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Original Research

Mothers' Preferences and Willingness to Pay for Human Papillomavirus Vaccination for Their Daughters: A Discrete Choice Experiment in Hong Kong

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ABSTRACT

Objectives: To determine the preference of mothers in Hong Kong and their willingness to pay (WTP) for human papillomavirus (HPV) vaccination for their daughters. **Method:** A discrete choice experiment survey with a two-alternative study design was developed. Data were collected from pediatric specialist outpatient clinics from 482 mothers with daughters aged between 8 and 17 years. Preferences of the four attributes of HPV vaccines (protection against cervical cancer, protection duration, side effects, and out-of-pocket costs) were evaluated. The marginal and overall WTP were estimated using multinomial logistic regression. A subgroup analysis was conducted to explore the impact of socioeconomic factors on mothers' WTP. **Results:** Side effects, protection against cervical cancer, protection duration, and out-of-pocket cost determined the decision to receive or not receive the vaccine. All attributes had a statistically significant effect on the preference of and the WTP for the vaccine. Maximum WTP for ideal vaccines (i.e., 100% protection, lifetime protection

duration, and 0% side effects) was HK\$8976 (US \$1129). The estimated WTP for vaccines currently available was HK\$1620 (US \$208), lower than the current market price. Among those who had a monthly household income of more than HK\$100,000 (US \$12,821), the WTP for vaccines currently offered was higher than the market price. **Conclusions:** This study provides new data on how features of the HPV vaccine are viewed and valued by mothers by determining their perception of ideal or improved and current vaccine technologies. These findings could contribute to future policies on the improvement of HPV vaccine and be useful for the immunization service in Hong Kong.

Keywords: discrete choice experiment, HPV, vaccination, willingness to pay.

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Introduction

Cervical cancer was the eighth most common cancer among females in Hong Kong in 2014, accounting for about 3.3% of all new cancer cases in females [1]. In the most recent cancer registry conducted in Hong Kong, there were 472 cases of cervical cancer diagnosed in 2014 with an age-standardized incidence rate of 8.1 per 100,000 in the population. In the past two decades, the burden of the disease has been relatively higher compared with that in other developed countries [2], although both the incidence and mortality rates of cervical cancer show a decreasing trend [1].

To further reduce the burden of cervical cancer, a cervical cancer screening program was organized and launched in 2004 [3]

and two preventive vaccines were introduced and became available for females in the community since 2006 [4]. These two commercially available vaccines offer about 70% protection against various strains of the human papillomavirus (HPV) [5], which causes cervical carcinoma [6]. Nevertheless, HPV vaccines have yet to be integrated into the government's immunization schedule in Hong Kong [7]. Instead, people voluntarily can seek the vaccines in private clinics. The administration rate for adolescent girls was as low as 2.4% in 2008 and 9.1% in 2012 because of the lack of the HPV vaccination program that has been currently organized [4,8]. Nevertheless, including the HPV vaccination for girls aged 12 years and older is considered a cost-effective option compared with offering only cervical cancer screening [9,10].

Conflicts of interest: The authors have indicated that they have no conflicts of interest with regard to the content of this article.

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The success of the HPV vaccination program largely depends on the attitude of local stakeholders toward the risks and benefits of the vaccination [11–13]. For the purpose of policy decision making and improving health services, it is important to understand the various factors that may affect consumers' demands and their decision toward administering the vaccine. Factors associated with decision making include not only the results of economic evaluation but also other considerations such as consumers' demands and preferences. With regard to the HPV vaccination, mothers, who are highly involved in the decision to vaccinate or not vaccinate their daughters who are younger than 18 years [14,15], were therefore regarded as the critical consumers of the HPV vaccination. This study adopted a discrete choice experiment (DCE) to determine consumer preference of the HPV vaccine attributes and their willingness to pay (WTP) for the vaccine in Hong Kong. Similar studies have been conducted in other countries [16–20]; nevertheless, given that consumer preference may be subject to cultural differences, the applicability of research from overseas to the local community may be limited. The aim of this study was to investigate the mothers' choices and decision making when contemplating the attributes of the HPV vaccination to determine local mothers' preferences and their WTP toward the HPV vaccination. It is anticipated that this study will provide useful information on immunization services in Hong Kong to help create local HPV vaccination policies in a more effective and economically sustainable way.

Methods

A cross-sectional survey was conducted in two local public hospitals for which a stratified sampling approach was adopted to recruit mothers as subjects who match the inclusion criteria in pediatric specialist outpatient clinics in Princess Margaret Hospital (PMH), Kowloon, and Queen Mary Hospital (QMH), Hong Kong Island. A mother with at least one daughter aged between 8 and 17 years who has not received any HPV vaccination fulfilled the inclusion criteria of the study.

Target Population

Given that the decision to vaccinate girls aged 8 to 17 years would largely be determined by their mothers [14,15], mothers in the pediatric clinics were regarded as the consumers in this study, as

was the case in similar studies conducted overseas [16,19]. As such, fathers or any other carers of the girls were not considered in this survey.

Study Design

Attribute and level identification

The relevant attributes and levels for DCE have been identified through literature review with reference to attributes used in the HPV vaccine DCE studies conducted in the United States, Canada, the Netherlands, and Vietnam [16–19] and interviews with relevant local experts, consisting of two pediatricians and two nonpediatric medical practitioners, who were involved in policymaking and were clinical experts in the fields of vaccinations and infectious diseases (See Appendix 1 in Supplemental Materials found at <http://dx.doi.org/10.1016/j.jval.2017.10.012>). A pilot study of these attributes was conducted in October 2012 when our research team interviewed eight pediatricians and eight mothers who matched the inclusion criteria to identify the most important attributes to be included in the DCE survey. As a result, the pilot data shortlisted four most important attributes: protection against cervical cancer, protection duration, side effects, and out-of-pocket cost. Each attribute was assigned by four levels to give the participants a range of the best and worst levels in our experimental design. All levels of each shortlisted attribute were selected on the basis of the overseas DCE studies [16–18]. Therefore, the identification of the four attributes and their relevant levels was justified and supported by literature review and by expert and respondent input from pilot data. The “protection against cervical cancer” levels were expressed in percentages (50/70/80/100) and presented in terms of an absolute risk reduction that was mainly used for the description of risk information in the DCE survey [21]. The “protection duration” levels were expressed in years (2/5/10/lifetime = 100 years). The “side effects” levels concern the potential side effects after the administration of the HPV vaccination and were expressed in frequency (2:100/6:100/10:100/14:100). The “out-of-pocket cost” levels were expressed in Hong Kong dollars (0/1000/2000/3000).

DCE design

To avoid impractically large sample sizes, the complete set of combinations of all attribute levels corresponding to a full factorial design ($4 \times 4 \times 4 \times 4 = 256$ hypothetical vaccine profiles) was not used in this experiment. Rather, an orthogonal design

Table 1 – Vaccine profiles.

Profile	Protection against cervical cancer (%)	Protection duration	Side effects	Out-of-pocket cost (HK\$)
Vaccine 1	80	2 years	6:100	3000
Vaccine 2	50	Lifetime	10:100	2000
Vaccine 3	50	5 years	14:100	3000
Vaccine 4	100	2 years	10:100	1000
Vaccine 5	80	5 years	10:100	0
Vaccine 6	100	Lifetime	2:100	3000
Vaccine 7	50	2 years	2:100	0
Vaccine 8	80	Lifetime	14:100	1000
Vaccine 9	70	10 years	10:100	3000
Vaccine 10	100	5 years	6:100	2000
Vaccine 11	70	Lifetime	6:100	0
Vaccine 12	80	10 years	2:100	2000
Vaccine 13	70	5 years	2:100	1000
Vaccine 14	100	10 years	14:100	0
Vaccine 15	50	10 years	6:100	1000
Vaccine 16	70	2 years	14:100	2000

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