

**Taiwan Elderly People's Willingness to Receive  
Government Promoted and Funded Flu Shots – Results  
of a 2007 Telephone Survey**

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**Abstract**

Understanding what elderly people know about the government's "Free Flu Shots for Elderly People" plan, what channels would be best for dissemination of information, and the reasons for people to accept or refuse influenza vaccinations is required to guide us in the promotion of the influenza vaccine policy. We conducted a telephone survey on the target population of the free influenza vaccine policy. Hopefully, the findings would enable us to better understand the knowledge of the elderly people regarding the policy, to evaluate the effectiveness of the policy, for the development of effective information dissemination strategies for the future.

The objective of this study is to find out what the elderly people in Taiwan and Fuchien know and need regarding influenza. This study targeted people aged 65 and older. The survey was conducted during the week of October 3 to 11, 2007. Random number dialing was used for this survey. We completed a total of 1,115 effective samples. The samples were weighted by sex, age, and city/county of residence. The main findings were: 63% of the elderly population eligible to

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receive the free shots indicated that they are plan to be vaccinated this year; the most important factor for increased willingness to vaccinate was age, i.e. older people were more likely to be vaccinated; for people who believed that vaccination was beneficial, willingness to vaccinate was 20.35 times higher compared to people who believed that vaccination was not beneficial (95% CI = 10.26~40.34); for people who had no obstacles against vaccination, willingness to vaccinate was 7.99 times higher compared to people who had obstacles against vaccination (95%CI = 5.03~12.68); for people who believed influenza to be a serious disease, willingness to vaccinated was 1.88 times higher compared to people who believed that vaccination is not beneficial (95% CI = 1.07~3.01).

Conclusion: Our study showed that 63% of the elderly plans to be vaccinated this year, while 16% were undecided. Only 22% of the elderly population indicated that they do not plan on being vaccinated. Therefore, we are very optimistic about this campaign and might be improved. We would like to recommend using “rational appeal” and “simple messages” to emphasize the safety and benefits of the flu vaccine in vaccination campaigns. In addition, healthcare workers from local health stations may disseminate the message while doing home visits or routine physical examinations for the elderly and during various community outreach programs.

Key words: influenza or flu, vaccine, influenza vaccine, vaccination, the elderly.

## Foreword

Influenza (more commonly known as flu) is an acute viral respiratory tract disease. It is caused by the influenza virus and often leads to fever, headache, muscle aches, malaise, rhinorrhea, sore throat, and coughs. The importance of influenza lies in the swiftness of its outbreaks, covering large geographic areas,

and the severity of complications, especially bacterial and viral pneumonias. During an outbreak, severe and fatal cases are usually found in the elderly and individuals with cardiac, pulmonary, renal, and/or metabolic illnesses, and people with anemia or immunodeficiency. Every year, epidemics of influenza occur in many places around the world, and it often targets the elderly. According to the findings of a joint study of Taiwan CDC and the National Institute of Health (NIH) of the United States, it is estimated that about 4,500 persons die of influenza and its complications each year in Taiwan (that is about 20 persons/100,000 population), and over 80% are people aged 65 years or older [1]. In the United States, approximately 36,000 persons died of influenza and associated complications each year in 1990-1999 [2].

Studies have shown that vaccination against influenza vaccines is the most effective way to prevent the elderly from becoming ill with influenza and its complications, which may result in hospitalization or death [3-6]. It is reported that influenza vaccination may decrease influenza-like illness in the elderly by 35%, influenza or pneumonia by 33%, death from influenza or pneumonia by 47%, and all-cause mortality by 50% [4]. Economically, vaccination against the flu vaccines decreased hospitalization cost incurred by all-cause and pulmonary disease hospitalizations. This is largely because of savings from high-risk elderly people aged 75 years or older. Annual saving is NT\$2,190,000 per person per year [5]. Assessment of the cost-effectiveness of influenza vaccination for non-institutionalized elderly population in Taiwan was performed with the assumption of an 80% vaccination rate for non-institutionalized elderly. Basing calculations on risk difference of influenza before and after vaccination in 1999, it is estimated vaccinating the elderly would result in NT\$1.935 billion of saving, after subtracting cost of vaccines, medical expenses, and administrative costs [6].

Most countries in Western and Central Europe, North America, Oceania, and East Asia include persons with cardiovascular or metabolic diseases as high risk group, and included them for influenza vaccination. Internationally, most recommendations suggest vaccinating persons aged 65 years or older as the first priority [7]. Taiwan government launched a pilot program in 1998, providing free influenza vaccine to high-risk persons who are 65 years or older. This was expanded to include all persons aged 65 years or older. According to a survey conducted by Taiwan CDC, annual vaccination rates of persons aged 65 years or older between 2003 and 2006 were 68.4%, 60.3%, 59.1%, and 52.6%. This apparent downward trend motivated us to explore the factors that may influence the willingness of the elderly to be vaccinated, to direct the government's future immunization policy.

### **Materials and Methods**

Multilayered socio-psychological factors influence the willingness of the elderly people to be vaccinated. We used the health belief model [8] and constructed a research framework which consists of the following: demographics, including marital status, cohabitants, educational background, location of residence, age, occupation prior to retirement, and sex; knowledge of disease, including self-rated probability of contracting disease and severity of disease; cues for action, including external cues (information source) and internal cues (physical conditions); self-rated threat of disease; and motivations for vaccination, including knowledge on vaccine benefits (reasons for vaccination) and obstacles against vaccination (reasons for refusing vaccination). We used telephone directory of Chunghwa Telecom as the sampling population to conduct a city/county stratified random sampling using the Computer Assisted Telephone Interview (CATI)

system. The number of subjects from each of the 25 cities/counties sampled was proportional to the population published by the Ministry of Interior.

For the telephone survey, we used the local residential telephone directory as the sampling population; from which we selected households for interview. For each one effective sample, we selected one number to be interviewed, along with 20 alternate series. If the first number selected could not be interviewed after three consecutive calls, alternate numbers will be used to obtain an effective sample. If an effective sample could not be obtained after exhausting all 20 alternate numbers, more numbers would be added. In order include people with unlisted numbers, we created new numbers by replacing the last two digits with a random number. This broadened the coverage of the telephone numbers to more than 95% of phone users. When the lists of telephone numbers were ready, they were keyed into the CATI system before the survey was conducted. The respondent must answer the survey without a proxy and the survey was conducted in the language of the respondent's preference.

After excluding non-human factors (including no answer, busy line, the number was temporarily suspended, changed, out of order, or not in use, connected to fax machine or other data transmitting devices, answering machine, business numbers, government agencies, social groups, or institutions), we completed a total of 1,115 effective questionnaires, representing residents from both Taiwan and Fuchien regions. Response rate was 8.2%. Sex, age, and location of residence were weighted; at confidence level of 95%, the sampling error was  $\pm 2.93\%$ .

## Results

People aged 75 year or older constituted 39% of the survey subjects. Over

55% had never gone to school or had only elementary school education. About 76% of the subjects were married or living with a partner; and 20% were widowed. Regarding their family background, 37% of lived with his or her children and grandchildren, and 12% lived alone. As for their health condition, 70% of did not hold an IC Card for Severe Illness, nor did they have heart diseases, diabetes, strokes, or malignant tumors (cancer). Probably because of recent influenza vaccine campaign efforts, 62.3% of those interviewed indicated that they planned on being vaccinated this year. Table 1 shows the information channels through which elderly people aged 65 years and above received information regarding the free flu vaccination program, knowledge on benefits and harms. For information channel, 39% of the elderly received messages from television news or commercials, 23% from hospitals and clinics, and 21% from local health stations. As to their knowledge on benefits, the main reason for people to receive vaccine was “fear of getting the flu” (52%), followed by “may become healthier” (27%). In contrast, the main reason for refusing vaccination were “fear of side effects” (21%) and “does not believe the vaccine to be effective” (7%). On the knowledge of the severity of influenza, 64% agreed that influenza can lead to complications; 18% disagreed. With regards to the severity of threat by influenza, 53% agreed that influenza will have serious effects on their health, while 30% disagreed. Most (53%) believed that it is not possible to contract flue; 26% believed it possible; 20% didn’t know. When asked if he or she would possibly fall victim to influenza during a flu epidemic, 42% of the subjects believed that they were will not be infected and 35% believed they might be infected.

Results of hierarchical logistic regression are shown in Table 2. Model 1 indicated that willingness of be vaccinated increased with increased age (OR =

1.052, 95% CI = 1.02~1.08). In addition, interpersonal communication showed significant impact people's willingness to be vaccinated. Elderly people who received information from their healthcare providers at hospitals and clinics was 1.61 times more likely to be vaccinated compared to those who did not (OR = 1.610, 95% CI = 1.07~2.43). Likewise, information dissemination at local health bureau/station also proved to be very effective; elderly people who received information at local health bureau/station were 1.75 times more willing to be vaccinated compared to those who did not (OR = 1.74, 95% CI = 1.12~2.71).

After controlling for demographic variables and informational channels, model 2 showed that people who believe influenza may have adverse effects on their health were 1.96 times more likely to be vaccinated compared to those who believed otherwise (OR = 1.96, 95% CI = 1.34~2.87). People who considered it possible to be infected with flu was 1.62 times more likely to be vaccinated compared to those who considered it not possible (OR = 1.62, 95% CI = 1.10~2.38).

After controlling for demographic variables, informational channels, belief about influenza's effect on health and self-rated probability to be infected, the full model showed that people who had knowledge of the benefits of vaccination were 20.35 times more likely to be vaccinated compare to people who did not (OR = 20.35, 95% CI = 10.26~40.34), and those who did not have obstacles against vaccination (negative thinking) was 7.99 times more likely to be vaccinated compared to people who had obstacles (OR = 7.99, 95% CI = 5.03~12.68). However, self-rated disease threat showed no effect in this model, which might be because its effect have been controlled by belief on influenza's adverse effect on health and self-rated probability of being infected. Comparing the three models using their  $-2$  Log likelihood values, we can see that the full model is better than

the other two. Therefore, the full model is used.

## **Discussion**

Through this survey, we found that the main reason for vaccination in the elderly was because they are “feared getting flu.” However, the survey also showed that 53% of the elderly believed that it was not possible for them to get flu. This might be the principle reason that target vaccination rate has not been reached. We recommend using the message stating that “probability of influenza and severe flu-related disease is high in the elderly”. This will increase flu awareness and knowledge of vaccine benefits in from the elderly, thus increase vaccination rate. This study also revealed that 23% and 22% of those polled received information regarding influenza vaccination from hospital/clinic and local health bureau/station, respectively. In contrast, in the 2006 Taiwan CDC survey, 13% of adults aged 20 years and above polled indicated that they were informed at hospital/clinic and only 4% received the message from local health bureau/station. This means that face-to-face interpersonal communication approaches, such as information from hospitals/clinics and health bureau/station, should be used more frequently to target the elderly. Furthermore, during this telephone survey, only 22% of the elderly population indicated that they do not plan on being vaccinated this year; 63% of plans to be vaccinated, while 16% were undecided. Compared to the vaccination rate of the elderly people last year (53%), we are optimistic about the turnout of this year, but we need to continue the flu vaccination campaign.

Studies have shown that increased self-rated health condition is associated with decreased use of healthcare services. In respect to usage, increased physical condition is associated with decreased probabilities of emergency room visits,



hospitalization, and buying over-the-counter drugs [9]. A similar survey in 2004 to assess the attitude of the public towards vaccines and communicable diseases revealed that the majority of the people interviewed were confident to fend off flu and SARS on their own, especially the elderly, people with minimal education, and people confident about having a good immune system; reasons for refusing vaccination were health-related [10]. Factors associated with increased influenza vaccination rate in the elderly include increased age, having awareness of influenza risk, having physician recommendation, and increased knowledge about flu [11-13]. In this study, using similar demographic variables, we found that sex and education level were not significantly associated with willingness to be vaccinated; only age had significant association.

Because this study was done using telephone interviews, response rate was 8% because of lack of eligible interviewee, discontinued interviews, and refusals. The low response rate may affect the result of the study. Because this survey was limited to persons aged 65 years or older, the findings could not be generalized to other age groups. During random sampling of telephone numbers, institutions and businesses were excluded. The surveyed subjects consist of elderly person in the community who are healthy. Because 5% of the elderly population is institutionalized, the representativeness of this survey is not known [14]. To date, most studies on influenza vaccines have been restricted vaccines funded by the government. Future studies should stratify into paid and government funded free vaccines. Because Taiwan has an aging society, there should be increased emphasis on the social welfare of the elderly. Finally, the in *Healthy People 2010*, the United States had set the target of influenza vaccination rate in persons aged 65 years or older and institutionalized persons at 90% by 2010. This is a goal that Taiwan should also pursuit.

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**Table 1. Information channels through which elderly people aged 65 years and above received information regarding the free flu vaccination program, knowledge on benefits and harms. (n = 1115)**

	Positive	Percentage (%)
<b>Information channel</b>		
I was informed about the free flu vaccine by: (select all that applies)		
News or commercial on television	433	39
Healthcare professionals at hospital or clinic	251	23
Health workers at local health bureau or health station	237	21
Newspaper	171	15
None of above	167	15
<b>Knowledge on benefits</b>		
Reasons for vaccination: (select all that applies)		
Fear of getting the flu	566	51
May become healthier	299	27
Recommended by healthcare personnel	107	10
Fear of spreading the disease to family members	80	7
Vaccine is free	64	6
<b>Identified obstacles</b>		
Reasons for refusing vaccination: (select all that applies)		
Fear of side effects	233	21
Does not believe vaccination to be effective	76	7
Does not have time	42	4
Lack of family members accompanying to be vaccinated	29	3
Lack of transportation	26	2
<b>Self-rated probability of being infected</b>		
Self-rated probability that subject will get the flu:		
Possible	292	26.1
Not possible	592	53.1
Don't know	218	19.6
Refused	13	1.1

**Table 2. Hierarchical logistic regression analysis of people's willingness to be vaccinated**

Will be vaccinated Yes/No	Model 1		Model 2		Full Model	
	OR	95% CI	OR	95% CI	OR	95% CI
Constant	0.031**		0.011***		0.001***	
Sex male/female	1.406	0.98~2.01	1.380	0.96~1.99	1.266	0.81~1.99
Educational background						
Never attended school/college or above	1.100	0.59~2.05	1.443	0.76~2.75	1.788	0.78~4.09
Elementary school/college or above	1.093	0.66~1.81	1.266	0.75~2.13	1.190	0.63~2.24
Junior high school/college or above	1.374	0.73~2.57	1.449	0.77~2.74	1.280	0.60~2.75
Senior high school/college or above	0.816	0.47~1.41	0.861	0.49~1.50	0.881	0.45~1.73
Age	1.052***	1.02~1.08	1.057***	1.03~1.09	1.052**	1.01~1.09
Television news or commercials Yes/No	1.363	0.95~1.95	1.296	0.90~1.87	1.032	0.66~1.62
HEC <sup>1</sup> at hospital or clinic Yes/No	1.610*	1.07~2.43	1.548*	1.02~2.36	1.005	0.61~1.66
HEC <sup>1</sup> by health bureau/station						
Yes/No	1.741*	1.12~2.71	1.813**	1.15~2.85	1.467	0.85~2.55
Severity Severe/Not severe			1.962***	1.34~2.87	1.877**	1.17~3.01
Probability of being infected Possible/Not possible			1.620*	1.10~2.38	1.423	0.90~2.25
Knowledge of benefits Yes/No					20.346***	10.26~40.34
Identified obstacles No/Yes					7.989***	5.03~12.68
Felt threatened by the disease Agree/Disagree					0.691	0.44~1.08
-2 Log likelihood		791.977		766.534		553.416

N = 656 (only those who answered all questions were included in the models)

\*:  $p < 0.05$  \*\*:  $p < 0.01$  \*\*\*:  $p < 0.001$

1HEC: Health education campaign.