xin quan trọng là gì?
      2.1.2.2 Vắc-xin phế cầu (PCV) có phải là một trong số các loại quan trọng không?
   2.1.3 Sau đây, tôi sẽ hỏi về một số câu hỏi liên quan đến vắc-xin phế cầu:
      2.1.3.1 Trung bình mỗi ngày, anh/chị tiêm bao nhiêu liều vắc-xin phế cầu?
      2.1.3.2 Anh/chị có biết rằng trong số 10 trẻ em đến phòng khám của anh/chị, bao nhiêu trẻ được tiêm vắc-xin phế cầu?
      *Phòng khám của anh/chị có mục tiêu về tiêm chủng vắc-xin phế cầu (PCV) không (ví dụ: số lượng/phần trăm)?
      *Anh/chị hoặc phòng khám của anh/chị có được hưởng lợi tài chính khi người dân được yêu cầu tiêm vắc-xin phế cầu (PCV) không? Nếu có, anh/chị có thể nêu rõ hơn không? Được hưởng lợi như thế nào?
      *Giá của mỗi liều vắc-xin phế cầu (PCV) tiêm theo yêu cầu là bao nhiêu tiền?
      2.1.3.3 Theo anh/chị, mức độ hiểu biết về những thông tin về vắc-xin phế cầu (PCV) người dân như thế nào? (Chỉ một

ít, nhiều, đa số, hoặc hầu hết mọi người biết)

2.1.3.4 Theo Anh/chị, khách hàng tìm hiểu về vắc-xin phế cầu (PCV) ở đâu?

2.1.3.5 Theo Anh/chị, người chăm sóc quyết định tiêm chủng/không tiêm vắc-xin phế cầu (PCV) cho con cái của họ vì những lý do gì?

2.1.4 Anh/chị có cung cấp các loại vắc-xin miễn phí thuộc Chương trình Tiêm chủng Mở rộng [EPI] không?

2. Nếu người dân quyết định tiêm vắc-xin phế cầu,

2.2.1 Theo anh/chị, bao nhiêu phần trăm trong số họ sẽ tuân thủ lịch tiêm vắc-xin phế cầu (PCV) (ví dụ: Synflorix cần 3 liều)?

3. Theo anh/chị, nếu người dân quyết định không tuân thủ lời khuyên về việc cho con em mình tiêm vắc-xin phế cầu, thì nguyên nhân chính để từ chối tiêm chủng cho con cái là gì?

2.3.1 Anh/chị nghĩ gì về các rào cản mà người dân phải đối mặt khi tiêm chủng? (rào cản là gì? Tác động thế nào? Giải pháp là gì?)

Sonde: Anh/chị nghĩ gì về việc tính giá cho vắc-xin phế cầu? (Chính quyền Hà Nội đã công bố bao gồm vắc-xin phế cầu (PCV) trong Chương trình Mở rộng Tiêm chủng [TCMR], anh/chị nghĩ gì về điều đó?)

2.3.2 Nếu giá cả là một vấn đề lớn, anh/chị nghĩ rằng nên có nhiều phương thức tiếp cận về giá hơn không? (ví dụ: bảo hiểm tư nhân cho các loại vắc-xin nói chung)

4. Anh/chị có biết về những người có ảnh hưởng trong cộng đồng hoặc các quản lý chương trình tham gia vào các hoạt động liên quan đến tiêm chủng không?
Anh/chị có thể cho tôi biết thêm về họ không? (Có các nhà ảnh hưởng trên mạng xã hội, người ủng hộ bệnh nhân, các tổ chức cụ thể...)

5. Nếu có cơ hội, anh/chị sẽ làm gì để cải thiện dịch vụ tiêm chủng vắc-xin phế cầu (PCV) trong khu vực của mình?
Cuối cùng, anh/chị có điều gì muốn nói thêm không?

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