

Determinants of Flu Vaccine Uptake in Older Adults

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ABSTRACT

Background: Seasonal influenza poses severe health risks to vulnerable populations, yet vaccine coverage rates among older adults remain substandard globally due to various socio-demographic, systemic, and behavioral barriers. **Objective:** This study evaluated the influenza vaccine uptake among older adults in Marikina City for the year 2025 and examined the factors influencing their vaccination behavior. **Methods:** A quantitative cross-sectional, descriptive-correlational design was conducted in Marikina City involving 405 adults aged over 60 selected via snowball sampling. Data were collected using an expert-validated researcher-made survey questionnaire tool. Data analysis utilized descriptive statistics, Chi-square testing, Analysis of Variance (ANOVA), and Multivariate Logistic Regression. Ethical approval was granted by the administrative entities involved and strict compliance of confidentiality of every respondent's participation. **Results:** Vaccine uptake was 57.5%, with likely associations identified between knowledge versus socioeconomic status, educational attainment, and civil status; source of health information versus educational attainment; and flu vaccine uptake versus knowledge and educational attainment. **Conclusion:** Educational attainment and knowledge significantly drive flu vaccine uptake, highlighting the need for targeted, educational community-based public health interventions to enhance immunization coverage.

Keywords: older adults; determinants; influenza; vaccine uptake; Marikina City

INTRODUCTION

Vaccination remains a vital achievement in medical science, serving as a cornerstone of public health by preventing infectious diseases, protecting populations, and saving millions of lives globally. The World Health Organization (2024) emphasizes that vaccines provide a safe and effective means of preventing infection by strengthening the immune system and enhancing the body's natural defenses. Boccalini (2025), citing WHO data, reports that vaccine initiatives prevent approximately 4-5 million deaths annually and contribute to substantial reductions in infectious disease outbreaks. To sustain this success, WHO recommends a vaccine coverage rate (VCR) of at least 75% among priority populations, such as older adults aged 65 years and above, individuals with chronic conditions, pregnant women, children under 8 years old, and healthcare workers (Thierry et al., 2024). Among these diseases, seasonal influenza continues to pose a major global health concern, with around 1 billion cases occurring each year. According to both the Center of Disease Control (2025) and WHO, influenza results in an estimated 3-5 million severe cases annually and can lead to death, particularly among vulnerable groups.

To reduce its burden, many countries conduct annual flu vaccination campaigns. However, despite these efforts, influenza vaccination coverage among older adults remains below the ideal threshold (Prada et al., 2024). Older adults are particularly vulnerable to influenza due to physiological changes associated with aging, including diminished immune responses and the presence of chronic diseases that compromise resistance to infections (Eiden et al., 2023). The Department of Health (DOH) includes the

influenza vaccine in the national adult immunization schedule, prioritizing high-risk groups such as older adults, yet vaccination rates among older adults remain lower than those for other preventable diseases (Rivera et al., 2020). Contributing factors include vaccine cost, misconceptions, limited health-seeking behaviors, inadequate city health awareness programs, logistical issues, and distrust of healthcare services, all of which reduce vaccination intent among older adults (Cordero, 2023).

To address these issues, this study aims to identify the determinants of flu vaccine uptake in older adults in Marikina City by examining the relationship between demographic, socioeconomic, and health-related characteristics and vaccination behavior. Understanding these factors will contribute to the growing body of global research on influenza vaccine uptake, assist in aligning local initiatives with WHO's broader immunization agenda, and provide evidence-based recommendations for local public health authorities. Ultimately, the findings will guide effective community-based strategies, support nursing practice with patient-centered interventions, enhance vaccine accessibility and acceptance, and help safeguard older populations in Marikina City.

METHODS

Study design

This study utilized a quantitative, non-experimental, descriptive-correlational research design combined with a cross-sectional approach, wherein numerical data were collected at a single point in time to define flu vaccine

uptake, examine demographic profiles, and identify associations between influencing factors and vaccine uptake among older adults without manipulating variables.

Setting and participants

The study was conducted in Marikina City, Philippines, chosen due to its high population of older adults—numbering approximately 102,896 individuals aged 60 and above—and its active health management systems and senior citizen organizations. To calculate the required sample size, Slovin's Formula was applied using a 5% margin of error (representing a 95% confidence level), yielding a minimum requirement of 399 respondents. To account for a potential 10% non-response rate, the target sample size was expanded to approximately 436 respondents. Recruitment was carried out using snowball sampling (chain-referral sampling), starting with initial respondents ("seeds") connected through local health workers and senior citizens' associations. The final analyzed sample consisted of 405 older adults. Eligible participants were required to be 60 years of age or older and residents of Marikina City for at least one year with proof of residency. Excluded from the study were individuals clinically diagnosed with—or reported by caregivers to have—cognitive impairments (e.g., Alzheimer's disease, dementia, delirium, Parkinson's disease, post-stroke deficits, or major depression with psychotic features), as well as those with advanced gerontologic sensory changes such as severely impaired hearing or visual acuity.

Variables and instruments

The primary outcome of the study was the actual level of influenza vaccine uptake for the year 2025, evaluated via a direct binary (yes/no) response. Secondary outcomes included sociodemographic profile variables (sex, socioeconomic status based on PIDS 2020 income clusters, educational attainment based on PSA 2020 categories, and civil status) and factors affecting vaccine uptake (knowledge, perceived benefits, accessibility of vaccination services, and primary source of health information). Data were gathered using a researcher-administered self-made survey questionnaire. Knowledge was evaluated through a 10-item quiz-type section using yes/no responses (with reverse scoring on items 3, 8, and 9); total scores were categorized using Bloom's cutoff points into Low (<59%), Moderate (60%–79%), and High (80%–100%). Perceived benefits and accessibility of vaccination services were measured using a 5-point Likert scale ranging from 1 (Strongly Disagree) to 5 (Strongly Agree). The primary source of health information was collected as a categorical response. Tool validation involved face validity assessed by expert evaluators—yielding an Item-Level Face Validity Index (I-FVI) above 0.80 for nineteen items and a Scale-Level Face Validity Index (S-FVI) of 0.95—and content validity, which yielded a mean score of 0.79 ("very valid").

Reliability was established via a pilot study of 30 eligible older adults, yielding a Cronbach's alpha coefficient of 0.797 (acceptable/good internal consistency).

Data collection

Data collection was administered directly by the researchers using Google Forms. Prior to administration, the researchers secured official permissions from the Dean of the PLMar College of Nursing and the Marikina City Mayor's Office, and enlisted the support of primary healthcare facility nurses and barangay health workers. Eligibility and cognitive capacity were screened through a brief orientation, structured observation, orientation questions (checking date, place, and personal details), log-sheet documentation, and caregiver verification. Informed consent was formally secured from all eligible participants via written waivers. To manage data retention and privacy in compliance with Republic Act 10173 (Data Privacy Act of 2012), collected electronic response files are retained for a maximum period of two years before permanent deletion from researcher Google Drive accounts.

Data analysis

Statistical analysis was conducted using MS Excel and IBM SPSS Statistics. Descriptive statistics summarized the data, using frequencies and percentages for categorical variables (sex, income, education, civil status, sources of information, uptake status, and knowledge levels) and weighted means with standard deviations for numerical Likert-scale items (perceived benefits and accessibility). Inferential statistical procedures were executed at a significance level of $p \leq 0.05$. The Chi-Square Test of Independence was used to analyze associations between categorical sociodemographic variables and factors such as knowledge level and health information sources. Analysis of Variance (ANOVA) was used to compare differences in group means for numerical factors (perceived benefits and accessibility) across sociodemographic categories. Binary Logistic Regression was applied using a binary dependent variable (uptake status: 1 = yes, 0 = no) to evaluate multivariate predictive relationships, reporting regression coefficients, odds ratios, and p-values for both sociodemographic predictors and decision-making factors.

Ethical considerations

The research protocol, including data collection instruments and informed consent procedures, received administrative approval from the Dean of the College of Nursing at Pamantasan ng Lungsod ng Marikina (PLMar). In adherence to the Declaration of Helsinki and the Belmont Report, key ethical principles were enforced: autonomy was upheld through voluntary participation, clear explanations of risks/benefits, and the right to withdraw without consequence; beneficence and non-maleficence were maintained by ensuring participant and researcher safety during field

administration; and justice was maintained through non-discriminatory inclusion. Confidentiality and anonymity were protected by assigning distinct alphanumeric codenames or initials to participant records, restricting raw data access exclusively to the research team and designated faculty, and establishing a strict two-year data retention and deletion timeline.

RESULTS

A total of 405 older adults (aged 60 years and above) in Marikina City completed the study questionnaire (N = 405). Over half of the analyzed sample were female (58.5%, n = 237), while males comprised 41.5% (n = 168). The majority of participants belonged to the "Poor" monthly income category at 51.1% (n = 207), followed by Low-Income at 37.0% (n = 150), Lower Middle-Income at 10.4% (n = 42), and Middle-to-Upper Income combined at 1.4% (n = 6).

By educational attainment, High School Graduates represented the largest group (29.4%, n = 119), followed by College Graduates (19.85%, n = 80), Elementary Graduates (13.8%, n = 56), High School Level (13.6%, n = 55), College Level (11.4%, n = 46), Elementary Level (9.6%, n = 39), Vocational (1.0%, n = 4), No Formal Education (0.7%, n = 3), and Graduate Studies (0.7%, n = 3). Regarding civil status, 63.0% were married (n = 255), 26.2% widowed (n = 106), 6.9% single (n = 28), 3.5% separated (n = 14), and 0.5% live-in (n = 2). The grand mean knowledge score was 0.71, placing the sample at a moderate knowledge level.

Categorically, 52.3% (n = 212) demonstrated moderate knowledge, 41.2% (n = 167) high knowledge, and 6.4% (n = 26) low knowledge.

Participants reported high agreement regarding vaccine benefits, yielding a grand weighted mean of 4.61 (SD overall ranging 0.60-0.76).

Service accessibility received an overall grand weighted mean of 3.95. Respondents indicated strong knowledge of scheduling/walk-in procedures (mean = 4.95), but long waiting lines were identified as a deterrent (mean = 3.69).

The primary information source was family/friends (41.0%, n = 166), followed by healthcare providers (24.19%, n = 98), social media (23.2%, n = 94), barangay/workplace (6.41%, n = 26), television (2.7%, n = 11), radio (2.0%, n = 8), and newspapers (0.5%, n = 2).

Inferential testing (Chi-Square (χ^2) test of independence and ANOVA) revealed significant relationships in 4 out of 16 sub-analyses: Knowledge Level significantly associated with Monthly Income (χ^2 , p = 0.0004), Educational Attainment (χ^2 , p = 0.0003), and Civil status (χ^2 , p = 0.0000). Sources of Health Information significantly associated with Educational attainment (χ^2 , p = 0.0016).

Sex showed no significant association with any factor (p ≥ 0.12). Perceived benefits (p ≥ 0.33) and

accessibility (p ≥ 0.29) did not differ significantly across any profile categories.

The overall seasonal influenza vaccine uptake rate in the analyzed sample was 57.5% (n = 233/405), while 42.5% (n = 172/405) were unvaccinated.

Table 1. Primary Outcome: Influenza Vaccine Uptake and Predictors

Predictor Variable	B	OR	p Value	Decision (p ≤ 0.05)
Educational Attainment	0.20	1.23	0.003	Reject H_{02}
Sex	-0.10	0.90	0.62	Accept H_{02}
Civil Status	0.10	1.10	0.53	Accept H_{02}
Monthly Household Income	-0.10	0.91	0.51	Accept H_{02}
Knowledge Level	0.44	1.56	0.02	Reject H_{03}
Perceived Benefits	-0.003	1.00	1.00	Accept H_{03}
Accessibility of Services	0.05	1.05	0.75	Accept H_{03}
Health of Information Source	-0.009	1.00	0.76	Accept H_{03}

B (Unstandardized Regression Coefficient/Log-odds); OR (Odds Ratio)

In summary, binary logistic regression identified educational attainment (B = 0.20, OR = 1.23, p = 0.003) and knowledge level (B = 0.44, OR = 1.56, p = 0.020) as the sole significant independent predictors of actual seasonal influenza vaccine uptake.

DISCUSSION

Educational attainment and baseline vaccine knowledge were identified as the decisive drivers of influenza immunization among older adults in Marikina City, whereas favorable perceptions of vaccine benefits and physical accessibility served as baseline prerequisites rather than direct catalysts for action. While the local municipal government's policy of distributing free seasonal flu vaccines effectively neutralizes direct socioeconomic barriers, a critical health literacy threshold continues to separate lower-educated, less-informed seniors from actively seeking preventive care (Kawi et al., 2024; Long et al., 2020). Addressing the immunization gap in urban settings requires shifting public health strategy from simply securing vaccine supply toward actively building individual cognitive self-efficacy (Hoffman & Lutz, 2021).

The empirical finding that higher educational attainment (p = 0.003) and higher vaccine knowledge (p = 0.02, OR = 1.56) directly predict actual vaccine uptake reflects established health behavior theories and international empirical

literature (Hoffman & Lutz, 2021; Kawi et al., 2024). Older adults who demonstrate higher literacy regarding influenza, specifically regarding annual dosing cycles, high-risk vulnerability, and safety profiles, were over 50% more likely to undergo vaccination compared to their less-informed peers. Higher educational attainment equips individuals with superior health information processing skills, enabling them to evaluate the long-term benefits of preventive medicine over immediate inertia or fear (Hoffman & Lutz, 2021).

The plausible mechanism driving this outcome is cognitive self-efficacy. Highly educated and health-literate older adults possess the critical evaluation skills necessary to navigate complex health environments, filter out ubiquitous vaccine misinformation, and overcome common anxieties regarding post-vaccination side effects (Long et al., 2020). When individuals understand the specific biomedical mechanism of the vaccine and its role in preventing severe respiratory complications, their internal motivation outweighs passive non-compliance (Hoffman & Lutz, 2021).

Furthermore, a major discrepancy in this study lies in the relationship between household income and vaccine uptake ($p = 0.51$). While substantial global literature identifies household income as a dominant structural determinant of health access, socioeconomic status did not independently predict actual immunization in Marikina City.

This finding contrasts with broader research by Sileo et al. (2023) and Williams et al. (2022), which often highlights income disparities as primary drivers of healthcare utilization.

This deviation is best explained by the localized public health infrastructure of Marikina City, where localized interventions mitigate traditional structural barriers (Sileo et al., 2023; Vardavas et al., 2023). The local government's active, community-level distribution of free seasonal influenza vaccines through primary health centers and barangay outreach drives effectively eliminates out-of-pocket costs for senior citizens. This demonstrates that well-targeted public welfare policies can successfully decouple financial status from healthcare utilization (Williams et al., 2022).

However, another notable relationship emerged regarding perceived benefits and physical accessibility where perceived benefits, despite earning a "Strongly Agree" grand mean score ($M = 4.61$), was identified as not a statistically significant predictor of actual uptake ($p = 1.00$). Accessibility on the other hand, despite positive overall ratings ($M = 3.95$), proximity and ease of access did not independently drive the decision to get vaccinated ($p = 0.75$).

Although variables such as income, civil status, and educational background were not all direct predictors of actual uptake, bivariate tests revealed that they significantly dictate an individual's underlying vaccine knowledge.

Economically marginalized seniors showed significant knowledge deficits ($p = 0.0004$), pointing to a persistent disparity in how health information reaches lower-income households (Kawi et al., 2024; Sileo et al., 2023).

Lower formal education consistently corresponded to lower vaccine literacy ($p = 0.0003$), reinforcing education as a root determinant of health awareness (Hoffman & Lutz, 2021; Long et al., 2020).

Knowledge levels varied significantly by marital and living arrangements ($p = 0.0000$), echoing findings by Oquendo (2024) regarding the critical role of family networks and household social capital in sharing health information.

Seniors with higher education relied more on verified healthcare professionals, whereas those with lower educational attainment leaned heavily on informal peer networks, social media, or family gossip ($p = 0.0016$), exposing them to greater risks of misinterpretation (Long et al., 2020; Oquendo, 2024).

Strengths and limitations

While the study establishes a methodologically sound framework, several critical limitations impact the scope and application of its findings. On one hand, the research benefits from a high level of measurement reliability and statistical power. The primary survey instrument demonstrated strong face and content validity alongside high internal consistency ($\alpha = 0.797$). Furthermore, by surveying 405 older adults, the sample successfully exceeded the threshold of 399 participants determined by Slovin's formula at a 5% margin of error. Methodological integrity was further reinforced through a 30-participant pilot test, reverse-coded items to minimize response bias, and structured cognitive screening to ensure participant capacity. Conversely, the study's primary methodological constraint lies in its reliance on non-probability snowball sampling. This recruitment strategy introduced selection bias, as participants likely shared social networks that overrepresented well-connected, health-seeking individuals. Consequently, this bias likely skewed the data toward a more favorable perception of immunization, potentially overestimating both general vaccine attitudes and the reported 57.5% uptake rate. Moreover, the reliance on self-reported data introduces potential recall and social desirability biases, which may further inflate actual compliance rates. Ultimately, these sampling constraints limit the internal validity and transferability of the results, restricting their generalizability predominantly to urban settings comparable to Marikina City.

CONCLUSION

Findings of this study demonstrate that a majority of older adults in Marikina City (57.5%) received the influenza vaccine in 2025. Educational attainment and baseline knowledge regarding influenza were identified as the significant

determinants of vaccine uptake, whereas demographic variables, socioeconomic status, perceived benefits, and physical accessibility showed no significant association. Consequently, public health strategies must move beyond general access improvements and prioritize targeted, literacy-adapted health education to effectively raise immunization rates among the elderly population.

IMPLICATIONS FOR NURSING AND HEALTH SCIENCES

Primary healthcare facility nurses and barangay health workers can utilize these findings to tailor community interventions, directly addressing knowledge gaps identified through the 10-item evaluation to improve local vaccine uptake. Concurrently, local government leadership, including the Marikina City Mayor's Office and municipal health administrators, can leverage data on the accessibility of vaccination services and socioeconomic status based on PIDS 2020 income clusters to optimize health management systems, reallocate resources, and refine senior citizen vaccination policy. Finally, academic institutions such as the PLMar College of Nursing can integrate these real-world insights into community health education, while future researchers adapt the quantitative, non-experimental, descriptive-correlational research design to evaluate long-term immunization trends.

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AUTHOR CONTRIBUTIONS

R.R.D.D.: Conceptualization, methodology, investigation, analysis, writing, supervision—original draft, review, and editing. A.L.C.: Methodology, investigation, writing—original draft. K.E.V.E.: Methodology, investigation, writing—original draft. M.A.M.G.: Methodology, investigation, writing—original draft. H.S.G.: Methodology, investigation, writing—original draft. M.O.A.R.: Conceptualization, methodology, investigation, analysis, writing, supervision—original draft, review, and editing. L.I.J.P.S.: Methodology,

investigation, analysis, writing—original draft. Authors R.R.D.D. and M.O.A.R. both approved the final illustrative manuscript.

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This research received no external funding.

CONFLICT OF INTEREST

The authors declare no conflict of interest.

DATA AVAILABILITY

De-identified quantitative survey data, data collection instruments (employed researcher-made questionnaire tool), and supplementary materials used in this study may be accessed upon reasonable request. These materials are retained for a period of up to 2 years in accordance with Republic Act 10173 (Data Privacy Act of 2012).

Access to the de-identified primary dataset and analytical files is subject to approval by the College of Nursing Dean and the research team at Pamantasan ng Lungsod ng Marikina. Approval will be granted under the condition that the requesting party utilizes the data solely for ethical, academic, or public health research purposes.

Because no formal analytic code or automated scripts were deployed, standard statistical processing outputs generated via IBM SPSS Statistics and MS Excel are available from the corresponding authors upon request.

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