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IMMUNISATION OF OLDER ADULTS IN THE ASIA PACIFIC: BARRIERS, FACILITATORS, AND STRATEGIES TO IMPROVE ACCESS TO VACCINES

TECHNICAL REPORT

PHASE I

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About Tsao Foundation

Tsao Foundation is dedicated to transforming the ageing experience so the extra decades of life in longevity is an opportunity for us to actualise our full potential for growth, well-being, and fulfilment in a society for all ages. Established in 1993 as a non-profit, operational foundation, Tsao Foundation is an Institution of Public Character (IPC) with the goal of being a catalyst for constructive change at practice, systems and policy levels through innovations and excellence.

Ageing-in-place and active ageing have been our battle cry since inception. For almost three decades, Tsao Foundation has pioneered new approaches, services and programmes in ageing, longevity, and community-based eldercare, and the Foundation's work is taken forward through four synergistic initiatives: Hua Mei Centre for Successful Ageing, Community for Successful Ageing (ComSA), Hua Mei Training Academy and International Longevity Centre Singapore.

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International Longevity Centre Singapore

The International Longevity Centre Singapore (ILC Singapore) aims to promote the well-being of older people and contribute to national development through supporting policy, practice and capacity building by enabling a "connecting of the dots" between community, practitioners, academia, policy makers and the private sector through the creation of relevant stakeholder platforms as well as high impact research that strives to inform policy, facilitate cogent policy-action translation, and promote quality, effective practice in Singapore and internationally.

ILC Singapore is member of the ILC Global Alliance, a multinational research and education consortium which aims to address longevity and population ageing in positive and productive ways, typically using a life course approach, highlighting older people's productivity and contributions to family and society as a whole.

As an initiative of the Tsao Foundation, ILC Singapore's mission is to drive constructive change in how society approaches and responds to ageing.

Website: https://tsaofoundation.org/what-we-do/research-and-collaboration/about-ilc-singapore

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Foreword

The Asia Pacific region is experiencing a rapid increase in its aging population, with the number of individuals aged 65 and older projected to more than double by 2050. (United Nations, 2017). This demographic shift poses significant public health challenges, as older adults are more susceptible to severe illnesses, including infectious diseases. To that end, life-course immunisation is particularly important in the Asia-Pacific, as many of the infectious diseases older adults are susceptible to are vaccine-preventable (Bianchi and Tafuri, 2022). In response, Tsao Foundation, through its International Longevity Centre Singapore, conducted a study to understand better the barriers to immunisation of older people in selected countries – Australia, Indonesia, the Philippines and Singapore.

This report presents the findings of study, which includes a literature review and interviews with key stakeholders involved in older adult immunization. The report outlines research methods and synthesizes the results, offering insights into strategies for policymakers and stakeholders to enhance immunization rates among older adults in the Asia Pacific region, leveraging vaccine-preventable measures to address this pressing health concern. By understanding and addressing these barriers, the foundation can make a meaningful contribution to public health, reduce healthcare costs, and improve the quality of life for older individuals not only in Singapore but in the region as well.

We want to thank our partners and colleagues from the following organisations- Behavioural and Implementation Sciences Interventions (BISI) at the National University of Singapore, the Asia Pacific Immunisation Coalition (APIC), the Research for Impact Singapore (RFI) for their valuable contributions in the conduct of the study and in preparing this report. We also want to acknowledge the funding support from the MSD.

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Introduction

The Asia Pacific population is ageing at an unprecedented pace. By 2050, the region's older adult population (aged 65 and older) is expected to more than double from 535 million to about 1.3 billion (United Nations, 2017). As older adults have limited regenerative capacities and higher susceptibility to illnesses, particularly severe illnesses, an ageing population represents a public health challenge that must be addressed. Moreover, global health crises such as the COVID-19 pandemic are further reminders of the importance of the prevention and control of infectious disease outbreaks. To that end, life-course immunisation is particularly important in the Asia Pacific, as many of the infectious diseases older adults are susceptible to are vaccine-preventable (Bianchi and Tafuri, 2022).

Against this backdrop, this technical report details the results of a multi-component research study that explored the factors influencing vaccination uptake among older adults in four health systems across the Asia Pacific: Australia, Singapore, Indonesia, and the Philippines. The study comprised a scoping review of literature and semi-structured in-depth interviews with key stakeholders working on the immunisation of older adults across the four countries (Tong et al., 2023). The report elaborates on the methods employed for the various research components of the project and synthesises and summarises the findings based on the four countries of interest. We discuss interventions that policymakers and other key actors across the region could adopt to increase the appropriate uptake of immunisation among older adults in the Asia Pacific, based on best practices identified in the research.

Our overall study aims are as follows:

- Understand the key policy gaps and social, cultural, and economic barriers to immunisation for older people in the region
- Explore how these barriers to immunisation for older people vary across different country settings and subpopulations
- Drawing on best practices drawn from across the region and/or previous research, develop:
    - Strategies for optimising the delivery of immunisation to older adults under current vaccination programmes
    - Strategies to build engagement and support for vaccine programmes from key external stakeholders such as charities and patient advocacy groups
    - Strategies to improve older adults' vaccine confidence and better encourage them to seek out and take vaccines

Background

Despite the widespread benefits of immunisation and its global expansion as a cost-effective investment into human and population health, overall immunisation uptake rates in the region remain low. Influenza vaccination uptake within Asia, for instance, is reported to only have a median uptake of 14.9% among the general population and 37.3% among high-risk groups (Sheldenkar et al., 2019), trailing behind the WHO target of 75%. Data remains even more scarce for the older adult population and presents an even more difficult challenge for policymakers working on ways to increase vaccination uptake among this population in the region.

We chose to examine four health systems across the Asia Pacific: Australia, Singapore, Indonesia, and the Philippines in depth to provide a lens on the regional diversity of immunisation and immunisation programmes with respect to older adults. The former two countries are rapidly ageing societies with an older adult population of 17% and 14% respectively (The World Bank, 2022) and represent countries in the Asia Pacific region with well-developed healthcare systems. In contrast, while Indonesia and the Philippines are both developing health systems with currently less than 10% of the population above 65, they are expected to become ageing societies by 2030 (KPMG & Sanofi, 2019). A summary of the population statistics of the four countries can be found in Table 1 below:

Table 2 presents a summary of immunisation policies as instituted by the four countries of study.

Table 1: Sample country characteristics

	Australia	Singapore	Indonesia	Philippines
Population size (as of 2021)[1]	25.69mil	5.45mil	273.8mil	113.9mil
% of population >= 65	16.2% (2021)	18.4% (2022)[2]	6.79% (2021)[3]	5.4% (2021)[4]
Estimated % of population aged >= 65 by 2050[5]	23.8%	34.3%	15.0%	10.8%
Life expectancy (2020)[6]	83.2 years	83.74 years	68.8 years	72.12 years

[1] Data Commons (2023), using data from the World Bank and the United Nations. https://datacommons.org

[2] National Population and Talent Division, Prime Minister's Office, Republic of Singapore (2022). 'Population In Brief 2022.' https://www.strategygroup.gov.sg/files/media-centre/publications/Population-in-Brief-2022.pdf

[3] National Team for the Acceleration of Poverty Reduction and the SMERU Research Institute. (2020) 'The Situation of the Elderly in Indonesia and Access to Social Protection Programs: Secondary Data Analysis'. https://www.tnp2k.go.id/download/83338Elderly%20Study%20-%20Secondary%20Data%20Analysis.pdf

[4] Population and Talent Division, Prime Minister's Office, Republic of Singapore (2022). 'Population In Brief 2022.' https://www.strategygroup.gov.sg/files/media-centre/publications/Population-in-Brief-2022.pdf

[5] United Nations Economic and Social Commission for Asia and the Pacific Population Trends (2023). https://www.population-trends-asiapacific.org/data

[6] World Development Indicators, World Bank. https://datatopics.worldbank.org/world-development-indicators/

Table 2: National Adult Immunisation Policies in Australia, Singapore, the Philippines, and Indonesia

Country	Clear national policy on adult vaccination?	What level of guidance and financing support exists?
Australia	Yes, National Immunisation Programme (NIP)	• Pneumococcal, influenza, and shingles vaccines are provided free of charge for adults (Australian Government Department of Health and Aged, 2017).
Singapore	Yes, National Adult Immunisation Schedule (NAIS)	• Guidance on 11 important vaccinations for adults. • NAIS-recommended vaccinations for adults are subsidised for elderly (Ministry of Health Singapore, 2022).
The Philippines	No	• Older adults receive 20 – 60% discounts for influenza and pneumococcal vaccines through the Expanded Senior Citizens Act and PhilHealth, the national public insurance scheme (Congress of the Philippines, 2021) • The Health and Wellness Programme for Senior Citizens provides free influenza and pneumococcal vaccines to 1.3 million indigent citizens aged 60 and above (PhilHealth, 2012).
Indonesia	No	• Vaccines for adults are paid for out-of-pocket. • Certain vaccines, including the influenza vaccine, are recommended to older adults and/or adults with underlying chronic diseases, Hajj pilgrims, and healthcare workers.

Australia has a National Immunisation Programme (NIP) which explicitly targets adults. Vaccines – such as influenza, pneumococcal, and shingles – are federally funded for those aged 65 and above. Vaccination recommendations from various bodies dealing with seniors – such as the Australian Council on the Ageing and the Department of Veteran Affairs – are being considered during the government's decision-making process. Alongside, there exists an Australian Immunisation Register (AIR) to which all nationally funded vaccines are mandated to be reported. Experts noted there are still high out-of-pocket costs for newer vaccines not covered under the NIP.

In Singapore, concerted national policy efforts are made to support immunisation for older adults following National Adult Immunisation Schedule (NAIS). Various subsidies are available to help defray the costs of the 11 vaccinations listed under the NAIS for the elderly and those in lower-income groups, including the Community Health Assist Scheme (CHAS) and other community-based financing schemes for those getting vaccinated in public or private primary care. In November 2022, further means-tested subsidies based on a patient's per capita household income were introduced for NAIS vaccines administered in public healthcare settings. Out-of-pocket costs can be paid for

using Medisave, the mandatory national medical savings scheme. Finally, the forthcoming national HealthierSG reforms include the development of health plans for individuals that include appropriate vaccinations across the life course.

In the Philippines, national policies cover some vaccinations for older adults, but decentralisation leads to broader challenges with implementation. PhilHealth, the national health insurance scheme, provides influenza and pneumococcal vaccination at a subsidised rate for older adults. In addition, needy senior citizens can access immunisation services for free at pharmacies, specifically for influenza and pneumococcal vaccines. Additionally, most immunisation takes place at health centres of local government units. However, the implementation of immunisation campaigns is decentralised and therefore in practice is contingent upon the efforts and resources of local governments. Also, a recently enacted pharmacy law now allows certified pharmacies to vaccinate in the private sector, but how vaccination for older adults is to be delivered through this channel has yet to be explored.

Finally, Indonesia has no national adult immunisation programme. Vaccinations for older adults are excluded from the national health insurance scheme Jaminan Kesehatan Nasional (JKN). Although JKN is the national platform for achieving universal health coverage, the scheme currently only covers free routine immunisations for children under age 5 (except for tetanus immunisation for pregnant women, which falls under the umbrella of maternal and child health). Vaccines for older adults such as influenza are recommended but not covered by the government, and these imply relatively high out-of-pocket costs for older adults.

The impact of these policies can be reflected in the mixed results and quality of the available data. As can be seen in Table 3, overall vaccination rates for older adults are highest in Australia. The Philippines has significantly higher influenza and pneumococcal immunisation rates than Singapore. With respect to COVID-19 vaccination, however, Australia and Singapore lead the Philippines and Indonesia, with no data available from Indonesia on other vaccines.

Table 3: Vaccination uptake among older adults by country (in %)				
	Australia	**Singapore**	**Indonesia**	**The Philippines**
Influenza	68.9% (2022)[7]	20.8%* (2020)[8]	No data	36.3% (2019)[9]
Pneumococcal	52.0%* (2016)[10]	14.4%* (2019)[11]	No data	52.9% (2019)[12]
Tetanus/Diphtheria/ Pertussis (Tdap)	No data	No data	No data	No data
Zoster (Shingles)	30.4% (2020)[13]	No data	No data	No data
COVID-19 (full vaccination = 2 doses)	92.5% (2022)[14]	92% (2022)[15]	70.33% (2023)[16]	82.16% (2023)[17]

[7] National Centre for Immunisation Research and Surveillance (NCIRS) https://ncirs.org.au/influenza-vaccination-coverage-data/national-influenzavaccination-coverage-all-people Data represents older adults aged ≥65 who have received at least one dose of influenza vaccine between 31 Aug 2021 – 31 Aug 2022.

[8] National Population Health Survey (NPHS) 2020 https://www.hpb.gov.sg/docs/default-source/default-document-library/nphs-2020-surveyreport.pdf?sfvrsn=ee50aa9_0. Data represents percentage of older adults aged 60-74 who received a flu injection in the past 12 months, compared to 13.9% (2017) and 21.2% (2019). The report does not disclose data for older adults aged ≥75.

[9] Natividad J (2019). 'Chapter 6: Health and healthcare utilisation', in Cruz et al (eds.) (2019), *Ageing and Health in the Philippines*. Economic Research Institute for ASEAN and East Asia (ERIA). https://www.eria.org/uploads/media/Books/2019-Dec-Ageing-and-Health-Philippines/12-Ageing-and-Health-Philippines-Chapter-6-0208.pdf % of surveyed participants age 60 and above who reported having had a flu vaccine since they turned 60 years old.

[10] Frank et al. (2020). Retrieved from https://doi.org/10.1080/21645515.2019.1682844 Data represents older adults "active patients" aged >65 who have ever received a pneumococcal vaccine

[11] National Population Health Survey (NPHS) 2020 https://www.hpb.gov.sg/docs/default-source/default-document-library/nphs-2020-surveyreport.pdf?sfvrsn=ece50aa9_0

[12] Natividad J (2019). 'Chapter 6: Health and healthcare utilisation', in Cruz et al (eds.) (2019), *Ageing and Health in the Philippines*. Economic Research Institute for ASEAN and East Asia (ERIA). https://www.eria.org/uploads/media/Books/2019-Dec-Ageing-and-Health-Philippines/12-Ageing-and-Health-Philippines-Chapter-6-0208.pdf % of surveyed participants age 60 and above who reported having had a pneumococcal vaccine since they turned 60

years old.

[13] NCIRS Annual Immunisation Coverage Report 2020 https://www.ncirs.org.au/sites/default/files/2022-

07/NCIRS%20Annual%20Immunisation%20Coverage%20Report%202020.pdf. Data represents older adults aged between 70-71 only.

[14] Department of Health and Aged Care, Australian Government, https://www.health.gov.au/sites/default/files/2022-12/covid-19-vaccine-rollout-update-22-december-2022.pdf As of 21 December 2022, 92.52% of older adults aged ≥65 completed 3 doses of vaccines, 70.30% of older adults completed 4 doses.

[15] Ministry of Health, Singapore https://www.moh.gov.sg/covid-19/vaccination/statistics. As of 31 December 2022, 92% of older adults aged 60-69, 92% of older adults aged 70-79, and 90% of older adults aged ≥80 achieved minimum protection status (minimum 3 doses of vaccines). As of 31 December 2022, 56% of older adults aged 60-69, 57% of older adults aged 70-79, and 61% of older adults aged ≥80 achieved up-to-date vaccination status

(achieved minimum protection with the last vaccine dose received within the past 1 year).

[16] Ministry of Health of the Republic of Indonesia. Vaksin Dashboard COVID-19 Provinsi. https://vaksin.kemkes.go.id/#/vaccines Rate for senior citizens aged 60 and above.

[17] Department of Health, Republic of the Philippines. National COVID-19 Vaccination Dashboard: Vaccination Accomplishment by Age Group. March 2023. https://doh.gov.ph/covid19-vaccination-dashboard Rate for senior citizens aged 60 and above.

Methods

Scoping review

A systematic search of the literature on the immunisation of older adults in Australia, Singapore, Indonesia, and the Philippines was conducted in August 2022. The search string developed and deployed used keywords and MESH terms centred on older people, vaccination, and known barriers and facilitators pertaining to immunisation among older people previously identified in the literature, including knowledge, access, information, cost, funding, affordability, and coverage. All literature retrieved from the search was retrieved and imported into EndNote X7 for management.

The study screening process was underpinned by the Cochrane Rapid Review Methods Group's recommendations for conducting rapid reviews (Garritty et al., 2021). Studies were included if they involved a human population over 50 years old, reported any barriers/facilitators/factors influencing immunisation or reported on the effectiveness of promoting immunisation among older adults. Included studies could be quantitative, qualitative, or mixed methods and were limited to Australia, Singapore, Indonesia, and the Philippines. Only English-language, peer-reviewed studies that used original data and were published between 2016 and 2022 were included (Box 1).

A total of 1,424 records were retrieved from database searches. After systematic removal of duplicates, title and abstract screening, 104 studies were full-text reviewed. Of those, 23 met the inclusion criteria; their findings were synthesised. 13 papers were from Australia and 10 papers were from Singapore (Figure 1).

During the literature search process, no publications were retrieved from Indonesia and the Philippines. To address this challenge, the search was re-conducted with the publication year limit extended to 10 years (i.e., 2012-2022) for the two countries. Despite this, no publications were found that fit into the study inclusion criteria as mentioned in Box 1. As a follow-up measure, emails were sent to experts on immunisation in the two countries requesting literature recommendations specific to the region. However, none were proposed.

Of the 23 articles, 19 reported on barriers and facilitators to immunisation of older adults and 4 articles reported on effective interventions to promote vaccination uptake. 8 studies looked at the COVID-19 vaccine while 5 looked at influenza, 3 at pneumococcal, 1 at pertussis, 2 at herpes zoster, and 4 at both influenza and pneumococcal vaccines. Risk of bias checks assessed the quality of included studies to be moderate overall.

Data extraction focused on the barriers and facilitators to immunisation among older people and effective interventions that promoted vaccination among older people. All barriers and facilitators from across study types were extracted through an inductive approach. For quantitative studies, factors that were significantly associated with vaccination uptake were extracted. Quality appraisal was guided by The Mixed Methods Appraisal Tool (Hong et al., 2018). Further details of the scoping review methodology can be found in the preprint manuscript, available at [FINAL CITATION TO BE PROVIDED BY NUS BISI]

Stakeholder interviews

Semi-structured in-depth stakeholder interviews were conducted with participants who work across the immunisation of older adults' space across Australia, Singapore, Indonesia, and the Philippines between September and November 2022. We aimed to conduct up to 8 interviews per country with a diverse range of stakeholders, including ageing and public health experts, clinicians, policymakers, academics, and patient advocacy groups.

Box 1: Study inclusion and exclusion criteria for scoping review [CITATION FROM BISI]

Inclusion criteria

- Human population over 50 years old
- Studies that reported any barriers, facilitators or factors influencing immunisation.
- Studies that reported effectiveness of interventions in promoting immunisation among older adults. Interventions are defined as a) study that included a comparison of a group who had been exposed to an intervention with a group who had not been exposed or who had been less exposed, or, or b) a programme that was implemented to increase vaccination uptake and looked at overall pre- and post-vaccination rates.
- Quantitative, qualitative, and mixed-method designs
- English only
- Studies conducted in countries limited to Australia, Singapore, Indonesia, Philippines
- Publication year from 2016 –2022 (5 years)
- Study that used original data
- Peer reviewed articles

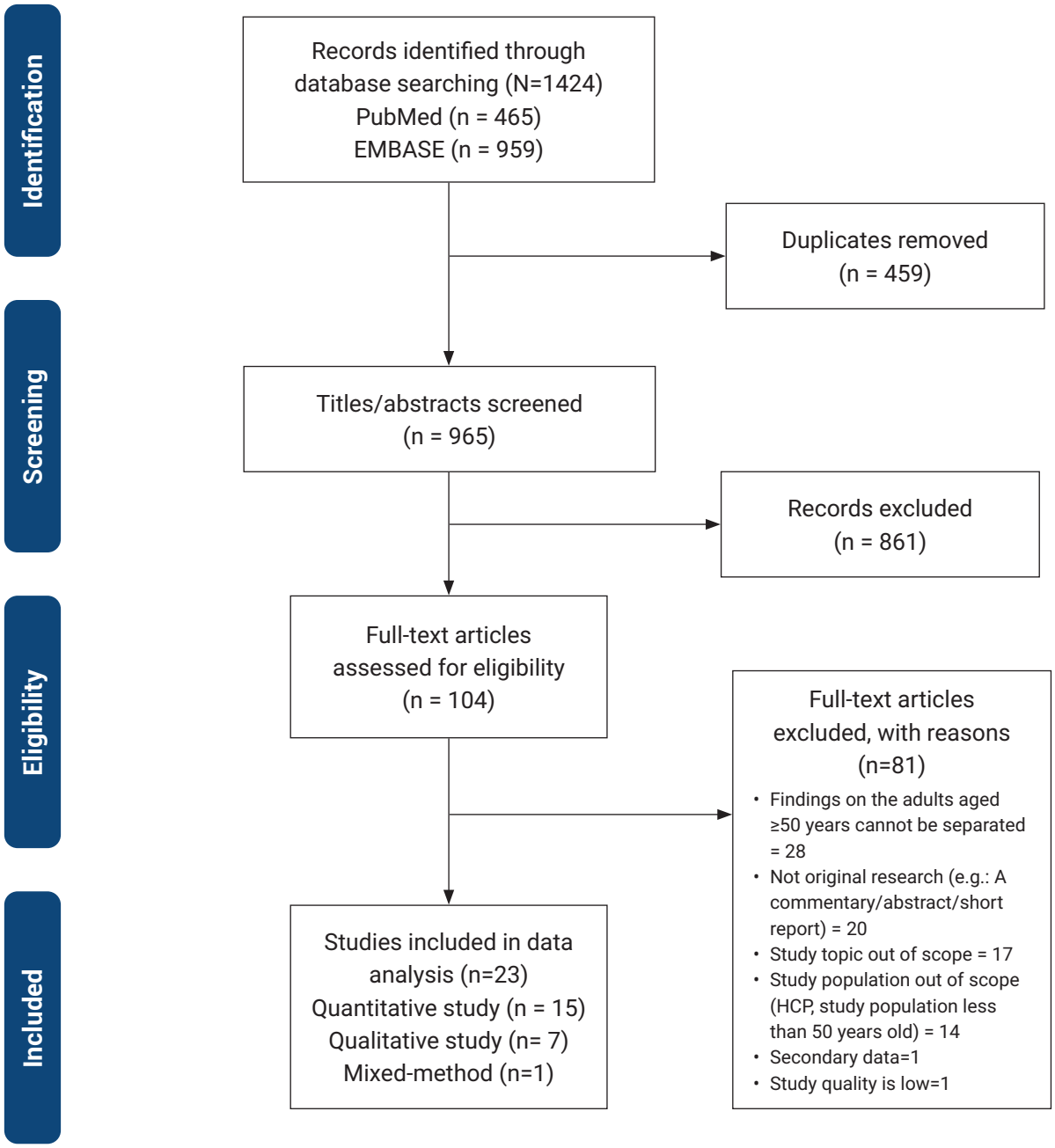
Exclusion criteria

- Study population less than 50 years old
- Populations out of scope (e.g. pregnant women and healthcare professionals)
- Vaccines out of scope (e.g. travel, occupational health vaccines)
- Outcomes out of scope (e.g. studies investigating vaccine immunogenicity, efficacy, effectiveness)
- Not about vaccines/vaccination
- Secondary research
- Not in English
- Study that was conducted in a multi-country setting but data on the targeted countries (Australia, Singapore, Indonesia, Philippines) could not be separated.
- Systematic, narrative or literature review or meta-analysis, protocols, commentaries, theses, dissertations, letters, editorials, abstracts, and conference proceedings, poster
- Duplicates

These interviews were guided by an interview guide (Appendix B) focused on understanding the current state of older adults' immunisation in the interviewee's country and best practices, successes, gaps, and potential ways forward to improve uptake.

Interviewees were purposively sampled based on their relevant experience in the immunisation of older adults' space in their respective countries. An initial list of potential interviewees from across the four countries of interest was developed with the support of the Asia Pacific Immunisation Coalition (APIC) at the National University of Singapore's Yong Loo Lin School of Medicine and further substantiated with the support of the International Longevity Centre – Singapore (ILC-S) and MSD. We supplemented our sampling strategy with a snowball approach, where we asked our interviewees to recommend

Figure 1: Flow diagram detailing the database searches, the number of abstracts screened, and the full texts retrieved for scoping review



other experts in their fields who might be interested in participating in our study. Additionally, lead and senior authors of peer-reviewed journal articles retrieved from the scoping review were contacted via email and invited to participate in the study.

A total of 30 semi-structured in-depth interviews were conducted with key stakeholders from across Australia, Singapore, Indonesia, and the Philippines between September and November 2022. We interviewed 9 stakeholders each from Singapore and the Philippines and 6 stakeholders each from Australia and Indonesia. Interviewees came from diverse backgrounds including medicine (e.g. gerontology, general practice, family medicine, immunology), nursing, community health and outreach, research, and health policymaking. Interviewee profiles can be viewed in Appendix C of this report.

Interviews were primarily conducted in English, with several interviewees from the Philippines interviewed in a mix of English and Tagalog. Interviews took place using a secure videoconferencing platform or in person. All interviews were audio recorded, transcribed, and translated into English where necessary prior to thematic analysis by the research team.

Ethical approval for this component of the study was granted by the Singapore Management University Institutional Review Board (SMU IRB Approval Number: IRB-22-107-A057(822)). In accordance with ethical research practices, prior to participation, all interviewees were required to sign an informed consent form that provided study information, sought permission for the audio recording of interviews, and reassured participants of data confidentiality.

Finally, the original review results reported by (Tong et al., 2023) were synthesized together with the interview results and reported thematically.

Findings

Individual drivers of vaccination decision-making

Table 4: Individual knowledge, attitudes, and perceptions related to vaccines

	Facilitators	Barriers
Perceived risk of disease	Perceived health condition that would increase their disease risk (Trent et al., 2022, Teo et al., 2019)	Perceived low susceptibility or risk of disease (Trent et al., 2022, Teo et al 2019);
Perceived severity of disease	High perceived severity of disease (Trent et al., 2022; Lupton et al., 2022, Ho et al., 2017)	Previous encounters with mild episodes of influenza (Teo et al., 2019)
Knowledge of vaccination and vaccine programmes	Awareness of vaccine for older people (Kaufman et al., 2022), previous experience of vaccination (Trent et al., 2022; Briggs et al 2019, Lupton et al 2022)	Lack of knowledge (Trent et al., 2022, Cummings et al., 2020; Ho et al., 2017), misconceptions e.g.: interval for vaccination, vaccine as a cure, not suitable for vaccine (Teo et al., 2019)
Perceived effectiveness of vaccine	Efficacy of protection (Burke et al., 2021; Enticott et al., 2018; Lupton et al., 2022, Trent et al., 2022, Teo et al., 2019)	Inevitability of illness in old age and belief in predestination (Teo et al., 2019)
Perceived risks of taking vaccine	Trust in safety of vaccines (Teo et al., 2019)	Belief that vaccine is not safe (Graham et al., 2022; Hamilton et al., 2022), Fear of short- and/or long-term side effects and/or pain (Kaufman et al., 2022, Teo et al., 2019; Cummings et al., 2020; H et al., 2017)
Secondary health incentives/disincentives	Benefits of vaccination in relation to health, strength, longevity (Graham et al., 2022; Hamilton et al., 2022, Ho et al., 2017, Cummings et al., 2020)	General distrust of vaccines (Trent et al., 2020), beliefs that vaccines would weaken bodies (Ho et al., 2017), preference to develop immunity 'naturally' (Trent et al., 2022); Dislike for any form of medication (Cummings et al., 2020)
Indirect incentives/ disincentives	Freedom to travel (Hamilton et al., 2022; Kaufman et al., 2022, Teo et al., 2019)	Concern about effects on ability to work (Teo et al., 2019), religious objections (Cummings et al., 2020)

Perceived disease risk and severity

The findings consistently show that individuals who believe themselves to be more susceptible or more likely to experience severe disease are more supportive of vaccination (Trent et al., 2020, Teo et al 2019, Lupton et al., 2022, Ho et al., 2017). Individuals who in contrast felt that the consequence of disease was low due to previous encounters with mild episodes (Teo et al., 2019) (Teo et al., 2019) were less likely to take it up.

In our interviews, experts in Australia and Singapore explained that older adults still displayed limited awareness of the possible risk and severe impacts of vaccine-preventable illnesses, such as influenza and pneumonia. As described by an Australian expert:

> *"Some older people say, "Look, I've never had the flu in my life. I'm never going to get the flu. I don't need vaccination. I've never been sick." (AU)*

The saliency and recency of visible disease among the older adult population was an important factor in changing what these experts described as "complacency" or an "it won't happen-to-me mentality". For instance, some experts remarked that older adults became more cognisant of the need for immunisation following observations of family, friends, and/or other members of their communities contracting COVID-19. As an Indonesian expert said:

> *"Once COVID arrived and so many casualties, especially among those over 60 years, then they started to demand "this vaccination we must get." That's the reason, because of seeing friends and then parents and all dying of COVID and getting severe respiratory distress." (ID)*

Finally, the vaccination programme itself sends important, if not always intended, signals to older adults about the importance of preventing disease. One expert from Australia noted that the distinction between funded and non-funded vaccines creates perceptions among older adults that funded vaccines are more essential compared to unfunded vaccines, which impacts the uptake of unfunded vaccines.

Awareness of vaccines and vaccination programmes

Basic awareness remains a concern in the region and is fundamentally correlated with exposure. Evidence from the scoping review shows that in Singapore and Australia, awareness (Kaufman et al., 2022) and past experiences with immunisation over the life course are associated with vaccine take-up at older ages (Trent et al., 2020; Briggs et al 2019, Lupton et al 2022), while lack of knowledge (Trent et al., 2020, Cummings et al., 2020; Ho et al., 2017) and basic misconceptions about vaccine delivery such as the interval for vaccination, vaccine as a cure, suitability for vaccination can also play a role. (Teo et al., 2019)

In Indonesia, the lack of awareness is consistent with the exclusion of adult vaccination from the JKN. Interviewees related that medical doctors who work at the community health centres (Puskesmas) would typically not recommend vaccinations and were too busy to further spend time with their patients to educate them about older adult vaccinations, thereby limiting basic awareness among the community.

It is also critical to recognize that differences in exposure across vaccines can be substantial, even though COVID-19 activities may have increased overall vaccine awareness, especially for vaccines that are less frequently administered.

> *"The awareness is very low. Because of the pandemic, people are now more aware of what vaccines are and how they work, but they may not have been socialised to this*

pneumococcal. Influenza has a little bit more traction because they do it yearly. Pneumococcal is not done yearly." (PH)

Perceptions of vaccine efficacy vs. risks of harm

The review shows that belief in vaccine efficacy and safety especially about older populations is critical for take-up (Burke et al., 2021; Enticott et al., 2018; Lupton et al., 2022, Trent et al., 2020, Teo et al., 2019). One study pointed to cases in which vaccine efficacy (or the efficacy of any intervention) was discounted due to the perception of inevitable illness in old age and belief in predestination (Teo et al., 2019).

In Australia and Singapore, experts noted that even among those with low vaccine hesitancy and openness to vaccination in general, limited knowledge among the elderly about how vaccines reduce the risk and severity of disease persists. Respondents emphasised the need to acknowledge real differences in efficacy across vaccines and the complexity of that understanding, as shown in a Singapore expert's quote below:

"There are some more complex vaccines like the pneumococcal vaccine. Time and again, I have bumped into some who actually ask me, "Doctor, I don't understand what the pneumococcal vaccine is… [E]ven if people are sensitised to the overall sense that "vaccines are good," I think there is still more work to be done on the benefit of every specific vaccine available. Otherwise, they will be confused." (SG)

On the other hand, our review highlighted common beliefs about harms that decrease take-up including the belief that vaccine is not safe (Graham et al., 2022; Hamilton et al., 2022) and concerns about pain and short- and/or long-term side effects, especially for those with pre-existing health conditions (Kaufman et al., 2022, Teo et al., 2019; Cummings et al., 2020; Ho et al., 2017).

Beliefs about harm can be particularly challenging for new technologies such as mRNA or for those that had negative experiences with vaccination in the past, as benefits may appear unknown while existing mistrust is difficult to overcome and can be further stoked by vaccine-related misinformation or disinformation.

Experts from the Philippines reiterated both these concerns: many older adults remain sceptical of vaccines as well as their potential side effects, and some of these fears are deliberately stoked by antivaccine groups. Some existing fears around vaccines as rooted in the 2019 dengue vaccine controversy, perpetuating continued scepticism of new vaccines.

Secondary health-related incentives/ disincentives

Our review found that older adults held a range of beliefs about other health-related benefits or harms from vaccination. While the benefits of vaccination are typically seen to be preventing disease, other interesting benefits can also be considered concerning health, strength, and longevity (Graham et al., 2022; Hamilton et al., 2022, Ho et al., 2017, Cummings et al., 2020).

In this regard, specific forms of misinformation may increase hesitancy. For example, the belief that vaccines weaken the body's natural systems (Ho et al., 2017) becomes an excuse for vaccine hesitancy for some older adults whose preference for a naturopathic lifestyle leads them to disdain vaccination (Trent et al., 2020), or indeed medication of any kind (Cummings et al., 2020). Other incorrect beliefs, however, may even inappropriately increase the likelihood of vaccine take-up (e.g. the belief that vaccines would contribute to longevity, or that vaccines contain vitamins).

More generally, a lack of motivation to undertake preventive healthcare also plays a role. In the Singapore context, both the review and our experts raised the issue of fatalism – some older adults believed that they did not need to be vaccinated due to the natural course of ageing and the inevitability of sickness and death.

> *"Some of the seniors, especially those who are over 80s, to them, if I take the vaccination or not, I'll still die. This is very real. [...] Whether you take [it] or not, you're still going to die. So, some of them just don't care." (SG)*

Passivity was cited as an attitudinal barrier to vaccination among older adults, with many wishing to leave health-related decision-making to family members or healthcare professionals. Alongside, interviewees mentioned that the elderly tended to not value preventive health for themselves, instead prioritising financial security and their family's well-being.

Other incentives/disincentives

Apart from perceived health impacts, incentives, or disincentives for vaccination for older adults also include financial considerations such as the opportunity cost of taking the vaccine, e.g. in Singapore, older adults were fearful of burdening their families if anything happened to them post-vaccination, and among lower-income individuals especially, there was a fear of loss of income.

Most frequently, both our review and our interviewees described the freedom to travel or socialise as a critical driver of vaccine take-up (Hamilton et al., 2022; Kaufman et al., 2022, Teo et al., 2019). In Indonesia, during the COVID-19 pandemic, vaccination was required to access public transportation and public spaces. Likewise in the Philippines, older adults felt compelled to comply with the system to gain access to public spaces, including workplaces and key community spaces:

> *"It also helped that [institutions] were strict, even the churches, malls, schools, offices. They were strict in giving access to those who were fully vaccinated, to only those who can show their vaccine card. So, they're obligated to go for vaccination." (PH)*

Other factors include perceived effects on ability to work (Teo et al., 2019), echoed by an expert from Singapore:

> *"When they work, their employer will ask them, "Have you been inoculated? If you did not, you can't come to work", so you have to go for it." (SG)*

A final category was religious objections (Cummings et al., 2020). In Indonesia for example, one of the largest Muslim-majority countries in the world, the majority follow the official policy of exemption for vaccines for which there are no feasible substitutes. However, conservative groups and populations residing in more religious regions of the country may remain vaccine-hesitant, due to the belief that some vaccines are not approved by religious authorities, and some may choose not to be vaccinated at all if they were uncertain. On the other hand, immunisation can also be supported by religious obligations, for example, the meningitis vaccine is mandated by the Saudi Arabian government for all Muslim pilgrims completing the hajj.

Last but not least, it is important to highlight that some common ageist stereotypes were not supported by our review or by expert opinion. For instance, we found no strong evidence that older adults' fear of injections results in low take-up, and mixed responses from our experts, including one expert who claimed the opposite:

"The injection is a good treatment. So, actually not so many Indonesians are afraid of needles. Maybe the young generation. But the older ones sometimes ask for two injections, one after another." (ID)

Table 5: Systemic drivers of vaccine acceptance and take-up

	Facilitators	Barriers
Accessibility	Vaccines easily available (Burke et al., 2021) Awareness of free vaccination (Trent et al., 2020)	Inconvenient to travel to vaccine site, long waiting hours at polyclinics (Cummings et al., 2020). Expensive (Ho et al., 2017)
Family and friends	Individuals in close contact with children <5 years old (parents, grandparents and carers of children) (Bayliss et al., 2021, Concern for health and livelihood of grandchildren and other family members (Briggs et al., 2019, (Teo et al., 2019); Encouragement from friends and family (Teo et al., 2019; Cummings et al., 2020; Ho et al., 2017)),	Adult populations without regular contact with young children (Bayliss et al., 2021) Low peer vaccination uptake rates (Teo et al., 2019)
Healthcare	Recommendation from healthcare professionals, both doctors and nurses (Trent et al., 2020; Kaufman et al., 2022; Briggs et al., 2019; Hamilton et al., 2022, Teo et al., 2019; Ho et al., 2017) Having a regular family doctor/GP (Ang et al., 2018; Ang et al., 2017)	Lack of advice and encouragement, or even Deterrents from healthcare professional (Briggs et al., 2019, Teo et al., 2019; Cummings et al., 2020) Mistrust of doctors (Teo et al., 2019, Cummings et al., 2020)
Community and social care	Protecting the public/ community in general (Briggs et al., 2019, Hamilton et al., 2022,Kaufman et al., 2022; Lupton et al., 2022), fulfilling moral obligation (Hamilton et al., 2022)	
Government and mainstream media	Trust in government sources and local media (Tan et al., 2022)	Lack of trust in governments (Graham et al., 2022)

Systemic drivers of vaccine acceptance and take-up

Access to vaccination

Having vaccines that are easily available free or at a low out-of-pocket cost (Burke et al., 2021, Trent et al., 2020, Ho et al, 2018) without subjecting older adults to inconvenient travel or long waits (Cummings et al 2020) is a first-order facilitator.

However, our expert interviews also describe multiple situations in which such conditions may be compromised. Lack of availability within the public healthcare system in Indonesia and the Philippines has been raised, with one expert contrasting the experience of COVID-19 vaccination with other adult vaccines to illustrate the gap:

> *"COVID … propelled the focus on older adult immunisation. But what about the other vaccines for older adults, like shingles, pneumococcal vaccine, influenza, and TDAP? uptake there is very low because they're not government subsidised, and so you must go to the private sector." (ID)*

In addition, limited facilities for vaccination among rural and lower-income populations and mobility challenges faced by older adults when seeking immunisation services also remain.

Financing barriers also hindered older adults from getting immunised in Australia and Singapore, where the out-of-pocket cost of more expensive vaccines (e.g. pneumonia and shingles vaccines) can still be prohibitive.

> *"We have [a herpes zoster vaccine] available in Australia, the recombinant DNA vaccine that per dose in Australia, it's $280. You need two doses. So, we're talking over $500. And it's recommended, again, for people over 50, but the government's not paying for it. So, when you're talking about cost, the cost can be quite high." (AU)*

Interviewees from Singapore also observed that despite subsidies, certain vaccines are still perceived as costly by certain generations of seniors due to the lack of steady income post-retirement and lower-income older adults who are weighing competing priorities against limited financial resources. Moreover, it is important to note that in countries like Singapore or the Philippines, where means-tested schemes exist, the lower middle class rather than the indigent may also be at risk, as some seniors may not be eligible for vaccine subsidies after means testing.

Finally, some barriers are less visible, such as linguistic barriers for specific populations such as new migrants in Australia and regional residents in Indonesia.

> *"In Jakarta, we use the Indonesian language, but when we go, for instance, to Yogyakarta or Aceh, I involve the local people because the elderly speaks the local language. So, it is important that you use the people from that area, who know the local language and the culture of the elderly at that place. It's different for each." (ID)*

Family and friends

Our review shows that one of the most prevalent rationales for immunisation is protecting loved ones, particularly grandchildren or other young ones (Briggs et al., 2019,; Teo et al., 2019); as such individuals in close contact with young children, such as parents, grandparents, and carers of children, are more accepting of vaccination (Bayliss et al., 2021).

"Especially if they are seniors staying alone, or just the husband and wife living together but without other family members. The likelihood of them not going is quite high. For those who are staying with their children, the likelihood is that they will go." (SG)

In addition, family members have a critical role in encouraging the elderly to care for themselves and providing emotional and physical support. Within the family, an overall culture of valuing health and well-being, including prevention and healthy lifestyles, can further encourage the elderly to get vaccinated (Teo et al., 2019; Cummings et al., 2020; Ho et al., 2017). Interviewees in Singapore also observed that elderly individuals' willingness to be vaccinated is affected by their trust in their family members' advice and opinions around vaccination and other health-related matters, and reassurance that they would be cared for post-vaccination should they experience any adverse side effects.

Equally, family environments can also discourage vaccination for many reasons. This can be more implicit, such as transmitting beliefs or fears around vaccination, and a lack of awareness and understanding of vaccination and its benefits. More directly, an older adult's family/caregivers may play a large role in their healthcare decision-making. In Indonesia, one expert noted:

"It usually comes from the family whether they allow their parents or the elderly to be vaccinated or not. Especially the poor because they cannot go alone. The children have to accompany their parents to the health centre where the vaccination is being done." (ID)

Interviewees from the Philippines also mentioned this as a concern at the height of the COVID-19 pandemic, when some older adults were prevented from taking the vaccine by their own family members despite personally intending to be vaccinated.

In turn, some older adults may not be explicitly restricted by their families but refuse vaccination from a desire to avoid being burdensome or an inconvenience to their loved ones.

While the family has more direct control over an older person's decisions, friends and peers also create a sphere of influence due to established trust, shared experiences and language, and potentially common concerns around vaccination. Teo et al., (2019) in our review highlighted that individuals' decision to be vaccinated follows their peer group, which implicitly conveys how seriously their social networks take the vaccine; this was strongly echoed by our community experts.

"I met an aunty who is Cantonese and had a conversation with her on inoculation…. I reassured her that nothing will happen, but she still insisted that she was not going. However, the next morning, when we started the inoculation exercise at the [community centre], I saw the daughter pushing her down in a wheelchair, I said, "Aunty, last night, you didn't want to come, you said no, no, no, I don't want" … She said "My friend came and told me that she was inoculated and it's okay. There's no problem. That's why today I come down" … This is the generation we are talking about, very stubborn and have a very peer-to-peer sort of trust. They don't trust anybody except themselves and their peer group." (SG)

Moreover, while social networks can be supportive, experts from all four countries noted that social networks can also amplify misinformation and facilitate sharing of vaccine-related fears and misinformation among themselves, particularly via the use of social media and text-based mobile communication apps.

Healthcare system

Our scoping review results show that recommendations from healthcare professionals are strong predictors of individual behaviour, most notably in the context of an established relationship with a trusted provider (Trent et al., 2020; Kaufman et al., 2022; Briggs et al., 2019; Hamilton et al., 2022, Teo et al., 2019; Ho et al., 2017), consistent with the views of our experts:

> *"They're very driven by the recommendation of their doctor. If their doctor doesn't recommend it, they're much less likely to have it." (AU)*

Conversely, a lack of such trust in doctors (Teo et al., 2019, Cummings et al., 2020), or a lack of feedback or negative feedback from healthcare professionals (Briggs et al., 2019, Teo et al., 2019; Cummings et al., 2020) can lead to hesitancy.

Experts in all four countries agreed with review findings suggesting that a regular family doctor (Ang et al., 2018; Ang et al., 2017) is the most appropriate locus for this relationship. In Australia, generally, the GP is the first and most common starting point of contact for seniors accessing the health system and is therefore crucial in recommending and administering vaccines to patients, while increasing coordination with other parts of the healthcare system. In Singapore, for example, an expert noted the central role of the GP in getting patients vaccinated as follows:

> *"The GP is definitely one of the best people to convince their patients to be vaccinated. Anyway, they can just say, "Mr Tan, you're right here to see me for your flu. Based on your records, you should be vaccinated. Why don't I give you a jab now? "(SG)*

Comparatively, getting vaccinated in other healthcare settings can prove complicated and tedious, as explained by an Indonesian expert:

> *"I must pay for a hospital card or something like that, and I must wait for my turn, for my consultation, for this geriatric, sometimes 20, 35 patients. It is a long time. After I get the consultation, I ask them. I want to get, say, a pneumococcal vaccine. So, the geriatrician will give me a receipt, and prescription, and I must go to the pharmacy, and there I should wait again with another person who wants to buy insulin, who wants to buy chemotherapy and everything. I get it and I'm back to my geriatrician to get the immunisation. So, for that, it may be two, three, or four hours. That's why we recommend that every hospital should have an immunisation service, separate from the consultation with another disease." (ID)*

However, even in a primary care setting, challenges can arise. In Australia, multiple issues may prevent GPs from communicating the importance of vaccination to their patients: these include being time-poor and having competing priorities during patient consultations. GPs are often reminded to have short, one-to-five-minute conversations to nudge their patients to get vaccinated, and yet still do not always do so. This is further exacerbated by complicated and changing guidelines about recommendations and subsidies, which GPs often feel unprepared to discuss with patients. Additionally, unlike the paediatric immunisation programme, GPs are not financially incentivised to vaccinate older adults, resulting in predictable consequences:

> *"Providers get additional funding if they vaccinate children under the age of seven. But there's no funding to vaccinate the adults. About two years ago, I think 97% of children had all of the recommended vaccines. Many older people have had one or two or three vaccines, but only about 3% of the elderly population has had all of the vaccines that were recommended." (AU)*

Similarly in Singapore, in public facilities, providers may have little scope or bandwidth to promote immunisation outside the presenting illness. Some experts even described a generalised reluctance to raise the subject of vaccination with patients unless necessary. Reasons cited included a lack of time to speak with patients due to rapid turnaround and high patient volume, a focus on the treatment of the patient's immediate concerns during consults, and limited bandwidth to proactively educate the elderly on the benefits of vaccination.

Finally, our experts described ways in which healthcare systems overall are still oriented towards specialist care and curative medicine, with the mindset and tools for stewardship of primary care and/or prevention still lacking.

In decentralised or mixed healthcare systems, the gap between different sources of provision creates further challenges. In Australia for instance, experts described a fragmented vaccination landscape where vaccines can be administered by GPs, specialist physicians, pharmacists, and local councils via public health immunisation clinics. In Singapore, where the primary care landscape is mixed, the lack of a registry led to vaccination monitoring being described as:

> *"… pretty ad-hoc, partly because also a lot of adults go to private GPs for the jabs. And up till now, private GPs are not mandated by law to share the information." (SG)*

This was also true in Indonesia, where respondents highlighted that many individuals in fact have access to their own private family doctors, who can build and sustain good relationships with their patients, and from whom patients are willing to accept healthcare recommendations. However, in this setting, immunisation for older adults is typically not addressed or reported to a registry.

In low-resource settings, the problems can be even more fundamental. For immunisation specifically, many developing healthcare systems are not prepared to provide resources to procure and distribute vaccines, or more fundamental challenges may well dominate. These include poor access to healthcare facilities, limited time during doctor-patient consultations, a lack of trained healthcare professionals to serve populations and their health needs, a limited supply of vaccines, and underdeveloped health information systems or supporting infrastructure:

> *"Many of them have a record system, but is it integrated? Are they able to talk to each other? Right? Is it transferable? Our health information system is also laden with its own uniqueness and idiosyncrasies. So maybe this system may not be suited for this local government unit, because they have unreliable electricity. You can't rely on electricity, the internet." (PH)*

Community and social care system

In this region, our review found consistent evidence that communitarian norms are important – older adults feel strongly about their obligation to contribute to community protection beyond their direct social circles (Briggs et al., 2019, Kaufman et al., 2022; Lupton et al., 2022), to the extent of seeing it as fulfilling a moral obligation (Hamilton et al., 2022).

In turn, community organisations in all countries were described as having a key role to play in facilitating immunisation on the ground beyond the healthcare setting. A key element of success in this regard was strong integration with pre-existing community-based initiatives and social care.

For example, Singapore's nationwide community and social support agency networks were described

as an important driver of vaccination uptake among the elderly during the COVID-19 pandemic, especially among isolated seniors who had limited knowledge, awareness, mobility, and/or resources. The strength of this network is long-term familiarity and the ability to reach seniors within the communities of their belonging, physical locale, and comfort, grounded in accessible language and the human touch.

"There is a very concerted attempt to try and reach out to seniors, to understand where they are. It's part of this campaign of making sure that they age in place and age well, and to sense-make whether or not there are people who are socially isolated, needing help. It's driven by the social side more than the health side, but I feel often that it sets up the right framework and ingredients for us to tap on. And then, given that there's so much social and health overlay in this nexus, the co-determinants of health, it provides a good opportunity for us to move in this space, to reach out to them better." (SG)

Experts also related instances in which vaccine hesitancy could be engendered at the community level by targeted misinformation campaigns that deliberately leverage underlying group-based historical or socio-political tensions, as shown in this Australian example:

"For Aboriginal people living in remote areas, there was great concern about what would happen if COVID got into their community… Anti-vaxxers were saying to them, that vaccine is a genetic weapon designed to wipe you out. It's designed to make you infertile so that Aborigines will be wiped out. And there were many more. And that's terrible. And so, sometimes, it's other people telling certain groups things which are not true." (AU)

Government

Trust in the government's actions as well as the reliability of information coming from the government and local media are critical. (Tan et al., 2022, Graham et al., 2022). However, these trust relationships take significant effort to build and maintain:

"The trust is there and has been built over many decades, and we can move along with what the government or the authority is doing for the betterment of the people. … This trust doesn't come just like that. We have built it up throughout the years, and we should not allow this to erode. And that's what our seniors are sticking to, the trust." (SG)

Such maintenance requires a consistent and credible strategic and fiscal commitment to vaccination, at both the national and local levels. In the Philippines, national government-led risk communications about older adults during COVID-19 were effective at promoting vaccination but fundamental pre-existing challenges with decentralisation have so far prevented a further shared agenda around a national immunisation programme for the elderly. Despite the necessity for systemic reforms, differences in priorities across local governments and national interests, gatekeeping, interference from interest-based groups, as well as background corruption in certain areas are particularly challenging to overcome.

"Vaccination may not be a priority of local government. So, while [the national-level Department of Health] can promote or even encourage, can maybe write administrative orders that say set targets for vaccination, you have to reach this proportion of your population for vaccination and monitor, but they have to make sure that it is local governments which are given the responsibility to reach these targets." (PH)

Disparities across subpopulations

Our study reiterates that older adults are an extremely heterogeneous group, across but also within countries. The scoping review identified some clear disparities based on key demographics: notably older age is positively associated with vaccine take-up (Enticott et al., 2018, Trent et al., Briggs et al., 2019, Lupton et al., 2022, Ang et al., 2017) i.e., the "old old" (age 85 and above) are more likely than the "youngest old" (age 65-74) and the "middle old" (age 75-84) to be vaccinated. Our review also finds that individuals with comorbidities or other health-related vulnerabilities are more likely to take up vaccination (Frank et al 2019, Ang et al 2017) Individuals who are proactively managing their health and wellness with evidence-based healthy lifestyle practices are more likely to be vaccinated while, those who are pursuing alternative or complementary medicine are less likely to be vaccinated (Frank et al 2019, Wardle et al, 2017, Ang et al 2017).

In line with the previous discussions on accessibility, markers of socioeconomic status (SES) are associated with higher take-up, including education, income, house type, and neighbourhood SES (Ang et al 2017, 2018; Tan et al 2022, Lin et al 2020, Frank et al 2019, Enticott et al 2018). Our experts broadly agreed but cautioned against overextrapolation from population-level differences to individual cases, noting that highly educated or wealthy adults may sometimes be extremely vaccine-hesitant. As one Australian expert explained:

> *"... a lot of people who are not very well off are willing to pay. If we tell them it's recommended for you, if there's reasons, then it's surprising that even people who are fairly poor, some of them will say, "yes, I'll do that, and I'm happy to pay". And the reverse is true, that some people who are pretty rich, when they're told, you have to pay, they say, "oh, that's terrible". (AU)*

Finally, evidence on gender, marital status, employment, and ethnicity is less consistent: gender is associated with vaccine take-up, but the effects are not consistent across different types of vaccines. (Enticott et al., 2018, Frank et al 2019, Lin et al 2020, Tan et al 2022) Being partnered is associated with less vaccine take-up but only in one study (Ang et al., 2017). Being employed is positively associated with take-up in the same publication, but perhaps contrary to expectations, being employed as a healthcare worker is negatively associated with vaccine take-up (Enticott et al., 2018) We also find suggestive evidence that cultural or ethnic minority groups are less likely to take up vaccines, but only in one study that found that being of minority Indian ethnicity in Singapore was negatively associated with take-up (Tan et al., 2022).

Table 6: Disparities in vaccine take-up by population subgroups		
	Positive	**Negative**
Age	Higher age (Enticott et al., 2018); 75–84 (Trent et al., 2020); 85+ (Briggs et al., 2019); 70+(Lupton et al., 2022), ≥50+ (Ang et al., 2017)	
Gender	Men: SARSCoV- 2 (Enticott et al., 2018) Women: Pneumococcal (Frank et al., 2019; Trent et al., 2020); Herpes Zoster (Lin et al., 2020)	Women (Tan et al., 2022)
Ethnicity		Indian (Tan et al., 2022)
Marital Status	Separated, divorced, or widowed (Ang et al., 2017)	Married (Ang et al., 2017)
Employment	Working in the last 12 months (Ang et al., 2017)	Being a healthcare worker (Enticott et al., 2018)
Education	Higher education (Ang et al., 2018)	
Income	Higher household income (>$6000) (Ang et al., 2018; Ang et al., 2017); more expensive homes (Tan et al., 2022)	
Neighbourhood	Highest in major cities (Lin et al., 2020) and socioeconomically advantaged areas (Enticott et al., 2018).	Lower in outer/remote/very remote areas or socioeconomically deprived areas (Frank et al., 2019; Lin et al., 2020).
Health status	Positive perceived health (Tan et al., 2022)	Poorer perceived health (Ang et al., 2017; Ang et al., 2018; Tan et al., 2022
Comorbidities	General comorbidities (Frank et al., 2012, Ang et al 2017) lung disease (Trent et al., 2020)	
Smoking Lifestyle beliefs	Ex-smoker (Frank et al., 2019) Use of vitamins/minerals (Wardle et al., 2017), higher physical activity (Ang et al., 2017)	Smoker (Trent et al., 2020) Use of alternative health practitioners, yoga practice (Wardle et al., 2017)

Learning from intervention experiences

Relatively few successful interventions were identified in our review of the published literature; however, interviewees drew on their expertise and experience to provide examples of best practices as well as less optimal approaches.

Education addresses existing gaps in health and vaccine literacy. Targets of these interventions have typically been older adults themselves, such as flyers and posters targeting the elderly that were found to be effective in Singapore (Ho et al 2019). In practice, a range of approaches was described in our interviews, from general mass campaigns in the media or physician waiting rooms to more targeted interventions such as senior citizen newsletters or educational public lectures for older adults.

Experts also emphasised that, in order to be most effective, educational interventions need to go beyond communicating general information and also be delivered in a manner that is personal and relevant to the individual. As described by a Singapore expert:

> *"It's not effective to tell them what mRNA is. Instead, we should focus on their concerns. What they want to know are the impacts on their lives. They want to know after inoculation, what will be the side effects and so on, what will happen if they don't take it." (SG)*

Our experts also noted that it was important to think of education for both older adults and their families, explaining that it was critical to educate family members on the benefits, importance, and positive impacts of vaccination on their elderly loved ones as part of building a supportive and enabling environment for them.

Persuasion reflects attempts to influence or reinforce behaviours, attitudes, feelings, or thoughts. Such interventions may focus on the macro level of policymaking, at the level of stakeholders such as healthcare providers who, as noted, in turn, influence older adults, or patients themselves.

Experts highlighted that for national and local government policymakers with policy remits but

Table 7: Sample interventions shown to improve vaccination uptake among older adults

Function	Intervention Type	Source
Education	Using informational flyers and posters to increase vaccine awareness and demand among the elderly	Ho et al 2019;
Persuasion	Briefing clinicians regarding baseline vaccination rates and introducing vaccination card reminders led to more vaccination recommendations	Li et al 2019
Incentivisation	Small monetary incentives to encourage vaccination	Yue et al 2020
Enablement	Structured health assessments led clinicians to consider appropriate prevention strategies, including checking immunisation status, recommending appropriate vaccines, and administering vaccinations	Lin et al 2022

limited resources, it is critical to articulate and make salient the broader value of vaccination:

> *"It's a matter of persuading government that vaccination is actually a good investment and saves multiple costs downstream. So, the health economics have to be presented." (AU)*

For clinicians, whose bandwidth and time during patient consultations is limited, impactful persuasion can take the form of timely prompts or reminders to reinforce their intentions. Our review highlighted one such study that targeted clinicians in Singapore, who increased influenza vaccination prescriptions after being shown baseline vaccination rates among older adults as well as vaccination card reminders (Li et al 2019).

In the case of Australia, experts also identified innovative ways of using technology to nudge both physicians and patients, indirectly contributing to patient education at the same time.

> *"There're about seven or eight commonly used software packages, and sometimes that software will put up a prompt. They'll say, "Your patient has just turned 70. When the patient comes in, … they've come for a check of their blood pressure, but it's now time to talk to them about shingles vaccination." (AU)*

An important aspect of persuasion is considering the social preferences and context of older adults as previously discussed. In the case of Singapore, reportedly effective approaches included appealing to their desire to contribute to the family or choosing peers as lay workers.

> *"… the staff or the younger people, found it very hard to go and tell the senior that actually, if you don't do this, you might die. Which is actually the plain truth of it. But you have another senior telling him, "Hey, go lah, I took my jab already, you want to die early, is it?" Then the other senior is then more receptive. So, this peer support or peer pressure, if you will, was actually quite effective in getting seniors to be more open to vaccination." (SG)*

Other socially informed strategies include working through existing community organizations for outreach and implementation in order to be credible and engage diverse groups of seniors. These included senior activity centres and active ageing centres in Singapore, and senior citizens' centres and clubs in Australia.

Incentivisation has also been shown to be effective. In Singapore, Yue et al (2020) demonstrate experimentally that relatively small financial incentives for influenza vaccination increase take-up rates among older adults in Singapore. In a real-world setting, experts related how in the Philippines, some local governments offered material incentives such as food staples for older adults that received COVID-19 vaccinations as well as one-time fairs or campaigns to provide vaccines such as pneumonia and flu for free.

While there may be concerns that temporary incentives such as these may not be sustainable, one interviewee noted that short-term incentives can be leveraged for longer-term benefits: vaccine fairs at local primary health centres resulted in a large increase in demand that enabled healthcare providers to register the previously unregistered older adults, enabling them to catch up on other unmet needs and beginning a longer-term relationship with primary care.

Enablement refers to increasing or decreasing facilitators or barriers to change. In the clinical setting, Lin et al (2022) showed that building structured health assessments into part of clinical routines increased take-up by prompting clinicians to carry out appropriate checks related

to preventive care. In the previous example of Li et al (2019), acknowledging the limited bandwidth of the physician, the intervention authorised nurses to provide recommendations if the doctor did not. Other aspects of enablement include supporting infrastructure, such as in Australia, where a new electronic health records system to support tracking and audit was introduced.

"The other thing that has driven vaccination in older people in Australia is we now have a register – the Australian Immunisation Register, called the AIR. And most people now can readily access their vaccination through the online government portal, and GPs can, too. So, it used to be very hard to work out if a person's had pneumococcal vaccination ever in the past, but now with the AIR, we increasingly have a better record of that. So, that's been a major enabler or enhancer of cost-effective vaccination of older people." (AU)

Finally, environmental restructuring to reduce physical or social barriers to access was also discussed by our interviewees, especially in the context of the COVID-19 pandemic but also beyond. For example, in the Philippines, policies to encourage immunisation uptake included setting up vaccination centres in public places (e.g. malls, schools, and offices), which offered older adults the opportunity to take up immunisation services, while in both Singapore and the Philippines, in-home vaccination was also implemented.

"They created these big vaccine sites in malls with the help of the private sector. They went house-to-house. In fact, they went house-to-house and looked for the seniors and encouraged them to be vaccinated." (PH)

Beyond COVID-19, our experts in Australia, Singapore, and the Philippines also raised the benefits of enabling nurses and pharmacists to administer vaccines independently, extending networks for vaccination to various institutional contexts such as schools and nursing homes, as well as retail pharmacy settings, which can increase both access and uptake.

Last but not least, Australia also provides an example of environmental restructuring in the digital rather than physical space, in the form of providing patients with individual web-based portals to manage their overall health which also includes vaccination.

"It's done through patient portals … A web page, effectively, which is part of our record for them, that says, here are all the different preventive things that are relevant for you, things we should be doing with you to help you to stay well." (AU)

Recommendations

Drawing on the study findings as well as our experts' input on the necessary next steps to support older adults' immunisation, we present the following recommendations based on three strategic tiers.

System-level: optimising vaccination delivery

"All of the new discoveries of new vaccines and their promise for protection are just a promise unless you can actually substantiate that promise with an actual structure and a system for advancing it and delivering it, for the convenience of your target population." (PH)

1. Develop a national adult immunisation programme that addresses older adults

This first step is crucial to countries like Indonesia and the Philippines, where developing an

immunisation programme for adults remains in progress. Policy changes such as including older adult immunisation schedules for relevant vaccines into existing national immunisation programmes are crucial, as both Indonesia and the Philippines reckon with their growing ageing populations and their evolving health and social needs.

Implementation-wise, while acknowledging the achievements of countries like Singapore and Australia, the potential for further coordination across subnational policies and practices remains. In Australia, for example, noting the initiative and successes of individual states leading the way with their state-level programmes – such as Victoria and its pneumococcal vaccination programme – there is potential for greater collaboration between the federal and state governments to try to further improve such efforts.

2. Review existing guidelines on vaccine recommendations and funding, with the aim of:
    - Ensuring ease of vaccine availability, access, and affordability while comprehensively covering relevant preventable diseases for older adults
    - Meeting rigorous standards of efficacy and cost-effectiveness of vaccines
    - Building transparency in policy processes and establishing stakeholder consensus
    - Increasing clarity and ease of communication with physicians and patients

In Australia, expanding but also rationalising the National Immunisation Programme Schedule funded list is complicated but necessary. There is potential to explore the 'packaging' of immunisation for the elderly, with the possibility of such plans being accelerated by combination vaccines that protect against multiple illnesses. At the same time, appropriate resources must be allocated to analyse the cost-effectiveness of new vaccines to justify the inclusion of evolving variants of vaccines into the NIP schedule and to ensure final recommendations are well understood and supported by clinicians and other vaccine-administering healthcare professionals. Finally, a review on existing guidelines ensures that work processes such as the procurement and distribution of vaccines for older adults are transparent and effective.

3. Strengthen delivery systems in the wider context of meeting needs of an older population, including:
    - Expanding funding in conjunction with other forms of social protection for older adults and the goals of universal health coverage
    - Integrating immunisation into community-based and institutional models of care for older adults
    - Enabling more nurses and pharmacists to provide vaccination but also in geriatric care
    - Investing in wider health system supports that underpin better healthcare for older adults, such as expanding primary care and national registries for health information
    - Enacting oversight and governance mechanisms led both by scientific experts and community representatives to ensure that the programme is evidence-based, meets standards of propriety, and remains responsive to new vaccine technologies as well as evolving needs on the ground
    - Committing to developing strong monitoring, evaluation and learning processes or systems to enable continuous quality improvement

In the case of the Philippines, for instance, interviewees discussed expanding immunisation privileges through social welfare legislation (e.g. RA9994) to include all senior citizens instead of solely those from indigent categories or seeking other means such as the co-funding of vaccines from community groups and philanthropic foundations concerned with ageing to fund vaccination campaigns. Experts also pointed to the potential of increasing the overall availability and accessibility of vaccines, developing local and national health

information systems, as well as institutionalising incentives and nudges for vaccination campaigns.

More broadly, in Singapore, new healthcare reforms, i.e., Healthier SG, will focus on cultivating prevention and related healthful habits through a focus on primary care, including vaccination. Supporting such efforts contributes to changing mindsets about preventive healthcare (a core driver of vaccination) and as this initiative will be rolled out among older adults first, it offers the opportunity to further establish vaccination as a normative practice among elderly Singaporeans.

Similarly, in 2021, Indonesia signed the National Strategy on Ageing and established a division for the elderly in the Ministry of Health. It provides opportunities for the Ministry to shift its focus to preventive healthcare and health promotion, widening opportunities for the development of a national immunisation programme for older adults. The national ageing policy also opens opportunities to address the current limitations of Indonesia's healthcare system by increasing health financing, reforming the national insurance scheme, and building a comprehensive and integrated health information system at the local and national levels, both currently lacking or inadequate.

4. Use technology to enhance system effectiveness and efficiency while managing risks for older adults

As new technologies including electronic medical records systems, mobile and digital health applications and new data analytics tools proliferate, the potential to support immunisation increases. In Australia, as noted earlier, the introduction of electronic medical records enabled better recording and analysis of data as well as the implementation of digital "nudges' in the form of prompts to patients and providers. Other applications of technologies include decision support systems for clinicians and online patient portals that provide individuals with a highly personalised, fully documented healthcare journey. These technologies contribute to an enabling health information system environment for the immunisation of older adults, with the national immunisation register at its heart.

In other countries featured in this study, such as the Philippines and Indonesia, the promise of social media has been raised as a range of new media platforms emerge to encourage immunisation among older adults. At the same time, limitations of certain technologies need to be accounted for – the lack of stable electricity or internet in rural areas, for instance – as well as the potential for an emerging digital divide for older adults, who may find themselves opted-in to receiving services online without understanding the context completely. Moving towards telemedicine may also be more effective in areas such as dermatology, but for many could introduce anxiety.

Community-level: engaging and supporting key stakeholders

> *"Now we medical professionals understand that we cannot struggle with only the medical profession. We should ask the community, especially the groups who have a very good impact on immunisations." (ID)*

1. Foster interconnectivity between partners with common goals

While it is clear that the government or healthcare system cannot work alone for success, the positive engagement of external stakeholders cannot be taken for granted. This is especially true when external stakeholders have had previously challenging experiences, or when there is general mistrust of the formal healthcare system and/or government and institutions writ large.

For instance, experts felt that Singapore's extensive community and social support network with its

many localised touchpoints for seniors could also be mobilised to improve vaccination awareness and appropriate uptake among the elderly. These touchpoints can be used to further build awareness, spread information, and build trust in vaccines, highlight the availability and types of vaccine subsidies available to elderly individuals, assist those who require support navigating these subsidy schemes, and carry out mass vaccination exercises (as was done during the COVID-19 pandemic), depending on the type of community organisation. In Australia, similarly, experts pointed to a wide array of groups including Rotary and business groups that engage with older adults, while experts in Indonesia and the Philippines described potential collaborators from non-governmental organisations, community organisations, patient advocacy groups, and even the private sector. Experts across all four countries of study broadly agreed that moving forward, further engagement with likeminded partners was essential to creating a sustainable and supportive environment to normalise the regular vaccination of older adults.

In the landscape of ageing policy and practice, collaboration is desirable (or even inevitable) across multiple organisations that may typically not work together. Successful partnerships, therefore, require clearly identifying ways in which immunisation or preventive healthcare are in line with different organisations' respective missions and reaching a consensus about alignment, rather than simply choosing not to work with a specific interest group or simply choosing to work with an organisation servicing the same target age group.

2. Engage partners to maximise comparative advantage, while supporting and strengthening local capacity

Engaging partners in any setting calls for trust-building as well as respect for one another as equals with different roles to play. In the example of large, diverse, archipelagic nations like the Philippines and Indonesia, it is important to actively engage local regional counterparts who have access to local relationships, expertise, and knowledge, and rely on their credibility and networks to promote immunisation among older adults. The strengths of cooperation are clear, as the national authority may provide resourcing and overall plans to make the programme feasible, while local organisations provide the deep context and cultural adaptation to make the programme acceptable. Local organisations can also play the role of the ground-level implementor, capitalising on existing trust and social capital within the communities in which they work. Alongside this, it is important to assess and address disparities in the abilities and resources of partners without taking their support for granted. More pragmatically, resources need to be fairly allocated especially when groups such as charities or patient advocacy groups may have few resources themselves. It is also important to ensure that partners are given appropriate decision-making roles, in addition to ex-post visibility, or gain other in-kind benefits for themselves/their constituencies.

3. Target families and community networks aside from older adults themselves

Whether positive or negative, the influence of family critically shapes older adults' vaccination-related beliefs, knowledge, awareness, and uptake. As such, policymakers must prioritise helping families to help their elderly make better and more informed decisions around vaccination and preventive health. This necessitates educating families on the importance of vaccination and its benefits (including efficacy, safety, and preventive health impacts), addressing families' fears and concerns around vaccination, and encouraging families to have conversations about vaccination and support their elderly who want to be vaccinated.

Networks of friends, peers, and neighbours can also create a localised sphere of positive influence with shared experiences, language, and potentially common concerns and attitudes around vaccination and preventive health more broadly. By

offering emotional and physical support, peer and community networks not only are more effective but can also help to tackle the social isolation and loneliness among certain elderly subpopulations. Such networks also have a role to play in combating vaccine-related misinformation and propagating truthful, accurate vaccine-related information.

Individual-level: improving vaccine confidence and uptake

> *"It needs to be data-driven; it needs to be evidence-based. But if it's just too much about science, I'm not sure that will resonate with older people. But if you then translate that into, I think, how it benefits them, that's one. And how it can benefit their loved ones." (SG)*

1. Address basic gaps in knowledge and attitudes by meeting seniors where they are

To increase awareness of vaccines and vaccination as well as overcome attitudes of fear, passivity and limited prioritisation, educational initiatives must be conducted but must equally be grounded in meeting seniors where they are. In Singapore, for instance, it is crucial to harness the momentum of and lessons learned from COVID-19, which has successfully raised the profile, importance, and uptake of vaccination among the elderly in Singapore. This entails not seeing or treating seniors as a burden to society, understanding the validity of their vaccination-related concerns, empathising with them, treating them respectfully and in a humanised way, and tailoring potential interventions to the concerns of different groups (e.g. Pioneer vs Merdeka generations).

2. Communicate the value of vaccination from non-expert stakeholders' points of view

Establishing common goals is not the end, but rather the beginning. Overall, there is a need to shift patient and healthcare providers' mindsets towards a preventive health approach, as well as consider the social determinants of health and the need for more closely intertwined health and social care. As such, it is key to have a clear understanding of disease risks and vaccine efficacy, the benefits of investing in the vaccination of older adults as a wider public health strategy, and the financial costs of implementing this strategy. Alongside this, it is crucial to develop the ability to communicate these concepts clearly and ensure they are relatable to stakeholders from different sectors with no or limited prior background.

Possible strategies of exploration include the use of champions and peer advocates for health communication. The medium and language of messaging should also be catered to the needs of older adults and should be easy to understand by the layperson.

3. Use behavioural science to help close the action-intention gap

In addition to building education and social support, it is critical to take a final step and "nudge" individuals into action. Improving elements of choice architecture for older adults and their providers can help us to further bridge the last mile towards vaccine take-up. Some examples include simplifying vaccine-related information for an elderly audience, curating vaccination choices, giving "just-in-time" prompts to providers and patients with the support of information systems or clinical software solutions, deploying small incentives. Importantly, at the patient-healthcare provider interface level, behavioural nudges to improve vaccination uptake can be more effectively and consistently deployed in a healthcare environment where both older adults and busy vaccine-administering healthcare professionals, such as doctors, nurses, and pharmacists, are not overwhelmed by time constraints and decision fatigue – a concern raised by expert interviewees across all four countries.

Conclusion

This study sought to identify the barriers and facilitators influencing the uptake of immunisation among older adults in the Asia Pacific region, with a focus on the country-level experiences of Indonesia, the Philippines, Australia, and Singapore. We also aimed to identify and illustrate best practices from across the region to inform recommended strategies for optimising delivery of vaccines, building engagement and support for vaccination programmes, and improve vaccine confidence and uptake among older adults.

The findings from a scoping review and in-depth stakeholder interviews with experts from across the four countries of study found fundamental differences between countries' adult vaccination programmes, ranging from Australia and Singapore's national programmes to Indonesia and the Philippines not having programmes. Up-to-date data on older adults' vaccination rates in each country also varied, with more prominent data gaps in Indonesia and the Philippines.

Barriers and facilitators to uptake of older adults' immunisation were gleaned from across two main categories: individual drivers of vaccination decision-making and systemic drivers of vaccine acceptance and take-up. Individual drivers were complex, with barriers and facilitators spanning perceptions of disease risk and severity, awareness of vaccines and vaccination programmes, perceptions of vaccine efficacy and risks of harm, and incentives. Systemic drivers were access to vaccination, the influence of family and social networks, individual countries' healthcare, community, and social care systems, and the role of and trust in government.

Overall study findings also highlighted the importance of addressing disparities in knowledge and access across subpopulations, particularly socioeconomically vulnerable groups. Successful interventions as identified from the review of the literature and stakeholder interviews were focused on four key areas: education of the elderly population, persuasion by clinicians and other healthcare professionals, incentivisation to encourage vaccination uptake, and enablement within healthcare systems to 'nudge' providers to discuss and offer vaccination to elderly patients.

We conclude with recommendations for action to improve vaccination uptake among older adults in Asia Pacific at three interconnected levels: systemic, focused on optimising delivery of vaccines to older adults under current vaccination programmes; community, focused on engaging and supporting key stakeholders in the older adults' vaccination space; and individual, focused on improving vaccine confidence and take-up among older adults by tackling attitudes, knowledge, behaviours, and network influences.

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Country Summary: Australia

Overall policy:

Australia has an enabling federal policy and public awareness environment with low levels of vaccine hesitancy in the overall older adult population. The National Immunisation Programme (NIP) provides clear guidance for adult vaccines. Vaccines such as influenza, pneumococcal, and shingles are federally funded for those aged 65 and up.

Vaccination recommendations from various bodies dealing with seniors, like the Australian Council on the Ageing and the Department of Veteran Affairs, are considered during the government's decision-making process.

All nationally funded vaccines are mandated to be reported to the Australian Immunisation Register (AIR).

Key individual and systemic determinants

- Past vaccination experience or knowledge of vaccines/vaccine programmes
- Having pre-existing conditions and/or perceived susceptibility to severe illness
- Perceived vaccine effectiveness
- Sense of social responsibility
- Personal health beliefs and practices (e.g. beliefs about effects on general health and longevity, preference for natural immunity, use of alternative medicine)
- Trust in healthcare system and physician recommendations

Challenges identified

- Access and demand for newer vaccines which are not covered under the NIP
- Bandwidth constraints at the critical interface of primary care.
- Vaccine availability at local level in remote/outer-lying or socioeconomically disadvantaged regions
- Cultural barriers or misinformation among minority populations

Key policy and practice priorities – improving implementation and addressing gaps

1. Continue to engage and educate the older adult population at the community-level, especially about new vaccines
2. Increase the effectiveness and capacity of primary care to deliver vaccination by leveraging new technologies such as digital "nudges" for patients and providers
3. Address gaps across local and national policies related to guidelines and funding as well as disparities among more vulnerable populations

Country Summary: Singapore

Overall policy:

In Singapore, the National Adult Immunisation Schedule (NAIS) provides guidance on 11 vaccinations. Subsidies such as the Community Health Assist Scheme (CHAS) and other community-based schemes are available to help defray NAIS vaccination costs for the elderly and lower-income individuals getting vaccinated in public or private primary care.

In 2022, means-tested subsidies based on a patient's per capita household income were introduced for NAIS vaccines administered in public healthcare settings. Out-of-pocket costs can be paid for using Medisave, the national medical savings scheme.

Forthcoming national HealthierSG reforms addressing population health include the development of health plans for individuals that include appropriate vaccinations across the life course.

Key individual and systemic determinants

- Educational attainment and household income
- Past vaccination experience or knowledge of vaccines/vaccine programmes
- Perceived vaccine effectiveness
- Sense of social responsibility
- Influence of family and friends as well as community and social sector organisations
- Personal health beliefs and practices (e.g. disdain of vaccination, religious objections to vaccination or belief in predestination/fatalism)
- Trust in healthcare system and physician recommendations

Challenges identified

- Understanding and acceptance of new or more complex vaccines
- Out-of-pocket costs
- Physical access/travel time/long waiting hours at polyclinics
- Healthcare professionals' limited prioritisation of vaccines for the elderly
- Potentially negative influence of family and social networks

Key policy and priorities – engaging community and ensuring affordability

1. Continue to engage and educate the older adult population by leveraging families, social relationships as well as community-based organisations, especially about new vaccines
2. Address challenges to affordability from gaps in coverage or financial literacy
3. Reinforce ongoing population health reforms to emphasise the effective and efficient implementation of vaccination policy through primary care

Country Summary: Indonesia

Overall policy:

At the time of writing, Indonesia does not have a national adult immunisation policy. Vaccinations for older adults are excluded from the national health insurance scheme Jaminan Kesehatan Nasional (JKN) and are therefore paid out-of-pocket.

Although JKN is the national platform for achieving universal health coverage (UHC), the scheme currently only covers free routine immunisations for children under age 5 (except for tetanus immunisation for pregnant women, which falls under the umbrella of maternal and child health).

Vaccines for older adults such as influenza are recommended but not covered, and these imply relatively high out-of-pocket costs for older adults. However, certain vaccines, including the influenza vaccine, are recommended to older adults and/or adults with underlying chronic diseases, and healthcare workers. The meningitis vaccine is mandated for all Hajj pilgrims.

Key individual and systemic determinants

- Past vaccination experience or knowledge of vaccines/vaccination programmes
- Having pre-existing conditions and/or perceived susceptibility to severe illness
- Perceived vaccine effectiveness
- Role of private sector, especially family doctors
- Local/regional cultural and community practices

Challenges identified

- Lack of awareness and advocacy for older adult immunisation
- High out-of-pocket costs
- Availability of infrastructure and manpower

Policy and practice priorities – building a national policy integrated with national UHC aspirations

1. Support the formulation of a formal national policy on adult immunisation
2. Address coverage for adult immunisation under the JKN
3. Expand basic public health system capacity, working with existing networks of family doctors

Country Summary: The Philippines

Overall policy:

At the time of writing, the Philippines has not yet developed an adult immunisation schedule. However, PhilHealth, the national health insurance scheme, provides influenza and pneumococcal vaccination at 20 – 60% discounts for older adults. The Health and Wellness Programme for Senior Citizens provides free influenza and pneumococcal vaccines to 1.3 million indigent citizens aged 60 and above (PhilHealth, 2012).

However, the rollout of immunisation campaigns is decentralised and therefore in practice is contingent upon the efforts and resources of local governments, as well as the diverse levels of capacity of local healthcare systems.

Key individual and systemic determinants

- Past vaccination experience or knowledge of vaccines/vaccination programmes, notably through the dengue vaccine and COVID-19 experiences
- Physical accessibility of vaccination services in communities
- Incentives or disincentives associated with vaccination
- Local/regional government management of implementation

Challenges identified

- Costs related to unsubsidised vaccines or excluded populations
- Misinformation and fear around vaccination-related risks
- Limited prioritisation of preventive health among medical practitioners
- Strong resource constraints

Policy and practice priorities – strengthening coverage in a decentralised system

1. Support the formulation of a formal national policy on adult immunisation, together with advocacy and support efforts at the local government level
2. Extend current breadth of coverage for immunisation to include all older adults, through means such as but not limited to social welfare legislation
3. Expand efforts to mobilise additional resources from alternative sources such as community organisations, local advocacy groups, or philanthropy

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Appendices

Appendix A: Scoping review search string

PubMed

Search date: 15th August 2022

Search #	Search Details	Results
1	"aged"[MeSH Terms] OR "over 50 years old"[Title/Abstract] OR "older adult"[Title/Abstract] OR "elder*"[Title/Abstract] OR "geriatric"[Title/Abstract] OR "senior"[Title/Abstract] OR "life-course"[Title/Abstract] OR "old adult"[Title/Abstract] OR "elder people"[Title/Abstract] OR "older people"[Title/Abstract] OR "old people"[Title/Abstract] OR "old age"[Title/Abstract] OR "aged"[Title/Abstract] OR "ageing"[Title/Abstract] OR "aging"[Title/Abstract] OR "50 and over"[Title/Abstract] OR "late life"[Title/Abstract]	4,133,436
2	"vaccination"[MeSH Terms] OR "immuniz*"[Title/Abstract] OR "immunis*"[Title/Abstract] OR "vaccin*"[Title/Abstract] OR "inoculation"[Title/Abstract] OR "shot*"[Title/Abstract]	574,719
3	"Australia"[MeSH Terms] OR "Singapore"[MeSH Terms] OR "Philippines"[MeSH Terms] OR "Indonesia"[MeSH Terms] OR "australia*"[Title/Abstract] OR "singapore*"[Title/Abstract] OR "indonesia*"[Title/Abstract] OR "philippin*"[Title/Abstract] OR "phillippin*"[Title/Abstract] OR "filipin*"[Title/Abstract]	285,234
4	(("activat*"[Title/Abstract] OR "access*"[Title/Abstract] OR "barrier*"[Title/Abstract] OR "driver*"[Title/Abstract] OR "facilitat*"[Title/Abstract] OR "influence"[Title/Abstract] OR "factor"[Title/Abstract] OR "impact"[Title/Abstract] OR "block*"[Title/Abstract] OR "obstacle*"[Title/Abstract] OR "hinder*"[All Fields]) AND "title abstract"[All Fields]) OR "constrain*"[Title/Abstract] OR "uptake"[Title/Abstract] OR "adoption"[Title/Abstract]	631,656
5	"vaccination hesitancy"[MeSH Terms] OR "health knowledge, attitudes, practice"[MeSH Terms] OR "hesitan*"[Title/Abstract] OR "belief*"[Title/Abstract] OR "behavi*"[Title/Abstract] OR "confidence"[Title/Abstract] OR "social-norm"[Title/Abstract] OR "accept*"[Title/Abstract] OR "social determ*"[Title/Abstract] OR "antivaccin*"[Title/Abstract] OR "anti vaccin*"[Title/Abstract] OR "refus*"[Title/Abstract] OR "reluctan*"[Title/Abstract] OR "challeng*"[Title/Abstract] OR "fear"[Title/Abstract] OR "risk"[Title/Abstract] OR "perceived"[Title/Abstract] OR "perception"[Title/Abstract] OR "complacency"[Title/Abstract] OR "attitudes"[Title/Abstract]	5,876,421

Search #	Search Details	Results
6	"knowledge"[Title/Abstract] OR "internet access"[Title/Abstract] OR "information"[Title/Abstract] OR "digital"[Title/Abstract]	2,302,706
7	(("Primary Health Care"[MeSH Terms] OR "Homes for the Aged"[MeSH Terms] OR "availability"[Title/Abstract] OR "site"[Title/Abstract] OR "center"[Title/Abstract] OR "centre"[Title/Abstract] OR "accessib*"[Title/Abstract] OR "supply"[Title/Abstract] OR "deliver*"[Title/Abstract] OR "primary care"[Title/Abstract] OR "clinic"[Title/Abstract] OR "community"[Title/Abstract] OR "care"[Title/Abstract] OR "homes"[Title/Abstract]) AND "Retirement homes"[Title/Abstract]) OR "access"[Title/Abstract]	392,222
8	"advocacy"[Title/Abstract] OR "recommend*"[Title/Abstract]	808,942
9	("funding"[Title/Abstract] OR "cost"[Title/Abstract] OR "financial"[Title/Abstract] OR "infrastructure"[Title/Abstract] OR "policy"[Title/Abstract] OR "politic*"[Title/Abstract]) AND "affordability"[Title/Abstract]) OR "coverage"[Title/Abstract] OR "intervention"[Title/Abstract] OR "strategy"[Title/Abstract]	1,481,373
10	#1 AND #2 AND #3	1,867
11	#4 OR #5 OR #6 OR #7 OR #8 OR #9	9,133,067
12	#10 AND #11	1,243
13	#10 AND #11 with a 5-year filter	465

EMBASE

Search date: 17th August 2022

Search #	Search Details	Results
1	'aged'/exp OR 'over 50 years old':ti,ab OR 'older adult':ti,ab OR 'elder*':ti,ab OR 'geriatric':ti,ab OR 'senior':ti,ab OR 'life-course':ti,ab OR 'old adult':ti,ab OR 'elder people':ti,ab OR 'older people':ti,ab OR 'old people':ti,ab OR 'old age':ti,ab OR 'aged':ti,ab OR 'ageing':ti,ab OR 'aging':ti,ab OR '50 and over':ti,ab OR 'late life':ti,ab	4544222
2	'immunisation'/exp OR 'vaccination'/exp OR 'immuniz*':ti,ab OR 'immunis*':ti,ab OR 'vaccin*':ti,ab OR 'inoculation':ti,ab OR 'shot*':ti,ab	738995

Search #	Search Details	Results
3	'australia'/exp OR 'singapore'/exp OR 'philippines'/exp OR 'indonesia'/exp OR 'australia*':ti,ab OR 'singapore*':ti,ab OR 'philippin*':ti,ab OR 'phillippin*':ti,ab OR 'filipin*':ti,ab OR 'indonesia*':ti,ab	367703
4	#1 AND #2 AND #3	2211
5	'activat*':ti,ab OR 'access*':ti,ab OR 'barrier*':ti,ab OR 'driver*':ti,ab OR 'facilitat*':ti,ab OR 'influence':ti,ab OR 'factor':ti,ab OR 'impact':ti,ab OR 'block':ti,ab OR 'obstacle*':ti,ab OR 'hinder':ti,ab OR 'constrain*':ti,ab OR 'uptake':ti,ab OR 'adoption':ti,ab	9133026
6	'vaccine hesitancy'/exp OR 'hesitan*':ti,ab OR 'belief*':ti,ab OR 'behavi*':ti,ab OR 'confidence':ti,ab OR 'social-norm':ti,ab OR 'accept*':ti,ab OR 'social determ*':ti,ab OR 'antivaccin*':ti,ab OR 'anti-vaccin*':ti,ab OR 'refus*':ti,ab OR 'reluctan*':ti,ab OR 'challeng*':ti,ab OR 'fear':ti,ab OR 'risk':ti,ab OR 'perceived':ti,ab OR 'perception':ti,ab OR 'complacency':ti,ab OR 'attitudes':ti,ab	7594920
7	'knowledge'/exp OR 'knowledge':ti,ab OR 'internet access':ti,ab OR 'information':ti,ab OR 'digital':ti,ab	3008296
8	'community'/exp OR 'senior centre'/exp OR 'primary medical care'/exp OR 'availability':ti,ab OR 'site':ti,ab OR 'center':ti,ab OR 'centre':ti,ab OR 'accessib*':ti,ab OR 'supply':ti,ab OR 'deliver*':ti,ab OR 'primary care':ti,ab OR 'clinic':ti,ab OR 'community':ti,ab OR 'care':ti,ab OR 'homes':ti,ab OR 'retirement homes':ti,ab OR 'access':ti,ab	6600086
9	'advocacy':ti,ab OR 'recommend*':ti,ab	1144853
10	'intervention study'/exp OR 'policy'/exp OR 'funding':ti,ab OR 'cost':ti,ab OR 'financial':ti,ab OR 'infrastructure':ti,ab OR 'policy':ti,ab OR 'politic*':ti,ab OR 'affordability':ti,ab OR 'coverage':ti,ab OR 'intervention':ti,ab OR 'strategy':ti,ab	3191343
11	#5 OR #6 OR #7 OR #8 OR #9 OR #10	19341218
12	#4 AND #11	1854
13	#4 AND #11 AND [english]/lim AND [2016-2022]/py	919

Appendix B: Interview guide

Introduction

(1) To start, could you tell us a little bit about yourself and your professional background?
   (a) If you do not wish to, you do not have to share your name or organisation.
   (b) However, it would be helpful if you shared with us your current responsibilities and how long you have been working in this role.

Current situation

(2) In your opinion, what is the current state of older adults' immunisation in your country?
   (a) COVID-19, shingles, pneumococcal vaccines, influenza, Tdap + differentiation between COVID-19 and other types of adult vaccines
   (b) Uptake, adherence, current policies, availability of vaccines

(3) Why do you say this? Please elaborate.

Comparisons to paediatric vaccination

(4) In your experience, are there any differences between uptake rates/gaps in paediatric and adult vaccination programmes?

Best practices

(5) In your experience, can you share some best practices in the Asia Pacific region that demonstrate the success and value of life-course immunisation, especially among older adults?
   (a) Strategies for optimising the delivery of immunisation to older adults under current vaccination programmes
   (b) Strategies to build engagement and support for vaccine programmes from key external stakeholders such as charities and patient advocacy groups
   (c) Strategies to improve older adults' vaccine confidence and better encourage them to seek out and take vaccines
   (d) Strategies to ensure basic vaccine supply

Successes and advantages

(6) Can you comment on the success of the life-course immunisation strategies in your national context?

(7) What do you think are the key factors that contribute to their success?

Barriers and gaps

(8) What do you think are some of the barriers to life-course immunisation, especially among adults, in your country?
   (a) Sociocultural barriers
   (b) Economic barriers
   (c) Policy/systems barriers

(9) How and to what extent do these barriers to immunisation for older people vary across different subpopulations in your country?

(a) Check: marginalised, hard-to-reach and zero-dose populations

(10) In your opinion, what are some of the key gaps that need to be filled to improve the uptake of older adult immunisation?

(11) What are your recommendations to fill these gaps?

Concluding question

(12) We've come to the end of the interview. Is there anything further that you would like to share on the topic of adult immunisation that we have not yet covered?

Appendix C: Interview participant demographics

Interviewee	Country	Gender	Sector	Clinician/ Non-clinician	Interview Date
1	Australia	M	Community	Non-clinician	8/9/2022
2		M	Research	Clinician	16/9/2022
3		F	Community	Clinician	19/9/2022
			Medical +	Clinician	
8		M	Research		5/9/2022
17		M	Research	Clinician	11/10/2022
30		M	Medical	Clinician	15/11/2022
5	Indonesia	M	Policy	Clinician	29/9/2022
7		M	Medical	Clinician	30/9/2022
19		M	Policy	Clinician	18/10/2022
22		F	Policy	Clinician	24/10/2022
24		F	Community	Non-clinician	27/10/2022
26		M	Medical	Clinician	28/10/2022
9	The Philippines	F	Community	Non-clinician	5/10/2022
10		F	Community	Non-clinician	5/10/2022
11		F	Policy	Clinician	6/10/2022
12		M	Community	Non-clinician	6/10/2022
13		F	Research	Clinician	6/10/2022
15		F	Medical	Clinician	6/10/2022
16		M	Policy	Clinician	8/10/2022
20		M	Policy	Clinician	19/10/2022
23		F	Policy	Clinician	25/10/2022
4	Singapore	M	Community	Non-clinician	21/9/2022
6		F	Community	Non-clinician	30/9/2022
14		M	Community	Clinician	7/10/2022
18		M	Policy	Clinician	14/10/2022
21		F	Medical	Clinician	21/10/2022
25		F	Policy	Non-clinician	27/10/2022
27		F	Policy	Non-clinician	31/10/2022
28		F	Policy	Non-clinician	31/10/2022
29		M	Policy	Non-clinician	3/11/2022

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