



Determinants of Influenza, Pneumococcal and Varicella-Zoster Vaccine Hesitancy in Older Adults Attending a Geriatric Clinic in Nigeria

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DOI: <https://dx.doi.org/10.4314/ajhs.v37i3.4>

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Abstract

BACKGROUND

Influenza, pneumococcal disease, and shingles are vaccine-preventable diseases with high morbidity and mortality in older adults. Nigeria lacks a national immunisation program for older adults as well as empirical evidence on the uptake and hesitancy to the vaccines for these diseases. This study determined the level and factors associated with the uptake and hesitancy to influenza, pneumococcal, and varicella zoster vaccines among older adults at the Geriatric Centre, University College Hospital, Ibadan, Nigeria.

METHODOLOGY

This was a cross-sectional hospital-based study of older adults (≥ 60 years). Data were obtained from 332 patients in the outpatient clinic of the Chief Tony Anenih Geriatric Centre (CTAGC) of the University College Hospital (UCH), Ibadan, Nigeria. Participants were selected using a systematic sampling method, collecting data from January to March of 2023. Univariate and multivariate analyses were carried out at 5% significance.

RESULTS

Out of the 332 participants recruited, mean age was 71.8 ± 7.3 years and female-to-male ratio 1.24. Vaccination rates were low for influenza (2.7%), pneumococcal (2.4%), and varicella zoster (0.9%). Vaccine hesitancy rates were 79.2% (influenza), 78.6% (pneumococcal), and 81.6% (varicella zoster). Bivariate analysis revealed significant associations with vaccine hesitancy, including low education, low income, living with family, financial and social support, concerns over side effects, commercial profiteering, reliance on natural immunity, risk calculation, collective responsibility, and negative perceptions of vaccine safety and effectiveness. Multivariate logistic regression identified a preference for natural immunity, greater calculation of disease and vaccination risk, and vaccine safety concerns as predictors of hesitancy to influenza, pneumococcal, and varicella zoster vaccines.

CONCLUSION AND RECOMMENDATIONS

The uptake of influenza, pneumococcal, and varicella zoster vaccines was poor among older adults in our setting, while vaccine hesitancy was high indicating that a high proportion of older adults were unwilling and undecided to take the vaccines. Investigating and addressing vaccination concerns such as preference for natural immunity, greater calculation of disease and vaccination risk, and concerns about vaccine safety may improve vaccination coverage among older adults.

Keywords: Vaccine Hesitancy, Pneumococcal, Influenza, Varicella Zoster, Older Adults, Nigeria

[*Afr. J. Health Sci.* 2024 37 (3)275-284]

Introduction

Vaccination continues to play a crucial role in protecting the health of older people from infectious diseases, with a focus on

influenza, pneumococcal infections, and Zoster.¹ These diseases are important as they cause high morbidity and mortality in older people, who due to immune senescence, and

age-related specific organ physiological changes are prone to the development of these infectious diseases, thus the need to prevent their occurrence.^{1,2} Despite the proven efficacy of vaccines, a complex interplay of factors contributes to vaccine hesitancy and this is a serious threat to global health.³⁻⁵

Vaccine hesitancy refers to the delay in acceptance or refusal of vaccines despite their availability.⁶ It's a term in socio-medical literature describing a spectrum of attitudes toward vaccine decision-making, ranging from acceptance to outright refusal of certain or all vaccines.³ Vaccine hesitancy is intricate and context-specific, varying across time, place, and vaccines. Factors influencing it include complacency where diseases are not perceived as high-risk and vaccination as important, convenience reflecting practical hurdles, and confidence in the vaccine indicating a lack of trust in vaccine safety and effectiveness.^{5,6}

When tackling vaccine hesitancy, it is important to recognize the diverse factors that contribute to it. The World Health Organization (WHO) has categorized these determinants into contextual, individual and group influences as well as specific issues related to vaccines and vaccination.⁶ Vaccine hesitancy is an individual behaviour influenced by a range of factors, such as knowledge or past experiences.⁴ Vaccine hesitancy should always be looked at in the historical, political, and socio-cultural context in which vaccination occurs.⁴

Despite the enormous burden of vaccine-preventable infectious diseases, vaccine hesitancy remains a concern among older people. *Streptococcus pneumoniae* is the leading cause of community-acquired pneumonia among older people, resulting in high morbidity and mortality⁷, additionally, older persons face an increased risk of death compared to the younger age group.⁸ Influenza causes 15,000 to 70,000 deaths annually in Europe, predominantly among older people,⁹ despite the annual vaccination with an inactivated trivalent recommended for older individuals and those with chronic conditions or immunosuppression.² Herpes zoster infection

rates increase with age, from 1.1–2.9 per 1000 in those under 50 to 10.9 per 1000 in those over 80.² In Africa, there is an increase in the burden of varicella zoster due to an increasingly ageing population, the high prevalence of HIV/AIDS, and overstretched healthcare systems.¹⁰

Many older adults may not fully recover from infectious diseases, worsening existing chronic comorbidities.¹¹ This has been observed with influenza, pneumococcal disease, and herpes zoster, leading to long-term effects like frailty, loss of independence, and limitations in daily activities.¹¹ Healthcare providers have a pivotal role in influencing vaccination decisions to prevent vaccine hesitancy in older adults. This study identified the factors responsible for pneumococcal, influenza, and zoster vaccine hesitancy among older people in southwest Nigeria, offering insights and potential strategies for addressing vaccination concerns.

Methodology

Study design, site and population

This cross-sectional descriptive hospital-based study was part of a large project on vaccine hesitancy among older adults that has been previously reported.¹² Data were collected from patients in the outpatient clinic of the Chief Tony Anenih Geriatric Centre (CTAGC) of the University College Hospital (UCH), Ibadan. UCH is the first tertiary hospital in Nigeria founded in 1957. The CTAGC was founded on 17th November 2012 to care purposely for older adults aged 60 years and above.

A total of 332 older male and female adults (≥ 60 years) who presented at the CTAGC, UCH were enrolled during the study period (January 2023 and March 2023) using a systematic sampling method. Older adults who were too ill to participate were excluded from participation in the study.

Sample size and sampling

The sample size was derived using the prevalence value (68.5%) for the best estimate of vaccine hesitancy in Nigeria.¹³ The sample

size was estimated using the formula for a single proportion, $n = Z^2pq / d^2$.

During the 3-month study period, 630 older adults were expected and with a sample size of 332, a sample interval of 1.9 ($630/332$) ≈ 2 was derived. Every other older adult at the CTAGC clinic was recruited. Excluding those who did not give consent.

Instruments for data collection

A pretested, semi-structured, interviewer-administered questionnaire was used for gathering demographic and socioeconomic data. The questionnaire was pretested on 34 (10% of the study sample size) at an outpost station of the Department of Family Medicine, UCH, Ibadan. Vaccine hesitancy for influenza, pneumococcal, and varicella zoster was assessed by asking participants if they had received these vaccines with a possibility of either a "Yes or No" answer.¹⁴ Those who answered "No" were asked if they would take the vaccines if available, with response options: "Yes," "No," or "Undecided." Participants who had received or would take the vaccines were classified as "Not Vaccine Hesitant," while those undecided or unwilling were categorized as "Vaccine Hesitant."¹⁵

Determinants of vaccine hesitancy

These were assessed with demographic factors, vaccine attitudes, psychological factors, perceived sensitivity to medicines, and sources of vaccine information. The Vaccine Attitude Examination (VAX) scale measured general vaccination attitudes through 12 items across four subscales: mistrust of benefits, worries about future effects, concerns over profiteering, and preference for natural immunity. The VAX scale has high internal consistency and reliability.¹⁶ Scores ranged from 1 to 6, with lower scores indicating more positive views while higher scores represented more negative views.¹⁶⁻¹⁸

The "5C scale" (confidence, complacency, constraint, calculation, collective responsibility) measured participants' psychological antecedents to vaccination¹⁹,

with responses on a 7-point Likert scale (1 = strongly disagree, 7 = strongly agree) and these were scored by calculating the mean score for each subscale (score range 1–7). Higher confidence and collective responsibility scores indicated enablers of vaccination, while higher complacency, calculation, and constraint scores reflected barriers to vaccination.¹⁹

The participants' possible reaction to a vaccine was measured using the 5-item perceived sensitivity to medicines (PSM) scale.²⁰ A person's beliefs about their sensitivity to medicines affect their perception and reporting of medication side effects. A high score on the PSM scale predicts a greater number of symptoms following vaccination. PSM is scored on a 5-point Likert-type scale and individual items are summed to provide a total of 5 to 25. High scores indicated high perceived sensitivity to potential adverse effects of medicines.²⁰

Data management and analysis

Data entry, cleaning, and analysis were conducted using SPSS version 27. Descriptive analysis was carried out and appropriate charts illustrated categorical variables. Univariate logistic regression tested associations between independent variables and hesitancy for influenza, pneumococcal, and varicella zoster vaccines, while multivariate logistic regression determines predictors of vaccine hesitancy at $p < 0.05$.

Ethical considerations

Approval for the study was obtained from the University of Ibadan/University College Hospital Institutional Review Board (UI/EC/22/0351). Each respondents/ proxy gave informed consent before the interview.

Results

A total of 332 participants with a female-to-male ratio of 1.24 were recruited. The mean age was 71.8 ± 7.3 years. On uptake of influenza vaccine, 9 participants (2.7%) had received it, with 60 (18.1%) willing to take it, totalling 69 (20.8%) as "Not Vaccine Hesitant." However, 263 (79.2%) were hesitant, with 200 (60.2%) unwilling and 63 (19.0%) undecided.

Regarding pneumococcal vaccine uptake, 71 (21.4%) were not hesitant, while 261 (78.6%) were hesitant. Only 3 respondents (0.9%) had the zoster vaccine, with 271 (81.6%) hesitant, [207 (62.3%) unwilling and 64 (19.3%) undecided]. Figure 1.

Univariate logistic regression indicated that vaccine hesitancy was significantly associated with having less than 10 years of education, earning below the Nigerian minimum wage (30,000 Naira or \$24/month), living with family, and receiving financial and social support from family.

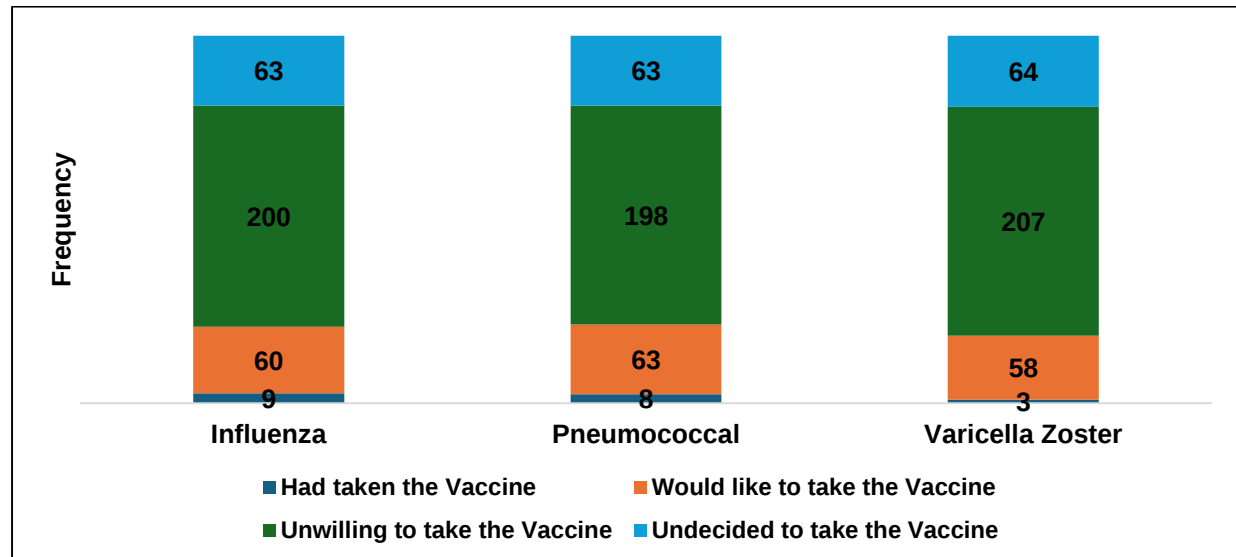


Figure 1:
Frequencies of influenza, pneumococcal, and varicella zoster vaccine uptake and hesitancy

Table 1:
Sociodemographic factors by Influenza, Pneumococcal, and Zoster Vaccine Hesitancy.

Variable	Influenza		Pneumococcal		Varicella Zoster	
	Crude OR (95% CI)	p-value	Crude OR (95% CI)	p-value	Crude OR (95% CI)	p-value
Age (Years)	1.001 (0.965-1.037)	0.977	1.003 (0.968-1.039)	0.884	1.421 (0.800-2.502)	0.233
Sex (Male)	1.229 (0.717-2.105)	0.453	1.307 (0.766-2.231)	0.326	1.001 (0.964-1.040)	0.941
Marital (Currently married)	1.386 (0.756-2.542)	0.292	1.325 (0.730-2.404)	0.354	1.242 (0.644-2.323)	0.498
Had <10 years of Formal education	6.404 (3.281-12.580)	<0.0001*	6.029 (3.149-11.544)	<0.0001*	6.613 (3.222-13.573)	<0.0001*
Income (Below the minimum wage)	3.039 (1.700-5.435)	<0.0001*	3.215 (1.802-5.747)	<0.0001*	3.185 (1.718-5.917)	<0.0001*
Occupation (Not Retired)	1.169 (0.636-2.149)	0.616	1.114 (0.607-2.043)	0.728	1.174 (0.621-2.218)	0.621
Living with Family members	5.486 (1.964-15.319)	0.001*	6.967 (2.438-19.909)	<0.0001*	8.660 (3.014-24.886)	<0.0001*
Financially supported by Family members	4.471 (2.268-8.817)	<0.0001*	4.260 (2.165-8.382)	<0.0001*	3.802 (1.898-7.615)	<0.0001*
Socially supported by Family members	9.785 (2.460-38.917)	0.001*	9.406 (2.367-37.386)	0.001*	4.750 (1.330-6.959)	0.016*
Number of Children (<5 Children)	1.767 (0.990-3.154)	0.054	1.677 (0.942-2.984)	0.079	1.525 (0.827-2.811)	0.176

* Significant at 5% level of significance

Family members (Spouse, Children, Relatives)

Significant factors associated with hesitancy included mistrust of vaccine benefits, concerns about future effects, preference for natural immunity, and psychological factors like complacency, constraints, calculation, and collective responsibility. Perceived sensitivity to vaccines was also statistically significant. Table 2. Table 3 shows that older adults who have heard or read negative things about vaccines, think vaccines are not effective and

safe, have been told by someone that vaccines are not safe, had a bad reaction to vaccines, were afraid of needles, and found it difficult to leave other work to get vaccinated, had a significant association with vaccine hesitancy.

Participants informed about Influenza, Pneumococcal, and Zoster vaccines through social media, printed and electronic newspapers, and face-to-face showed no significant vaccine hesitancy.

Table 2:

Attitude, Psychological Antecedents, and Perceived Sensitivity to Influenza, Pneumococcal, and Zoster Vaccine Hesitancy

Variable	Influenza		Pneumococcal		Varicella Zoster	
	Crude OR (95% CI)	p-value	Crude OR (95% CI)	p-value	Crude OR (95% CI)	p-value
Vaccine Attitude Examination						
Mistrust of Vaccine benefits	0.983 (0.928-1.041)	0.547	0.983 (0.928-1.041)	0.558	0.999 (0.939-1.062)	0.968
Worries over unforeseen future effects	1.210 (1.134-1.291)	<0.0001*	1.209 (1.134-1.291)	<0.0001*	1.240 (1.155-1.330)	<0.0001*
Concern about commercial profiteering	1.124 (1.062-1.189)	<0.0001*	1.123 (1.062-1.187)	<0.0001*	1.141 (1.076-1.210)	<0.0001*
Preference for Natural Immunity	1.212 (1.137-1.293)	<0.0001*	1.221 (1.145-1.302)	<0.0001*	1.231 (1.151-1.317)	<0.0001*
Overall	1.103 (1.070-1.137)	<0.0001*	1.105 (1.072-1.139)	<0.0001*	1.122 (1.085-1.160)	<0.0001*
Psychological antecedents to vaccination						
Confidence	1.032 (0.974-1.093)	0.288	1.030 (0.923-1.090)	0.310	1.029 (0.969-1.093)	0.353
Complacency	1.060 (1.004-1.118)	0.034*	1.058 (1.004-1.116)	0.037*	1.057 (0.999-1.117)	0.054
Constraints	1.095 (1.029-1.164)	0.004*	1.092 (1.027-1.162)	0.005*	1.099 (1.031-1.171)	0.004*
Calculation	1.141 (1.084-1.202)	<0.0001*	1.133 (1.077-1.193)	<0.0001*	1.118 (1.062-1.178)	<0.0001*
Collective responsibility	0.826 (0.772-0.883)	<0.0001*	0.820 (0.766-0.878)	<0.0001*	0.822 (0.766-0.892)	<0.0001*
Perceived sensitivity to vaccine						
My body is very sensitive to medicines.	1.223 (1.004-1.489)	0.045*	1.191 (0.978-1.451)	0.082	1.192 (0.970-1.464)	0.095
My body overreacts to medicines.	1.428 (1.126-1.811)	0.003*	1.405 (1.108-1.780)	0.005*	1.252 (0.974-1.611)	0.080
Stronger reactions to medicines than most people.	1.389 (1.073-1.797)	0.013*	1.342 (1.037-1.737)	0.026*	1.315 (1.006-1.720)	0.045*
Bad reaction to medicines in the past.	1.512 (1.168-1.957)	0.002*	1.464 (1.132-1.894)	0.004*	1.126 (0.842-1.506)	0.424
Very small amounts of medicines can upset my body.	1.390 (1.061-1.822)	0.017*	1.343 (1.024-1.761)	0.033*	1.158 (0.859-1.561)	0.335
Total score	1.085 (1.027-1.146)	0.004*	1.077 (1.019-1.138)	0.008*	1.051 (0.991-1.114)	0.095

* Significant at a 5% level of significance

Similarly, those who got information through the Government website did not report significant vaccine hesitancy to influenza and pneumococcal vaccines (Table 4). Multiple Logistic regression analysis was carried out for influenza, pneumococcal, and zoster vaccines. For the three vaccines, the preference for natural immunity, the psychological antecedents to vaccination and the belief that

vaccines were safe were the predictors of vaccine hesitancy (Table 5).

Discussion

The study determined the level and factors associated with the uptake and hesitancy to influenza, pneumococcal, and varicella zoster vaccines among older adults at the Geriatric Centre of the University College Hospital (UCH) in Ibadan, Nigeria.

Table 3:

Beliefs about Vaccines and Influenza, Pneumococcal, and Zoster Vaccine Hesitancy Vaccine

Variable	Influenza		Pneumococcal		Varicella Zoster	
	Crude OR (95% CI)	P-Value	Crude OR (95% CI)	P-Value	Crude OR (95% CI)	P-Value
Vaccines are needed	-	0.998	-	0.999	-	0.998
I know where to get a vaccination	1.451 (0.673-3.128)	0.343	1.531 (0.703-3.258)	0.290	1.426 (0.637-3.193)	0.388
I know where to get good/reliable information on vaccines	1.219 (0.624-2.382)	0.563	1.275 (0.653-2.487)	0.477	1.136 (0.568-2.275)	0.718
Heard or read negative things about vaccine	3.660 (2.045-6.552)	<0.0001*	4.238 (2.352-7.636)	<0.0001*	3.815 (2.054-7.087)	<0.0001*
Vaccines are effective	0.261 (0.091-0.752)	0.013*	0.261 (0.091-0.752)	0.013*	0.225 (0.068-0.749)	0.015*
Vaccines are safe	0.368 (0.160-0.845)	0.018*	0.368 (0.160-0.845)	0.018*	0.366 (0.151-0.891)	0.027*
Told by someone that the vaccines are not safe	1.762 (1.030-3.014)	0.039*	1.911 (1.123-3.252)	0.017*	1.706 (0.973-2.991)	0.062
Had a bad experience with a previous vaccinator/health clinic	0.948 (0.372-2.420)	0.912	1.659 (0.724-3.802)	0.232	0.879 (0.322-2.396)	0.800
Had a bad experience or reaction to a previous vaccination	1.378 (0.522-3.639)	0.517	2.083 (0.845-5.130)	0.111	0.931 (0.305-2.841)	0.900
Told by someone that they had a bad reaction to vaccines	2.279 (1.180-4.400)	0.014*	3.020 (1.589-5.738)	0.001*	1.944 (0.973-3.895)	0.060
Fear of needles	2.881 (1.519-5.462)	0.001*	2.138 (1.111-4.113)	0.023*	2.200 (1.094-4.924)	0.027*
Difficult to leave other work	2.138 (1.111-4.113)	0.023*	4.939 (1.912-12.758)	0.001*	7.328 (2.229-24.098)	0.001*
Religious beliefs prevent vaccination	2.857 (0.878-9.297)	0.081	2.749 (0.845-8.938)	0.093	0.885 (0.189-4.145)	0.876
Have other beliefs/traditional medicine that prevent vaccination	2.345 (0.547-0.066)	0.251	2.259 (0.527-9.689)	0.273	-	0.999

* Significant at a 5% level of significance

Vaccine uptake was very low, with high hesitancy rates for influenza (79.2%), pneumococcal (78.6%), and varicella zoster (81.6%). This mirrors global trends; for instance, in the United Kingdom, uptake remains below the WHO's 75% target, despite free vaccine availability.^{21,22} Similarly, among older Chinese, pneumococcal (60.2%) and varicella zoster (58.9%) vaccine hesitancy rates were high, although influenza hesitancy was lower (83.6%).²³

Ajibare et al. found low pneumococcal vaccine uptake (9%) among Nigerian adults with cardiac failure, with only 4% fully immunized.²⁴ In this study, varicella zoster vaccine hesitancy was highest, followed by influenza and pneumonia, possibly due to

varying awareness, with higher awareness levels for pneumococcal vaccine awareness in comparison to others. The lower pneumonia vaccine hesitancy may stem from its recognition as a serious illness. This study also showed that the official website as the source of information was significantly associated with the pneumococcal vaccine, suggesting greater emphasis on the awareness of this vaccine compared to other vaccines in Nigeria.

This study found that vaccine hesitancy toward influenza, pneumococcal, and varicella-zoster vaccines was higher among older adults with lower education and income, possibly due to limited access to vaccine information. Those with higher education tend to access diverse vaccine information sources.

Table 4:
Respondents' Sources of Information by Influenza, Pneumococcal, and Zoster Vaccines Hesitancy

Variable	Influenza		Pneumococcal		Varicella Zoster	
	Crude OR (95% CI)	P-Value	Crude OR (95% CI)	P-Value	Crude OR (95% CI)	P-Value
Social media	0.541 (0.315-0.930)	0.026	0.501 (0.290-0.865)	0.013*	0.511 (0.288-0.907)	0.022*
Television	1.443 (0.636-3.272)	0.380	1.205 (0.517-2.808)	0.666	0.756 (0.279-2.048)	0.583
Radio	2.042 (0.663-6.295)	0.214	2.042 (0.863-6.295)	0.214	1.720 (0.522-5.671)	0.373
Printed and electronic newspapers	0.191 (0.107-0.340)	<0.0001*	0.175 (0.098-0.313)	<0.0001*	0.170 (0.094-0.309)	<0.0001*
Face-to-face communication	0.321 (0.188-0.550)	<0.0001*	0.298 (0.174-0.511)	<0.0001*	0.293 (0.167-0.514)	<0.0001*
Official government website	0.430 (0.210-0.883)	0.021*	0.430 (0.210-0.883)	0.021*	0.630 (0.289-1.374)	0.246

* Significant at a 5% level of significance

Table 5:
The Predictors of Influenza, Pneumococcal and Varicella Zoster Vaccine Hesitancy

Variable	P-value	Odds Ratio	95% CI for OR	
			Lower	Upper
Vaccine Attitude Examination: Preference for Natural Immunity				
Influenza vaccine	0.002*	1.261	1.091	1.458
Pneumococcal vaccine	<0.0001*	1.321	1.134	1.541
Varicella vaccine	0.001*	1.269	1.107	1.454
Psychological antecedents to vaccination: Calculation				
Influenza vaccine	0.002*	1.138	1.047	1.237
Pneumococcal vaccine	0.015*	1.111	1.020	1.209
Varicella zoster vaccine	0.008*	1.112	1.028	1.203
Beliefs about vaccines: I think vaccines are safe				
Influenza vaccine	0.038*	0.208	0.047	0.915
Pneumococcal vaccine	0.034*	0.198	0.044	0.885
Varicella zoster vaccine	0.035*	0.204	0.046	0.896

Similar findings in Arkansas showed that higher education was associated with increased influenza vaccination rates.²⁵ Government policies to make vaccines affordable and accessible could increase uptake, particularly for retirees on irregular pensions as willingness to pay for vaccination also influences decision-making.³

Our study found that concerns about future side effects, commercial profiteering, and a preference for natural immunity were the significant negative attitudes to vaccination. Additionally, preference for natural immunity reflects not only distrust in science but also psychological, sociocultural, and political influences on low vaccine uptake among older adults.²⁶ Similarly, Nicholls et al. in the United Kingdom reported a preference for natural immunity as a predictor of vaccine hesitancy.²³

Psychosocial factors play a crucial role in understanding vaccine hesitancy among older adults. We found that increased complacency, perceived structural and psychological constraints, calculation of disease and vaccination risk, and low collective responsibility contributed to hesitancy for all three vaccines. The UK Scientific Advisory Group identified confidence, complacency, and convenience as primary factors affecting vaccination behaviour,²⁷ while Kan et al. found that transportation issues increased hesitancy among older adults.²⁸ Complacency about vaccine-preventable diseases was associated with hesitancy only for influenza and pneumococcal vaccines, aligning with findings by Nicholls et al.²³

Perceived sensitivity to vaccines was significantly associated with hesitancy. Beliefs surrounding vaccination, including exposure to negative information through word-of-mouth, media, or reading, as well as concerns about vaccine safety and its effectiveness, fear of needles, and the inconvenience of taking time off from other responsibilities to get vaccinated, were significantly linked to vaccine hesitancy. Additionally, reports of adverse reactions primarily obtained from newspapers and direct

conversations also contributed to hesitancy.²² Concerns about side effects or doubts about vaccine efficacy highlight the need for clear communication on vaccine benefits and safety.²⁹ However, the cross-sectional hospital-based nature of this study thus, provide a "snapshot" of the population at one time point, which may not reflect changes or trends over time.

Study Limitation

This is a cross-sectional hospital-based study, thus, it may be difficult to generalise its findings to the population.

Conclusion

This study found low vaccine uptake and high hesitancy for influenza, pneumococcal, and varicella zoster vaccines. Preference for natural immunity, greater calculation of disease and vaccination risk, and concerns about vaccine safety were the predictors of vaccine hesitancy. Understanding these factors is crucial for addressing challenges to vaccine uptake and combating hesitancy, which threatens global health. It also encourages policymakers to implement appropriate measures to enhance vaccine uptake among older people.

Recommendations

Practical Implications: Implement education programs, financial aid, transparent communication, and outreach for older adults through community engagement and government initiatives.

Policy Changes: Mandate vaccine literacy and integrate vaccine hesitancy screening in routine healthcare visits.

Further Research: Explore the effectiveness of various communication methods and long-term behavioral shifts in vaccine-hesitant individuals.

Acknowledgement

The authors would like to thank Mr. Segun Olabamiji for helping with the logistics of this study.

Conflict of interest: None declared.

Funding information: None

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