

A study of pneumococcal conjugate vaccine awareness and uptake among individuals aged 65 and over in the Gozo community attending Victoria Health Centre and Gozo community clinics

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ABSTRACT

Background

This study assessed awareness and uptake of the pneumococcal conjugate vaccine (PCV) among individuals aged 65 and over attending the Victoria Health Centre and Gozo community clinics.

Method

A total of 150 eligible participants, representing a diverse elderly population, were surveyed using a structured questionnaire between October and November 2024.

Results

Findings revealed a low pneumococcal vaccine uptake rate of 6.76%, with lack of awareness (72.6%) identified as the primary barrier. Although healthcare professionals play a vital role in influencing vaccine decisions, mass media emerged as the leading source

of vaccine information, surpassing direct physician recommendations. This study found no significant association between vaccine uptake and chronic disease status, gender, or education level, although higher education was linked to greater awareness ($p < 0.05$).

Conclusions

The results highlighted the need for a multifaceted public health strategy, including enhanced physician engagement, targeted awareness campaigns, improved accessibility, and educational outreach to address misconceptions. Limitations of this study included the small sample size, convenience sampling, and potential biases in self-reported responses. Strengthening public health education and physician-led interventions is critical to improving pneumococcal vaccine coverage among Gozo's aging population.

Key words

Health education, pneumococcal vaccine, preventive health, primary healthcare, vaccine uptake.

INTRODUCTION

In 2024, the Maltese government started providing the pneumococcal conjugate vaccine (PCV) for free to patients who are 65 years and over. This study was conducted to assess whether those eligible have enough information about the vaccine and their willingness to take it.

PCVs target the bacteria *Streptococcus pneumoniae* which is known to cause pneumonia and may also lead to invasive pneumococcal disease with complications such as meningitis and septicaemia. One of the vaccines available is the PCV 20 (20-valent pneumococcal conjugate vaccine) which provides immunisation against the following serotypes of *S.pneumoniae* (1, 3, 4, 5, 6A, and 6B, 7F, 8, 9V, 11A, 10A, 12F, 14, 15B, 18C, 19A and 19F, 22F, 23F, and 33F) (Tereziu & Minter, 2023).

S.pneumoniae is the most common pathogen which causes community acquired pneumonia worldwide. It accounts for up to 15% of pneumonia cases in the United States and 27% worldwide. Seasonality of infection is mainly winter and spring. *S.pneumoniae* tends to be more common in patients over 65 years, children less than 2 years old, smokers, alcoholics, those who have asplenia, chronic obstructive pulmonary disease and asthma. The World Health Organization (WHO) estimated that 1.6 million deaths in 2005, including 1 million children less than 5 years of age, occurred due to *S.pneumoniae*. It is a common co-infection in influenza patients and affects the morbidity and mortality in such patients (Dion & Ashurst, 2023).

Aim

This study aimed to assess the general awareness of the patients who are eligible for free PCV and who attend Victoria Health Centre (VHC) and Gozo Community Clinics (GCC). It also aimed to assess factors influencing individuals' decisions to get vaccinated and barriers to vaccine uptake and assesses attitudes towards future pneumococcal vaccination administration.

Objectives

This study evaluated the general knowledge and awareness of pneumococcal disease and the availability of the PCV vaccine among individuals aged 65 and over. It also aimed to identify key barriers to the vaccine uptake. Additionally, the study examined the role of healthcare professionals in promoting pneumococcal vaccination and assessed the effectiveness of public health initiatives in raising awareness among older adults. Furthermore, it explored potential disparities in vaccine awareness and uptake based on various demographic factors, including (but not limited to) age, geographical location and socioeconomic status. Based on the findings, this study intended to propose targeted interventions to enhance PCV awareness and uptake, including tailored public health strategies and improvements in healthcare provider practices.

METHOD

Study population

The study population consisted of individuals aged 65 and over who attended VHC and GCC between October and November 2024 and who met the eligibility criteria for the PCV. A total of 150 participants who met the inclusion criteria were included in this study. This sample represented a diverse group of elderly individuals with varying levels of awareness, experiences and potential barriers related to pneumococcal vaccination.

Data source

Data for this study were collected through a structured questionnaire administered to eligible patients. The questionnaire, available in both English and Maltese based on the participant's preference, included multiple-choice questions, Likert scale items, and demographic questions. The key areas of inquiry covered by the questionnaire included:

- **Awareness of the PCV:** Participants were asked about their knowledge of the vaccine and its benefits.
- **Vaccination status:** Participants were queried about whether they had received the PCV.

- **Healthcare provider recommendations:** The questionnaire explored whether healthcare providers had recommended the PCV to participants.
- **Presence of chronic conditions:** Participants were asked about any underlying chronic conditions, as these may influence vaccination decisions.
- **Attitudes and barriers to vaccination:** The questionnaire assessed participants' attitudes toward vaccination and identified potential barriers preventing uptake, such as misconceptions, fear or access issues.

Data collection and analysis:

This study employed a cross-sectional study design, collecting data at a single point in time. Participants who gave free informed consent completed a structured paper-based questionnaire. Before data collection, they were informed about the study's purpose and assured of the confidentiality and anonymity of their responses, with no personally identifiable information recorded.

Ethical clearance

Prior to the study, approval was obtained from the institution's Chief Executive Officer and Data Protection Officer. As the data used were fully anonymized, the study did not meet the criteria for human subjects research under the Declaration of Helsinki and GDPR Recital 26 pertaining to Ethics Committee approval.

Sampling method

Participants were recruited using a convenience sampling method, whereby the first 150 patients visiting the VHC and GCC who met the eligibility criteria were invited to participate. Doctors at these facilities distributed the questionnaires to patients during their visits. This sampling method ensured that the target population was represented within the study.

Data analysis

The collected data was analysed using statistical software. The analysis included both descriptive and inferential statistics:

- **Descriptive statistics:** Frequencies and percentages were calculated to summarize the responses to the questionnaire, offering an overview of participant awareness, vaccination status and other variables.
- **Inferential statistics:** Chi-square tests were applied to assess any associations between variables, such as the relationship between chronic conditions and vaccination uptake, or the correlation between healthcare provider recommendations and vaccine acceptance.

The analysis provided a comprehensive overview of the PCV uptake and the factors influencing it among the elderly population in the Gozo region. This methodology aimed to identify gaps in awareness, barriers to vaccination, and areas where interventions could be implemented to improve vaccination rates.

RESULTS

Participant demographics

A total of 150 participants were included in the study. The gender distribution was almost equal, with 49.3% males and 50.7% females. A chi-squared test revealed no significant association between gender and vaccine uptake (Cramer's $V = 0.0528$), suggesting that gender does not influence vaccine acceptance.

In terms of age distribution, 30% of participants were between 65 and 70 years old, 33.4% fell within the 71-75 age range, 25.3% were aged 76-80, and the remaining 11.3% were over 80 years old (Figure 1).

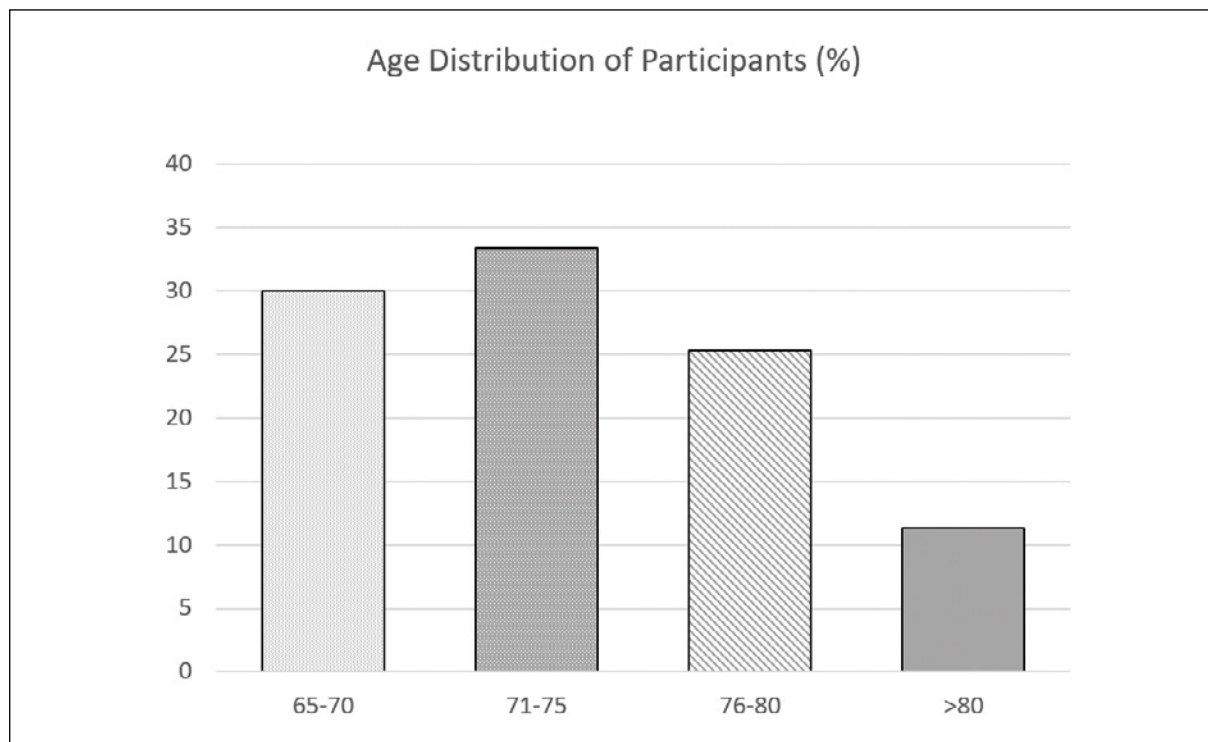


Figure 1: Age distribution of participants (percentage)

Health status and chronic disease

A substantial proportion of participants (82.3%) reported having a chronic disease (Figure 2), with hypertension (32%) and diabetes mellitus (22%) being the most prevalent conditions. Regarding vaccine uptake among those with chronic illnesses, 28.7% were unwilling to receive the PCV vaccine, whereas a combined total of

42.6% (15.6% very willing and 27.0% extremely willing) expressed a strong willingness to take it (Figure 3). A chi-squared test analyzing the relationship between chronic disease status and vaccine uptake found no statistically significant association (Cramer's $V = 0.0199$), suggesting that having a chronic disease does not notably influence the decision to get vaccinated.

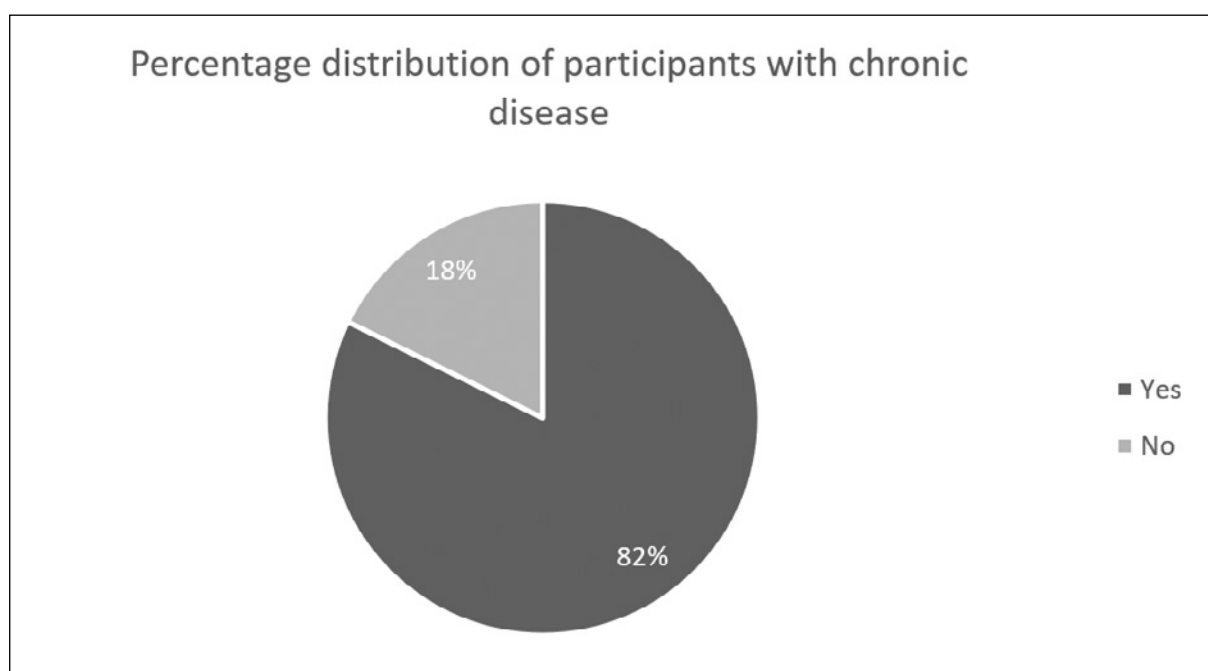


Figure 2: Percentage distribution of participants with chronic disease

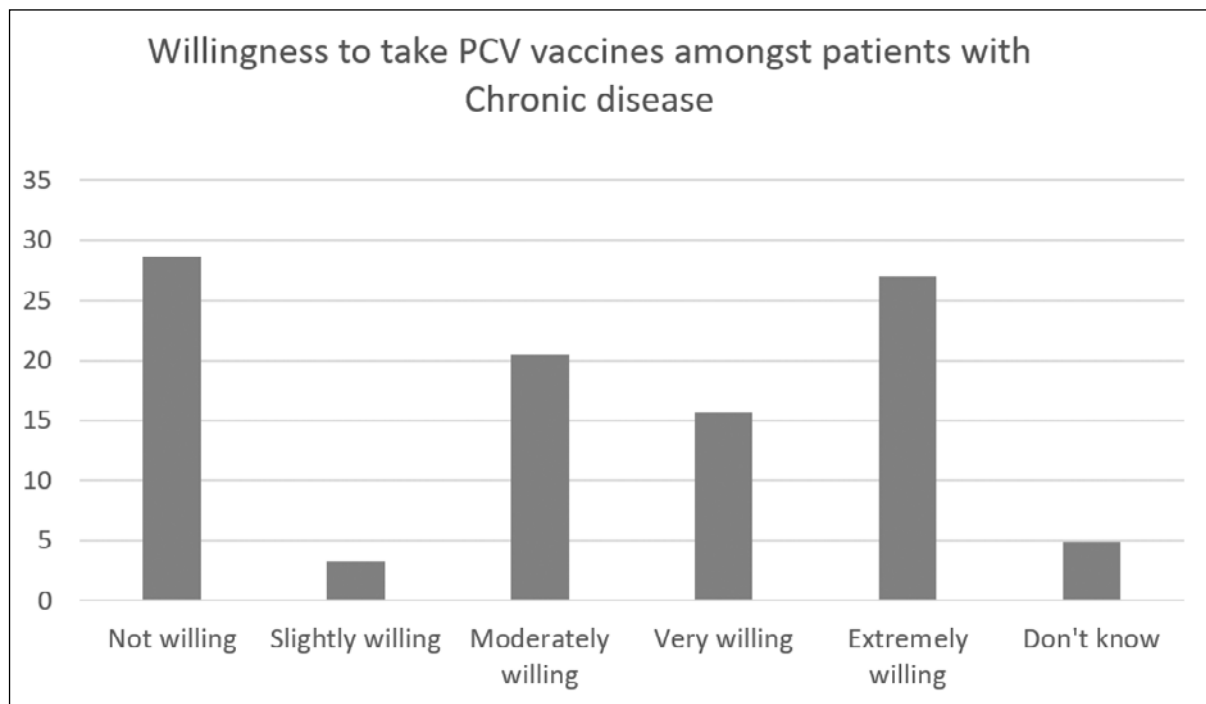


Figure 3: Vaccination willingness among individuals with chronic illnesses (percentage)

Education level

The majority of participants had attained primary education. A chi-squared test examining the correlation between education level and vaccine uptake showed no statistically significant relationship (Cramer's $V = 0.1528$), indicating that education level does not have a notable impact on vaccine acceptance.

Information sources and promotion

A total of 56.08% of participants reported having heard of the PCV vaccine, while the remaining participants were unfamiliar with it. Among those who were already aware of the vaccine, the most common source of information about the vaccine was media outlets (including TV, radio, and newspapers), as shown in Table 1. Thus, media outlets were the main reason for the participants' awareness of the vaccine. Doctors were the second most frequently cited source of such information, but at a considerably lower percentage compared to media sources. The data suggested that mass media plays a crucial role in disseminating information about the PCV vaccine, while healthcare professionals contribute to a lesser extent.

Table 1: Percentage distribution of PCV vaccine awareness sources. (The first column includes the various sources of information that led to participants knowing about the vaccine. The second column shows the percentage of participants who chose the relevant source. Data is in descending order.)

Source of information that made the participants aware of PCV	Percentage
Media Outlets - TV, Radio, Newspaper	44.44%
Doctor	19.75%
Other	11.11%
Friends/family	8.64%
Internet/social media	8.64%
Combined sources from the above	7.38%

When considering strategies for promoting the PCV vaccine, the most preferred approach was a combination of doctors and mass media, with 40 participants indicating this as the most effective method. Another 37 participants suggested that including community programmes alongside doctors and media could further enhance outreach. The data suggested that while media plays a crucial role in disseminating vaccine information, integrating healthcare providers and community outreach programs could enhance vaccination awareness and uptake.

Vaccine uptake and barriers

The majority of participants (91.89%) reported that they had not received the PCV vaccine, while only 6.76% had taken it, and 1.35% were unsure about their vaccination status. These findings indicated low uptake rates, highlighting the need for increased awareness and encouragement from healthcare providers.

Among those who had received the vaccine, the most common reasons for doing so included a doctor's recommendation and the presence of a chronic illness. This suggested that healthcare professionals play a crucial role in influencing vaccination decisions, particularly for individuals with underlying health conditions. However, given that only 6.76% of participants had taken the PCV vaccine, the small sample size of vaccinated individuals presented a limitation in fully understanding the broader motivations and potential influencing factors.

Among participants who had not taken the PCV vaccine, the most frequently reported reason was lack of awareness, with 72.6% stating that they did not know about the vaccine. Additionally, 6.7% cited concerns about side effects, while 4.4% felt they did not have enough information to make an informed decision.

DISCUSSION

This study was an insightful analysis of the current uptake and awareness of the pneumococcal vaccine among patients at Victoria Health Centre, which is the main public health centre on the island of Gozo. It explored vaccine acceptance with regards to PCV20 – an uncharted territory for research in the Maltese islands.

In 2018, a study focusing more on influenza vaccination in Malta showed that pneumococcal vaccination in Malta was low and that the main limiting factors for vaccination were physician recommendation and lack of physician awareness on the vaccine (Camilleri et al., 2018). A plausible limiting factor mentioned then was the fact that the PCV vaccine was not available for free to the public.

Our study indicated that whilst significant improvements have been made since then, more can be done to improve vaccination rates in the local population. The following is a discussion about the various factors associated with PCV uptake, taking into account the present study and various studies published internationally.

As seen from the results, chronic disease and gender differences did not show any statistically significant association with vaccine uptake. In a detailed scoping review, being male was identified as a barrier in two studies carried out in the United States (U.S.). On the other hand, health status was identified both as an enabler and as a barrier in different studies (Nasreen et al., 2022). The small population could account for the lack of association in these results. When taking into account the education level, whilst statistical testing found no significant association with vaccine uptake, the higher the education level, the higher the percentage of patients who had heard about the vaccine ($p < 0.05$). In addition, awareness of the vaccine was significantly associated with vaccine uptake ($p = 0.01$) and this has also been reported in multiple previous studies (Nasreen et al., 2022; Wan et al., 2024). Awareness of the vaccine is a significant predictor of uptake, highlighting the importance of educational campaigns.

A physician's recommendation of taking the PCV vaccine has been positively correlated with vaccination intention and uptake in various studies (Ekin et al., 2023). Recommendation or prescription of the pneumococcal vaccine from a healthcare provider were identified as enablers of vaccination in various countries including Japan, France, Poland, Canada and the U.S. (Nasreen et al., 2022). A local study in 2020 concluded that there is a need for geriatricians and family doctors in Malta to be reminded of

the guidelines surrounding the pneumococcal vaccine (Zerafa et al., 2020). Interestingly, from our study, a significantly higher percentage of males ($p < 0.001$) were recommended to take the vaccine than females and a higher percentage of smokers and ex-smokers were recommended to take the vaccine by their doctor than non-smokers ($p = 0.069$). Patients in our study who knew of the vaccine were mostly aware of it through the media and from a doctor's recommendation/information. A doctor's recommendation was also the number one reason for taking the vaccine prior to the date of the study.

In the present study, the commonest reasons for not taking the PCV vaccine until the date of study were lack of awareness (74.1%), concerns about side effects (12.2%) and not having enough information about the vaccine (8.16%). This emphasizes the importance of good public campaign as well as healthcare education in general. Other articles reflect the same reasons for low vaccine uptake internationally. In a recent study carried out nationally, examining the percentage of elderly aged >65 years who resided in a particular elderly home, only 12.3% had heard about the vaccine and only 7.7% took it (Farrugia et al., 2024). In our study the percentage of people who had heard of the vaccine is much higher, amounting to 56.1%. This could be attributed to the fact that the study was carried out at a time where the vaccine was being advertised for the first time on media. Differences in the population studied (including social status and health status) could also contribute to the difference in results attained. Out of those who had heard about the vaccine, 14% were still not willing to take the vaccine whilst only 12% had taken the vaccine. The primary reason for this could be that up till the date of the study the PCV vaccine was not available for free to the public, but other reasons such as concerns about side effects, not having enough information about the vaccine and past negative experiences with vaccination cannot be taken for granted. In fact, cost of PCV and subsidy eligibility or applicability has been found to be a determining factor of vaccination in other studies (Wan et al., 2024).

Strengths and weaknesses

This study represented one of the first comprehensive analyses of PCV vaccine awareness and uptake in Malta. It incorporated a detailed questionnaire, included a diverse set of demographic and health-related variables, and utilized statistical tests to assess associations between key factors.

However, there were several limitations to consider:

1. Small sample size: With only 150 participants, statistical power was limited, and findings may not be generalizable to the entire population.
2. Convenience sampling bias: Participants were selected from a single health centre, which may not be fully representative of the broader community.
3. Response bias: Self-reported data may be subject to recall bias or social desirability bias.
4. Question order bias: The way questions were structured may have influenced participant responses.
5. Given these limitations, future studies should aim for a larger, randomized sample across multiple healthcare facilities to improve generalizability and statistical reliability.

CONCLUSION

This study highlighted the low awareness and uptake of the pneumococcal vaccine among individuals aged 65 and over in Gozo. Only 6.76% of participants had received it, with lack of awareness (72.6%) being the predominant barrier.

Healthcare professionals play a critical role in vaccine uptake, as seen in previous studies and reinforced by this study. However, the results showed that mass media (TV, radio, newspapers) remains the leading source of vaccine information, surpassing direct recommendations from doctors. This suggests that while healthcare providers are trusted, they may not be actively discussing or promoting the vaccine as effectively as media outlets.

The findings also indicated that chronic disease status, gender, and education level

did not significantly influence vaccine uptake. Nonetheless, higher education levels were associated with greater awareness, reinforcing the importance of education in vaccination campaigns.

To address these gaps, a multifaceted approach is proposed to increase vaccine awareness and uptake, focusing on leveraging healthcare providers, expanding public awareness campaigns, improving accessibility and addressing misconceptions. A stronger emphasis on public health education and structured physician recommendations is essential to achieving higher vaccination rates and ultimately reducing pneumococcal disease burden in the aging population.

Recommendations

Based on the findings, the most effective recommendations should focus on increasing awareness through trusted sources like doctors and media, addressing concerns about side effects, and providing clear, accessible information about the vaccine's benefits and availability.

Table 2 outlines recommendations and specific strategies to achieve these goals. These recommendations are designed to address the key findings from the analysis and ensure that patients are well-informed and motivated to make decisions about the vaccine.

Table 2: Recommendations and key actions

Recommendation	Key Actions
Leverage healthcare providers as trusted sources	Encourage doctors and nurses to proactively recommend the vaccine, especially for patients with chronic illnesses or those over 65. Provide healthcare professionals with training and resources to address concerns about side effects and vaccine efficacy.
Enhance public awareness campaigns	Utilize mass media (TV, radio, newspapers, and social media) to promote vaccine benefits, safety, and availability. Develop targeted campaigns for older adults and individuals with chronic conditions.
Address barriers to uptake	Create educational materials to address misconceptions and fears, such as concerns about side effects. Ensure that information is available in clear, simple language and multiple formats (brochures, videos, online content).
Improve accessibility and convenience	Increase vaccine availability at local clinics, pharmacies, and community health centres. Offer mobile vaccination units or home visits for individuals with mobility issues.
Community engagement	Partner with community organizations and leaders to promote vaccine awareness and address cultural or social barriers. Host informational sessions or Q&A events in community centres to address concerns and provide accurate information.
Monitor and evaluate	Regularly assess the effectiveness of awareness campaigns and vaccination programs through surveys and feedback. Use data to refine strategies and address emerging barriers.

REFERENCES

- Camilleri, S. A., Casingen, J. C., Yamagata, K. & Balzan, M., 2018. Predictors of yearly influenza vaccination in hospitalized and community based patients. *Multidisciplinary Respiratory Medicine*, 13(1), 23.
- Dion, C.F. & Ashurst, J.V., 2023. *Streptococcus pneumoniae*. [online] Available at: <https://www.ncbi.nlm.nih.gov/books/NBK470537/> [Accessed 1 Mar. 2025].
- Ekin, T., Kış, M., Güngören, F., Akhan, O., Atıcı, A., Kunak, AÜ., Mutlu, D., Katkat, F., Demir, M., Saraç, İ., Soydan, E., Karabulut, D., Karaduman, M., Alp, Ç., Bekar, L., Büyük, F., Adıyaman, MŞ, Kaplan, M., Zengin, İ., Çalışkan, S., Kivrak, T., Öz, A., Eren, H., Bayrak, M., Karabulut, U., Öztas, S., Düz, R., Uluysal, Ö., Balun, A., Sağır, G.N., Kudat, H., Pamukçu, H.E., Abacıoğlu, Ö.Ö., Göldağ, Ö.G., Özmen, Ç., Günay, Ş., Zoghi, M. and Ergene, A.O., 2023. Awareness and Knowledge of Pneumococcal Vaccination in Cardiology Outpatient Clinics and the Impact of Physicians' Recommendations on Vaccination Rates. *Vaccines (Basel)*, 11(4), 772.
- Farrugia, P., Mifsud, I., & Zammit, K., 2024. Pneumococcal vaccination in community homes for the elderly : a Maltese perspective. *Journal of Malta College of Family Doctors*, 13(1), 42-46.
- Nasreen, S., Gebretekle, G. B., Lynch, M., Kurdina, A., Thomas, M., Fadel, S., Houle, S. K. D., Waite, N. M., Crowcroft, N. S., & Allin, S., 2022. Understanding predictors of pneumococcal vaccine uptake in older adults aged 65 years and older in high-income countries across the globe: A scoping review. *Vaccine*, 40(32), 4380–4393.
- Tereziu, S. & Minter, D.A., 2023. *Pneumococcal Vaccine*. [online] Available at: <https://www.ncbi.nlm.nih.gov/books/NBK507794/> [Accessed 1 Mar. 2025].
- Wan, S. W., Choe, L., Daariin, A. B. E. R., Wong, G. J., & Tan, K. K., 2024. Determinants of pneumococcal vaccination among older adults: A scoping review. *Public Health (London)*, 237, 245–260.
- Zerafa, N.M., Bonello, D., Grech, M. & Vella, A., 2020. Is a pneumococcal vaccine for the elderly appropriately recommended by Maltese geriatricians and general practitioners? *Journal of Malta College of Family Doctors*, 9(1), 5-18.

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