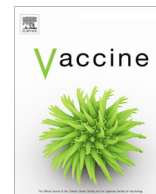


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## Knowledge, attitudes and practices related to the influenza virus and vaccine among older adults in Eastern China

Rachael Wendlandt<sup>a,\*</sup>, B.J. Cowling<sup>b</sup>, Yuyun Chen<sup>b</sup>, Fiona Havers<sup>c</sup>, Pat Shifflett<sup>a</sup>, Ying Song<sup>d</sup>, Ran Zhang<sup>d</sup>, Danielle Iuliano<sup>c</sup>, Cuiling Xu<sup>e</sup>, Hongie Yu<sup>i</sup>, Jun Zhang<sup>f</sup>, Hongjun Zhang<sup>g</sup>, Fenyang Tang<sup>h</sup>, Mark Thompson<sup>c</sup>

<sup>a</sup> Abt Associates, Inc., 2200 Century Parkway NE, Suite 950, Atlanta, GA, USA

<sup>b</sup> Hong Kong University, Pokfulam Road, Hong Kong Special Administrative Region

<sup>c</sup> United States Centers for Disease Control and Prevention; Atlanta, 1600 Clifton Rd, Atlanta, GA, USA

<sup>d</sup> United States Centers for Disease Control and Prevention; Beijing, Suite 601, Dongwai Diplomatic Office, 23 Dongzhimenwai Dajie, Beijing, PR China

<sup>e</sup> China Centers for Disease Control and Prevention, 155 Changbai Road, Changping District, Beijing, PR China

<sup>f</sup> Suzhou Centers for Disease Control and Prevention, 72 San Xiang Road, Suzhou City, Jiangsu Province, PR China

<sup>g</sup> Yancheng Centers for Disease Control and Prevention, 66 East Yu Long Road, Yancheng City, Jiangsu Province, PR China

<sup>h</sup> Jiangsu Centers for Disease Control and Prevention, 172 Nan Jing Road, Nanjing City, Jiangsu Province, PR China

<sup>i</sup> National Institute for Viral Disease Control and Prevention, China CDC, Key Laboratory for Medical Virology, National Health and Family Planning Commission, Beijing 102206, China

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## ABSTRACT

**Background:** This study aims to assess the association between socio-demographic and health characteristics of older adults in Eastern China and knowledge, attitudes, and practices (KAP) about the influenza virus and vaccine.

**Methods:** A prospective cohort of 1506 older adults (aged  $\geq 60$  years) was enrolled from November to December 2015 in Jiangsu Province. We examined the association between demographics, health and functional status, and cognitive impairment at enrollment with awareness of influenza virus and vaccine and KAP items focused on five Health Belief Model domains. At a 12-month follow-up interview we assessed change in awareness and readiness to be vaccinated.

**Results:** One in five older adults was aware of the influenza virus (21%) or vaccine (20%); even fewer reported having at least “a little” knowledge of the virus and vaccine (7% and 4%, respectively); less than 1% reported ever receiving an influenza vaccine. Retirement, higher education and income, and normal cognitive status were consistently associated with both awareness and knowledge of influenza virus. The odds of having at least “a little” knowledge of the vaccine was 2.9-fold (95% CI = 1.6–5.3) higher among older adults with at least some secondary schooling. Among the 108 with knowledge of the virus, 55% said they “worry about getting the flu this season.” Among the 73 with knowledge of the vaccine, 92% believed the vaccine was at least somewhat effective and less than half (43%) thought that influenza vaccination was safe. At a 12-month follow-up interview, 33% (442/1333) increased from no knowledge to at least “a little”.

**Conclusions:** If and when influenza vaccines become widely available to older adults in China, our results indicate that influenza vaccination campaigns with basic information on the virus and vaccine could be beneficial for all older adults, especially those with less education and/or more cognitive impairment.

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### 1. Introduction

Although older adults are known to be at increased risk of severe complications from influenza virus illness and a priority group for influenza vaccination in China and internationally, [1,2] influ-

enza vaccine uptake remains low (~4–13%) among older adults in China [3–6]. Seasonal influenza vaccination is not included in China's national immunization program, is only available upon request, and must be paid for out-of-pocket [60–80 RMB (\$9–15 USD)] with the exception of local government-subsidized influenza vaccine programs in a few large urban areas [4,7–10]. Previous studies have examined factors associated with receipt of seasonal influenza vaccine among older adults including knowledge,

\* Corresponding author.

E-mail address: [rachael\\_wendlandt@abtassoc.com](mailto:rachael_wendlandt@abtassoc.com) (R. Wendlandt).

attitudes, and practices (KAP) related to avian influenza [11–13] and pandemic influenza [14–17]. However, less is known about seasonal influenza vaccine KAPs among older Chinese adults living in smaller urban, semi-urban, and rural areas of China.

The Health Belief Model (HBM) has been applied to the study of influenza vaccination behavior among older adults in multiple countries [9,18,19] including China [20–22]. The HBM identifies five critical factors that are predictive of health behaviors: perceived susceptibility, perceived severity, benefits, barriers, and cues to action. Previous research has shown that the receipt of influenza vaccine and/or an intention to be vaccinated were related to greater perceived susceptibility and disease severity and greater perceived benefit from vaccination and lower perceived barriers to vaccination [18,23–25]. This study aimed to examine the association between socio-demographic and health characteristics among older adults in Eastern China and KAP about the influenza virus and vaccine across five HBM domains. In addition, we examined any subsequent gain in knowledge and readiness to receive influenza vaccination 12-months later.

## 2. Materials and methods

### 2.1. Participants

A detailed description of cohort recruitment is presented in Cowling et al. [26]. In brief, the China Aging Respiratory Infections Study (CARES) was a prospective cohort of older adults enrolled in Jiangsu Province, China during November and December 2015, to conduct active surveillance for influenza and respiratory syncytial virus for two years. Eligible enrollees were aged 60–89 years, planned to remain in the local area for at least two years, and had a home or cellular/mobile phone. Exclusion criteria included medical conditions that would preclude blood collection or influenza vaccination and signs of significant cognitive impairment, using a brief mental status screening tool (Mini-Cog™) [27,28]. Potential participants were approached in conjunction with medical or preventive care visits, in recreational or social settings, or in residential areas that included large numbers of older adults and were screened to determine eligibility.

### 2.2. Data collection

Consented participants completed a baseline interview divided into an initial assessment focused on socio-demographic characteristics (November 2015) followed by a longer second assessment (December 2015–January 2016), which included KAP items (described below) and information on self-rated health [29], self-reported chronic medical conditions, sensory or functional impairment, and the Mini-Mental State Examination (MMSE) [30]; participants were placed in three standard categories based on their MMSE score: normal (no impairment), mild impairment, or moderate to high impairment.

To assess awareness of influenza, participants were asked: “Have you heard about the influenza virus?” A “yes” or “no” answer was recorded and then all participants were told: “Influenza is a germ or virus that causes people to be sick with a cough, runny nose, body aches, or a fever. It comes to this area once or twice a year.” Then, all participants were asked, “How much do you know about the influenza virus and illness it causes?” Participants who answered “a little” or more knowledge were presented with influenza illness KAP items (Fig. 1). Similarly, awareness of influenza vaccines was assessed with a yes/no dichotomy and all participants were told: “It’s a vaccine that adults can receive every year to reduce their chances of getting sick with the influenza virus.” Then, all participants were asked to rate their knowledge

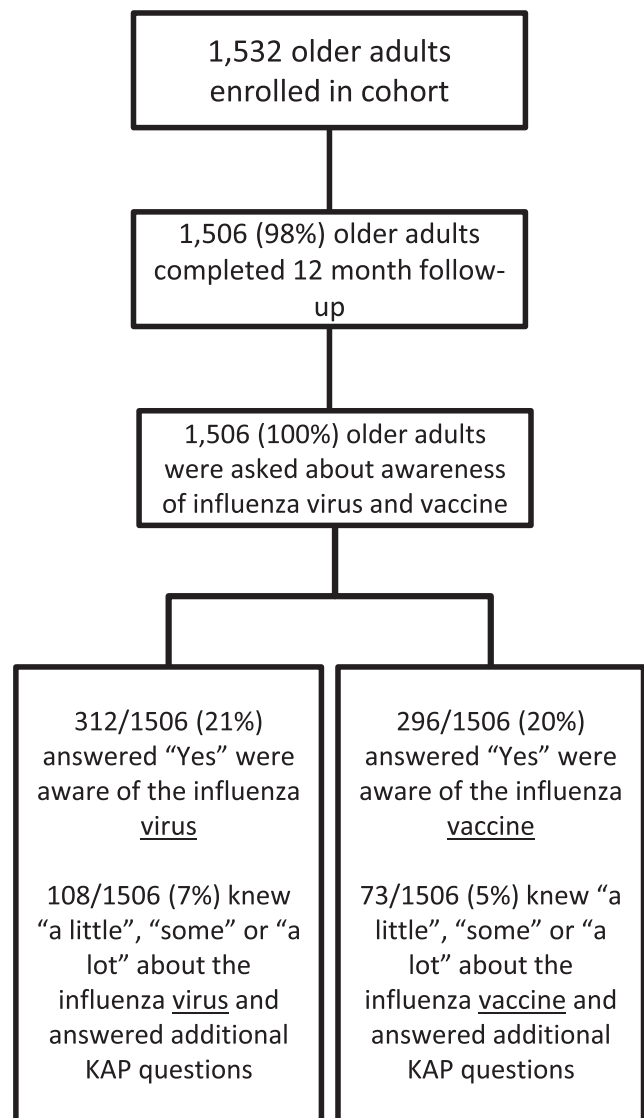


Fig. 1. Completion of Enrollment survey questions among 1506 older adults recruited in Jiangsu Province, China, 2015.

of influenza vaccines and those who answered “a little” or more knowledge were presented with the influenza vaccine KAP items.

We adapted KAP questions from previously published literature [28,30–33] and translated them into Mandarin in order to assess the five major domains of the HBM; full items and their sources are listed in Supplemental Table 1.

During the 12 month follow-up interview (December 2016–January 2017) the KAP question “How much do you know about the influenza virus and illness it causes?” with the same response options were repeated. Participants were also asked: “What are the chances that you will get an influenza vaccination in the next 12 months?”; participants were asked to answer using previously validated seven categories for vaccination readiness [15,29,31,32]: almost zero chance; very small chance; small; moderate; large; very large chance; and, almost certain.

Trained investigators conducted face-to-face interviews (with the exception of a small number that were conducted by telephone) using a structured questionnaire. Data was immediately captured in an electronic database using REDCap (Research Electronic Data Capture), which is a browser-based metadata-driven software system (Vanderbilt University, Nashville, TN) [33].

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