Research Square

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Influenza and Influenza Vaccine Literacy Among Nursing Home Caregivers In Plateau Regions of China: A Cross-Sectional Study

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Abstract

Background

To assess influenza and its vaccine literacy among nursing home caregivers in Qinghai province, a plateau region of China, by evaluating status and identifying gaps in knowledge, attitudes, and practices, and to explore individual and institutional determinants to inform targeted interventions.

Methods

A cross-sectional survey was conducted among 350 caregivers from 40 nursing homes across five prefectures in Qinghai Province, facility-level data were collected from administrators. Influenza and vaccine literacy were assessed across knowledge, attitudes, and practices domains, with literacy defined as a score ≥ 80%. Univariate and multivariate binary logistic regression analyses were performed using SPSS v26.0 to identify factors associated with literacy.

Results

A total of 40 nursing homes participated, with 350 online questionnaires distributed, and 343 (98.0%) valid questionnaires were recovered. Most caregivers were female (79.3%), aged ≤ 30 years (37.3%), and had high school or vocational education (37.3%). The literacy rate was 47.8% for influenza and 42.0% for the vaccine, with the lowest levels observed in Huangnan Prefecture. Knowledge awareness rates were 48.7% for influenza and 28.6% for the vaccine. Positive attitude rates were 57.1% for influenza and 46.4% for the vaccine. Practice rates were 46.4% for influenza prevention and 28.9% for vaccine-related behaviors, with influenza vaccination coverage at 24.2%. Multivariate analysis showed that lower vaccine literacy was associated with age 31–40 years (OR = 0.24) and ≥ 51 years (OR = 0.40), and location in Haibei, Yushu, or Huangnan (OR = 0.23–0.36); higher vaccine literacy with daily Internet use (>3 h: OR = 3.83; 2–3 h: OR = 2.57), a professional certificate (OR = 3.22), prior training (OR = 2.15), and facility-organized vaccination (OR = 1.86). Similar associations were observed for influenza literacy: age 31–40 years (OR = 0.35) for lower levels; daily Internet use (>3 h: OR = 3.60; 2–3 h: OR = 2.24) and a professional certificate (OR = 2.02) for higher levels.

Conclusion

Influenza and vaccine literacy among nursing home caregivers in Qinghai were moderate to low, with the lowest levels in Huangnan and suboptimal vaccination coverage. Given weaknesses in vaccine-related knowledge and practices, interventions should target older caregivers, those without formal qualifications, and facility-based strategies such as organized vaccination and tailored training.

Trial registration

Not applicable. This study did not involve any health care intervention on human participants.

1. Introduction

Influenza is an acute respiratory infection caused by influenza viruses, characterized by high transmissibility and rapid spread, with a high propensity for outbreaks in congregate settings, particularly nursing homes and other long-term care facilities[1]. China has entered an aging society, and nursing homes, as congregate living facilities for older adults, are characterized by high population density, frequent contact, and the immunocompromised status of residents, making them highly susceptible to influenza transmission and outbreaks [2]. Nationally, adults aged ≥ 60 years account for approximately 80% of influenza-associated excess respiratory deaths [3]. In nursing homes, attack rates can reach 33% during influenza seasons, placing elderly residents at high risk for severe complications[4, 5]. By the end of 2025, China had 41,700 nursing homes with 722,000 caregivers [6].In Qinghai Province, located on the Qinghai-Tibet Plateau at an average altitude exceeding 3,000 meters, the cold, dry climate and low oxygen levels may further impair respiratory function in older adults [7]. The elderly population (≥ 60 years) reached 92,000, representing 15.5% of the total population, served by 1,868 facilities, with 2,000–2,500 caregivers receiving annual training[8, 9, 10].Notably, this age group exhibited the highest influenza incidence growth rate from 2005 to 2023, with an average annual increase of 34.61%, and comprised 21.85% of reported influenza cases in 2024[11]. These data suggest that high-altitude environmental factors may amplify influenza vulnerability among older populations in plateau regions.Nursing home caregivers serve as the "first line of defense" in influenza prevention and control, and their level of influenza literacy directly influences the implementation and effectiveness of infection control measures[12]. The provincial government has prioritized caregiver training in its *Three-Year Action Plan for High-Quality Development of Elderly Care Services in Qinghai Province (2024–2026)*, mandating annual training for 1,000 nursing home caregivers [13]. However, empirical evidence regarding caregiver influenza and vaccine literacy in plateau regions remains scarce. This cross-sectional study evaluates these literacy levels and their determinants to provide a scientific basis for integrating influenza prevention into regional health strategies.

2. Participants and Methods

2.1 Participants and sample

A cross-sectional survey was conducted in Qinghai Province from September to October 2025 using multistage stratified random sampling. First, five of eight prefectures (Xining, Haixi, Yushu, Haibei, and Huangnan) were randomly selected. Then, 5–15 nursing homes per prefecture (40 total) were selected. Finally, 10 caregivers per home were selected using a random-number table (all eligible staff were included in facilities with fewer than 10 caregivers). Inclusion criteria: (1) employed in the sampled

nursing home for ≥ 3 months; (2) directly involved in the daily care of older adults; (3) able to provide written informed consent. Exclusion criteria: (1) administrative or logistical staff; (2) on leave or resigned during the survey. Sample size was calculated using the cross-sectional formula [14] with α = 0.05 (two-tailed), Z = 1.96, expected literacy P = 30%, and margin of error δ = 0.05; the required sample size was 322. After adjusting for a 5% non-response rate, the final target was 340 participants.

$$n = \frac{\mu_{\alpha}^{2}(1-p)p}{\delta^{2}}$$

2.2 Measures

Two self-designed questionnaires were developed using existing tools and guidelines, including *the National Health Literacy Survey Questionnaire (Infectious Disease Section)*, *the 66 Items of Chinese Citizen Health Literacy (2015)*, *the Infectious Disease Health Literacy Scale*, t*he Influenza Diagnosis and Treatment Protocol (2025)*, and the textbook *Infectious Diseases* (8th ed.)[15–19]. A pilot study evaluated its validity and reliability. The *Influenza Literacy Scale for Nursing Home Caregivers* demonstrated good psychometric properties: a scale-level content validity index (CVI) > 0.78, an overall Cronbach's α of 0.856 (domain-specific α: 0.802–0.891), and a test-retest reliability ICC of 0.892. Exploratory factor analysis indicated adequate sampling adequacy (Kaiser-Meyer-Olkin measure = 0.841), significant sphericity (Bartlett's test, P < 0.001), and a cumulative variance contribution of 62.35%, suggesting sound construct validity [20]. The questionnaire comprised four sections: Demographics: 10 items. Knowledge: 15 items (10 general influenza, 5 vaccine-related). Each correct answer received 1 point; partially correct multiple-choice answers received 0.5 points. Attitudes: 15 items (10 general, 5 vaccine-related), measured on a 5-point Likert scale. Practices: 15 items (10 general, 5 vaccine-related), measured on a 5-point Likert scale. Participants who scored ≥ 80% of the total score in a given dimension were classified as having literacy in that dimension, and those scoring ≥ 80% on the overall scale were classified as having influenza literacy [21]. Literacy rates were calculated as the proportion of participants meeting these criteria. The *Influenza Prevention and Control Scale for Nursing Homes* assessed facility-level characteristics, including policy support, funding allocation, resource availability, implementation of preventive measures, and health promotion activities. The two scales developed for this study are available as Additional file 1 and Additional file 2.

2.3 Data Collection

Caregivers completed an online self-administered questionnaire via a mobile platform, WJX.cn (a widely used survey tool in China), by scanning a QR code. Trained investigators provided instructions and conducted quality control. For nursing homes, data were collected through structured interviews with administrators and on-site observations.

2.4 Statistical Analysis

Statistical analyses were performed using SPSS version 26.0. Descriptive statistics summarized participant characteristics and literacy rates. Univariate comparisons were conducted using the chi-square test. Variables with $P < 0.05$ in univariate analysis were included in multivariate binary logistic regression models to identify factors independently associated with influenza and vaccine literacy. Adjusted odds ratios (OR) and 95% confidence intervals (CI) were calculated. Statistical significance was set at $P < 0.05$ (two-tailed).

2.5 Ethical approval

This study was approved by the Ethics Committee of Qinghai Center for Disease Control and Prevention (Approval number: 2025011). Informed consent was obtained from both the participating institutions and individual nursing home caregivers prior to enrollment. A written informed consent statement was embedded at the beginning of the electronic questionnaire, explaining the study purpose, voluntary participation, confidentiality, and the right to withdraw at any time. By completing and submitting the questionnaire, participants provided their informed consent to participate. All data were anonymized and managed using a coding system, with no personally identifiable information collected or used, thereby ensuring the protection of participants' privacy.

3. Results

3.1 Characteristics of Nursing Homes and Caregivers

A total of 40 nursing homes across five prefectures in Qinghai Province participated: 15 in Xining (37.5%), 8 in Haixi (20.0%), 7 in Yushu (17.5%), 5 in Haibei (12.5%), and 5 in Huangnan (12.5%). Of these, 25 (62.5%) were public, and 15 (37.5%) were private.

Regarding facility-level characteristics, 23 had policy support for infection control (57.5%), 35 had adequate resource allocation (87.5%), 25 recommended vaccination to caregivers and older adults (62.5%), 12 organized vaccination (30.0%), 27 had vaccination sites nearby 67.5%), 31 implemented preventive measures (77.5%), 33 conducted health promotion activities (82.5%), and 21 received community vaccination reminders (52.5%).A total of 350 caregivers were investigated: 149 in Xining(42.6%), 65 in Haixi(18.6%), 49 in Yushu(14.0%), 42 in Haibei(12.0%), and 38 in Huangnan(10.9%). Of these, 343 valid questionnaires were recovered (valid response rate: 98.0%). Most caregivers were female (272, 79.3%), aged ≤30 years (128, 37.3%), and had high school or vocational education (128, 37.3%). The majority had 1–5 years of caregiving experience (164, 47.8%), held a professional certificate (203, 59.2%), and were full-time employees (215, 62.7%). Regarding academic majors, 98 graduated from nursing programs (28.6%), 51 from rehabilitation therapy (14.9%), 38 from geriatric service management (11.1%), and 156 from other fields (45.5%). Additionally, 120 used the Internet for 1-2 hours (35.0%), 187 had prior experience in epidemic response (54.5%), and 236 had received influenza-related training (68.8%).

3.2 Influenza and Vaccine Literacy Levels

Among the 343 caregivers, the influenza literacy rate was 47.8% (164/343), and the vaccine literacy rate was 42.0% (144/343). Literacy varied by prefecture, with both influenza and vaccine literacy highest in Xining (53.0% and 48.3%, respectively) and lowest in Huangnan (29.0% and 21.1%, respectively).

3.2.1 Knowledge Domain

The rate of influenza knowledge awareness was 48.7% (167/343). Awareness of preventive measures was highest (98.0%), while typical symptoms were lowest (29.5%). The vaccine-related knowledge rate was significantly lower (28.6%), with vaccination timing most recognized (82.5%) and contraindications least (31.8%) (Table 1). The main information sources were the Internet (84.3%), bulletin boards (81.1%), training lectures (74.9%), social networks (58.6%), and text messages (42.6%). Acquired knowledge primarily covered theoretical content (93.6%) and practical skills (86.9%), with vaccination knowledge reported less frequently (80.8%).

3.2.2 Attitude Domain

The proportion of caregivers with a positive attitude was 57.1% (196/343). Most caregivers recognized the need for daily prevention (60.6%) and older adults' higher risk (56.0%), and were willing to answer questions when older adults consulted about influenza (55.7%). Only 10.8% felt unconcerned about contracting influenza. Vaccine-related positive attitude was significantly lower (46.4%). Agreement was low for vaccine safety (35.6%), annual vaccination (36.2%), and vaccine effectiveness (38.5%) (Table 2). Reasons for vaccine hesitancy included concerns about side effects (55.1%), contraindications (46.7%), cost (34.1%), perceived unnecessity (28.9%), and other reasons (10.5%).

3.2.3 Practice Domain

The proportion of caregivers adhering to recommended preventive practices was 46.4% (159/343). Daily room ventilation (53.1%), caring for febrile older adults (52.2%), and regular mask changes (51.3%) were common. However, only 37.0% would seek medical care when suspecting influenza instead of working while ill. Vaccine-related practice was lower (28.9%), with 24.2% vaccinated and 22.5% willing to vaccinate after symptom onset (Table 3). The most endorsed strategies to improve vaccination uptake were: free vaccination (85.4%), insurance coverage (81.3%), workplace-organized vaccination (78.1%), followed by enhanced vaccine education (78.1%) and paid leave for vaccination (68.2%).

3.3 Factors Associated with Literacy Levels

3.3.1 Vaccine Literacy

A univariate analysis was performed to examine the associations between vaccine literacy and 20 potential determinants, including 10 caregiver-level factors (gender, educational , age, major, work experience, professional certification, employment type, prior influenza training, epidemic response experience, and daily Internet use) and 10 facility-level factors (location, facility type, policy support, resource allocation, recommends vaccination, organized vaccination, vaccination wites nearby,

implementation of preventive measures, health promotion, and community vaccination reminders). Nine factors were significantly associated with vaccine literacy (P < 0.05): educational level, age, major, professional certification, influenza training, daily Internet use, location, facility-organized vaccination, and health promotion (Table 4).

Multivariate analysis identified factors associated with vaccine literacy (Figure 1). Lower literacy was independently associated with age 31–40 years (OR=0.244, 95%CI: 0.111–0.538) and ≥51 years (OR=0.397, 95%CI: 0.178–0.883), non-nursing degrees (OR=0.197, 95%CI: 0.052–0.748), and location in Haibei (OR=0.355, 95%CI: 0.149–0.844), Yushu (OR=0.347, 95%CI: 0.153–0.786), or Huangnan (OR=0.227, 95%CI: 0.085–0.605). Higher literacy was associated with daily Internet use (>3 h: OR=3.833, 95%CI: 1.772–8.292; 2–3 h: OR=2.572, 95%CI: 1.142–5.790), holding a vocational certificate (OR=3.223, 95%CI: 1.749–5.939), prior influenza training (OR=2.146, 95%CI: 1.087–4.238), and facility-organized vaccination (OR=1.858, 95%CI: 1.068–3.232).

3.3.2 Influenza Literacy

Univariate analysis of the same 20 caregiver- and facility-level factors identified nine variables significantly associated with overall influenza literacy (P < 0.05): education, age, major, certification, influenza training, Internet use, facility vaccination recommendation, access to vaccination sites, and health promotion (Table 4). In multivariate analysis, lower overall influenza literacy was independently associated with age 31–40 years (OR=0.348, 95%CI: 0.169–0.713), while higher literacy was associated with daily Internet use (>3 h: OR=3.604, 95%CI: 1.716–7.569; 2–3 h: OR=2.235, 95%CI: 1.029–4.856) and holding a vocational certificate (OR=2.017, 95%CI: 1.198–3.394) (Figure 1).

4. Discussion

4.1 Overview of Findings

Nursing home caregivers are pivotal in influenza prevention, yet their influenza and vaccine literacy remains poor. This study provides a systematic assessment of influenza and vaccine literacy among nursing home caregivers in a high-altitude region of Western China. Our findings indicate that influenza literacy among this cohort is higher than the levels reported for infectious disease literacy and general health literacy among caregivers in other Chinese regions [22, 23]. This elevation may stem from two key factors: the high seasonal visibility of influenza in Qinghai, which heightens awareness among both caregivers and vulnerable populations, and the impact of recent provincial policies, such as the *Three-Year Action Plan for High-Quality Development of Elderly Care Services* mandates annual training for 1,000 nursing home caregivers [13], a policy that has likely bolstered caregiver training and contributed to the observed literacy levels. However, vaccine literacy lagged substantially, driven by pronounced deficits in vaccine-specific knowledge and low vaccination uptake. This 'vaccine literacy bottleneck' confirms that vaccination remains a persistent vulnerability in this cohort [24], which is a critical barrier to effective influenza prevention. Their limited vaccine literacy likely undermines both their own vaccination uptake

and their ability to positively influence vaccination decisions among the residents they care for, thereby perpetuating a cycle of risk within nursing homes [25,26]. Furthermore, marked geographic disparities were evident; caregivers in Huangnan Prefecture demonstrated the lowest literacy across all domains, aligning with established socioeconomic gradients in health literacy [27]. Addressing these gaps necessitates targeted interventions to overcome the "vaccine literacy bottleneck" through competency-based training, with priority given to underserved areas.

4.2 Knowledge, Attitude, and Practice

In the knowledge domain, while awareness of basic prevention was nearly universal, comprehension of clinical specifics-such as typical symptoms and contraindications-was poor, mirroring trends observed in Suzhou [28]. This knowledge gap, particularly the misunderstanding of contraindications, likely explains why 46.7% of caregivers cited "contraindications" as a reason for vaccine refusal. The reliance on informal information sources over structured training further suggests that current educational outreach fails to demystify vaccine complexity. Regarding attitudes, although caregivers acknowledged the risk influenza poses to older adults, confidence in vaccine safety and efficacy remained low, consistent with Papageorgiou et al. [29]. Concerns over side effects emerged as the primary barrier [30], reflecting a widespread misperception of risk that hinders the translation of knowledge into practice. In the practice domain, adherence to basic hygiene was high, yet critical protective actions lagged. Only 37.03% of caregivers would seek medical care instead of working while ill, which significantly elevates influenza transmission risk. Moreover, vaccination coverage fell far short of the targets set by the *Chinese Technical Guidelines for Influenza Vaccination*. The tendency to work while symptomatic further underscores systemic deficiencies in occupational health protections.

4.3 Determinants of Literacy

Multivariate analysis identified several modifiable individual and institutional determinants. Older age was negatively associated with influenza and vaccine literacy, echoing Riccio et al.[31], potentially due to younger caregivers' higher adaptability to new information. While daily Internet use (>3 hours) was a positive predictor, aligning with evidence linking eHealth literacy to reduced hesitancy [32], the quality of online information and critical evaluation skills remain paramount. Vocational certification and a nursing background emerged as powerful facilitators. Caregivers without medical majors exhibited significantly lower vaccine literacy, highlighting the foundational role of formal medical education in knowledge accumulation [33]. Furthermore, prior influenza training more than doubled the odds of vaccine literacy, reinforcing the impact of pre-service competency building[16].Institutional factors were equally decisive. Regional disparities suggest an unequal distribution of education and services. As prior research indicates that intervention efficacy varies by geography[34], future efforts must prioritize nursing homes in agricultural and pastoral areas. Notably, facility-organized vaccination significantly predicted higher vaccine literacy, suggesting that institutional strategies, including convenient access and financial support, can enhance caregivers' vaccine literacy and uptake. This aligns with Lam et al. [35], who found

workplace vaccination programs substantially increase uptake. Notably, the insignificance of health promotion in multivariate models(despite significance in univariate analysis)implies that implementation quality outweighs mere presence. While health promotion activities showed significance in univariate analysis, their loss of effect in multivariate models suggests that implementation quality outweighs mere presence. Despite widespread training, persistent knowledge gaps-particularly regarding vaccine contraindications-reveal a mismatch between content and actual needs. This underscores the necessity of interactive, workplace-based training to bridge the gap [36]. Furthermore, the univariate associations of facility recommendations and site proximity highlight the comprehensive role of institutional management in fostering literacy, aligning with findings in hospital infection control research [37].

4.4 Recommendations

Based on these findings, we propose four targeted interventions: (1) Differentiated Training: Implement programs tailored to national standards (*the Technical Specifications for Influenza Outbreak Management in Nursing Homes* (DB 1409/T 43-2023) [38] and *the Specifications for Infection Prevention and Control in Nursing Homes* (GB/T 46913-2025)) [39] prioritizing older, non-nursing-qualified caregivers and underserved regions like Huangnan. (2) Curriculum Integration: Embed vaccine literacy into certification and continuing education via scenario simulations and digital platforms. (3) Enhanced Access: Facilitate facility-based vaccination through community partnerships and fee-reduction policies. (4) Supportive Environment: Strengthen infection control protocols and utilize workplace channels to cultivate a culture of active prevention.

5. Limitations

Several limitations warrant consideration. First, the self-administered online format may introduce social desirability or recall bias. Second, the small number of eligible facilities in remote areas precluded stratified sampling, potentially affecting representativeness. Finally, the cross-sectional design cannot support causal inference. Despite these constraints, this study provides vital evidence for improving vaccine literacy in underserved, high-altitude regions.

6. Conclusion

This study reveals that while nursing home caregivers in high-altitude Western China possess foundational influenza knowledge, a "vaccine literacy bottleneck" severely undermines prevention efforts. Geographic disparities highlight systemic inequities in education access. Multivariate analysis identified modifiable determinants, including age, Internet use, vocational certification, nursing education, prior training, and facility-organized vaccination, offering actionable targets for intervention. Bridging these gaps requires a transition toward competency-based training and facility-driven vaccination strategies. Future research should utilize longitudinal and qualitative methods to explore cultural drivers of vaccine hesitancy in multi-ethnic plateau regions.

Abbreviations

CDC: Center for Disease Control and Prevention

Declarations

***Ethics approval and consent to participate**

This study was approved by the Ethical Review Committee of Qinghai Center for Disease Control and Prevention (Approval number: 2025011) and conducted in accordance with the Declaration of Helsinki. Written informed consent was obtained from all participants prior to enrollment.

***Consent for publication**

Not applicable.

***Availability of data and materials**

The data supporting the findings of this study are available from the corresponding author upon reasonable request. The two scales are provided as Additional files 1 and 2.

***Competing interests**

The authors declare that they have no competing interests.

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***Authors' contributions**

Xiaojuan Ma, Binzhong Ma contributed to the conception and design of the study. *Guangchao Zhang, Ao Rong, Haijun Ma, Haixiao Jin* implemented the study and collected the data. *Fangming Guo, Xiaoming Ma* organized the data and performed the formal analysis. *Xiaojuan Ma* drafted the initial manuscript. *Yingxin Pei, Lili Xu, Huihui Liu* critically revised the manuscript for important intellectual content and made substantial revisions. *Xiaojuan Ma* and *Yingxin Pei* contributed equally to this work as co-first authors. All authors reviewed and approved the final version of the manuscript.

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Tables

Table 1
Influenza and Vaccine Knowledge Awareness Among Caregivers (N = 343)

Knowledge Item	Correct Responses, n (%)[1]
Influenza General Knowledge	
Prevention and control measures	336 (98.0)
Virus subtypes and epidemic features	305 (88.9)
Predominant pathogens	291 (84.8)
Peak seasonal incidence	291 (84.8)
Incubation period	240 (70.0)
Susceptible populations	229 (66.8)
Main transmission routes	159 (46.4)
Potential complications	139 (40.5)
Effective disinfection methods	124 (36.2)
Typical clinical symptoms	101 (29.4)
Vaccine-Specific Knowledge	
Optimal vaccination timing	283 (82.5)
Protective efficacy of vaccination	246 (71.7)
Priority groups for vaccination	167 (48.7)
Rationale for annual re-vaccination	136 (39.7)
Contraindications for the vaccination	109 (31.8)

Table 2

Attitudes Toward Influenza and Vaccine Among Caregivers (N = 343)

Attitude Item	**Response Distribution (%)[1]**				
Influenza Prevention	1[2]	2[2]	3[2]	4[2]	5[2]
Necessity of daily preventive behaviors	3.2	2.0	8.5	25.7	60.6
Perception of elderly as high-risk groups.	2.0	3.5	10.5	28.0	56.0
Willingness to provide health consultation for elderly	2.3	3.5	7.9	30.6	55.7
Necessity of facility-organized training	1.2	3.2	7.6	36.2	51.9
Rational use of antiviral medications	2.0	2.9	8.2	35.3	51.6
Willingness to mask and care for symptomatic elderly	1.8	5.5	7.6	34.1	51.0
Willingness to proactively learn about prevention	1.8	3.8	10.8	36.2	47.5
Perception of influenza as a fatal threat to elderly	2.6	4.4	14.9	37.9	40.2
Recognizing influenza as a serious respiratory disease	5.3	11.4	16.3	39.4	27.7
Knowing influenza can be prevented and treated	21.9	36.4	16.0	14.9	10.8
Vaccine-Specific Perception					
Support for free vaccination policies	2.0	3.5	13.7	36.2	44.6
Importance of vaccination for caregivers	1.5	6.7	14.6	37.6	39.7
Perceived effectiveness of the vaccine	1.5	6.1	16.6	37.3	38.5
Recommendation for annual influenza vaccination	2.6	9.0	19.2	32.9	36.2
Perceived safety of influenza vaccines	2.3	6.4	17.5	38.2	35.6

[1] All percentages are rounded to one decimal place. Row totals may not sum to exactly 100% due to rounding.

[2]: 1 = Strongly Disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, 5 = Strongly Agree.

Table 3

Influenza Infection Control and Vaccine Practices Among Caregivers (N = 343)

Practice Item	**Response Distribution(%)[1]**				
Infection Control Practices	1[2]	2[2]	3[2]	4[2]	5[2]
Perform daily room ventilation during work	2.0	2.9	5.0	37.0	53.1
Continue for febrile older adults	1.2	5.0	9.0	32.7	52.2
Change masks regularly during work	1.8	2.6	7.3	37.0	51.3
Hand hygiene before/after interactions	2.0	2.9	7.0	38.5	49.6
Regularly clean and disinfect work areas	2.0	2.3	9.0	37.9	48.7
Proactively wear masks during daily care	2.0	2.3	8.2	39.9	47.5
Keeping distance during care for symptomatic elderly	2.6	5.0	15.5	32.4	44.6
Proactively reporting influenza outbreaks to CDC	2.3	5.0	16.3	34.1	42.3
Recommend prophylactic medication for at-risk elderly	2.0	4.7	14.9	36.7	41.7
Seeking medical consultation if symptomatic	5.8	9.0	14.6	33.5	37.0
Vaccine-Related Practices					
Recommending vaccines for elderly	7.6	5.3	19.5	32.7	35.0
Proactive vaccination information seeking	2.3	6.7	22.2	37.0	31.8
Finding vaccination procedures convenient	5.5	7.9	25.4	31.8	29.5
Annual vaccination adherence	7.3	9.0	25.4	29.7	28.6
Vaccination when symptomatic before confirmation	15.2	13.1	26.0	23.3	22.5

[1] All percentages are rounded to one decimal place. Row totals may not sum to exactly 100% due to rounding.

[2]: 1 = Never, 2 = Rarely, 3 = Sometimes, 4 = Often, 5 = Always

Table 4
Univariate Analysis of Factors Associated with Influenza and Vaccine Literacy

Characteristic	Total (N)	Vaccine Literacy			Influenza Literacy		
		n (%)[1]	χ^2	P-value	n (%)[1]	χ^2	P-value
Education			14.33	0.002		19.35	< 0.001
Primary school and below	51	19 (37.3)			19 (37.3)		
Junior high school	92	31 (33.7)			35 (38.5)		
High school/vocational	128	50 (39.1)			60 (46.9)		
College and above	72	44 (61.1)			50 (68.5)		
Age			19.54	< 0.001		14.87	0.002
≤ 30 years	128	71 (55.5)			78 (60.9)		
31–40 years	62	15 (24.2)			22 (35.5)		
41–50 years	101	41 (40.6)			43 (42.6)		
≥ 51 years	52	17 (32.7)			21 (40.4)		
Major			8.49	0.037		13.06	0.005
Nursing	98	49 (50.0)			56 (57.1)		
Rehabilitation therapy	51	22 (43.1)			28 (54.9)		
Geriatric service management	38	20 (52.6)			22 (57.9)		
Other	156	53 (34.0)			58 (37.2)		
Professional Certificate			8.09	0.004		8.10	0.004
Yes	203	98 (48.3)			110 (54.2)		
No	140	46 (32.9)			54 (38.6)		
Influenza Training			15.97	< 0.001		16.03	< 0.001
Yes	236	116 (49.2)			130 (55.1)		
No	107	28 (26.2)			34 (31.8)		
Daily Internet Use			15.62	0.001		15.36	0.002

[1] All percentages are rounded to one decimal place.

Characteristic	Total (N)	Vaccine Literacy			Influenza Literacy		
		n (%)[1]	χ^2	P-value	n (%)[1]	χ^2	P-value
< 1 hour	77	26 (33.8)			28 (36.4)		
1–2 hours	120	40 (33.3)			50 (41.7)		
2–3 hours	62	29 (46.8)			32 (51.6)		
> 3 hours	84	49 (58.3)			54 (64.3)		
Location			11.07	0.026		7.53	0.110
Xining	149	72 (48.3)			79 (53.0)		
Haixi	65	30 (46.2)			32 (49.2)		
Haibei	42	14 (33.3)			18 (42.9)		
Huangnan	38	8 (21.1)			11 (29.0)		
Yushu	49	20 (40.8)			24 (49.0)		
Recommends Vaccination			2.20	0.138		8.59	0.003
Yes	213	96 (45.1)			115 (54.0)		
No	130	48 (36.9)			49 (37.7)		
Organized Vaccination			7.11	0.008		3.82	0.051
Yes	120	62 (51.7)			66 (55.0)		
No	223	82 (36.8)			98 (44.0)		
Vaccination Sites Nearby			1.95	0.163		5.22	0.022
Yes	226	117 (51.8)			136 (60.2)		
No	117	27 (23.1)			28 (23.9)		
Health Promotion			9.60	0.002		11.16	< 0.001
Yes	293	133 (45.4)			151 (51.5)		
No	50	11 (22.0)			13 (26.0)		

[1] All percentages are rounded to one decimal place.

Figures

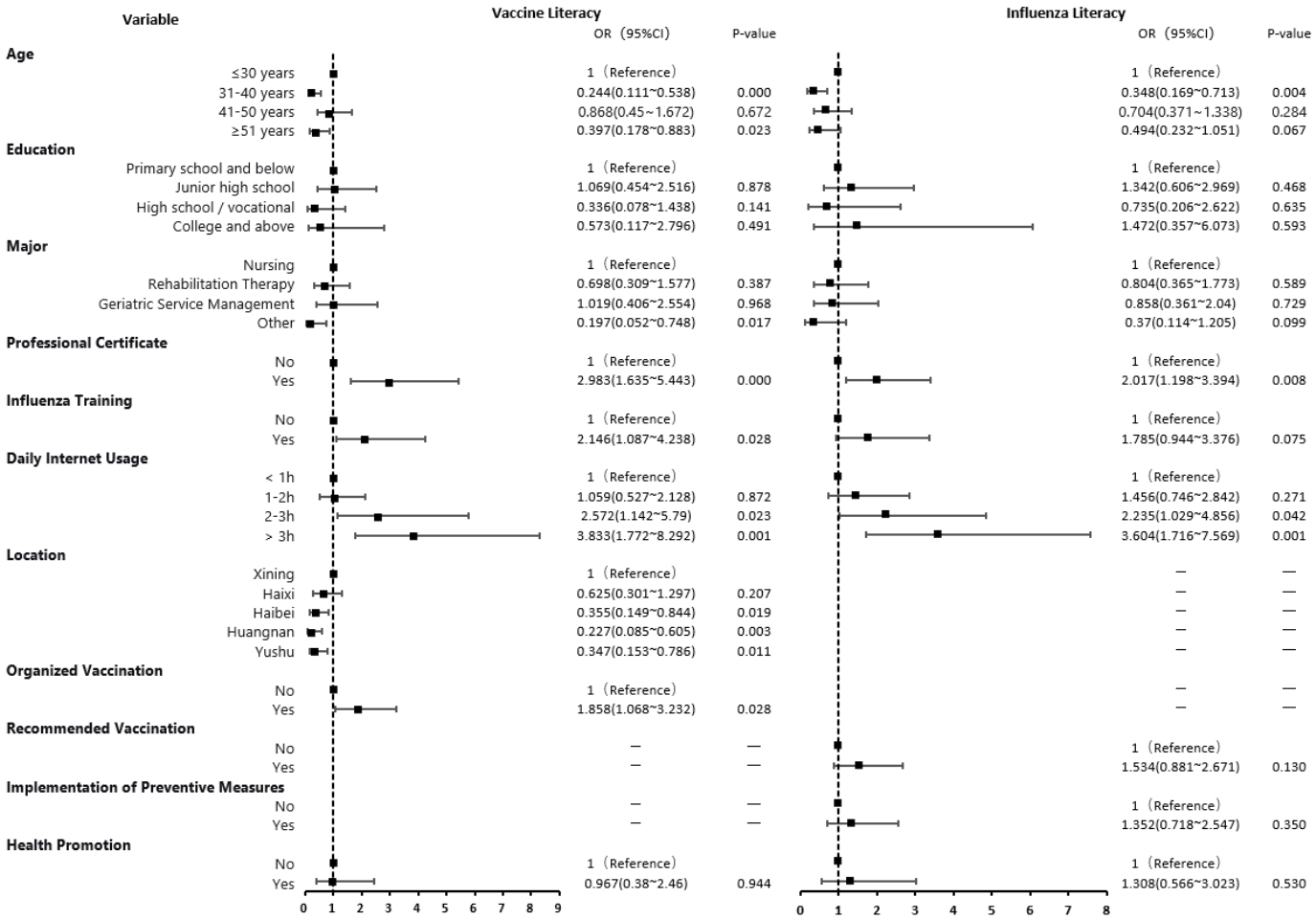


Figure 1

Forest Plot of Multivariate Analysis for Influenza and Vaccine Literacy

Supplementary Files

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