

Seasonal influenza surveillance and vaccination policies in the WHO South-East Asian Region

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ABSTRACT

The WHO South-East Asia Region (SEAR), with its high population density, is recognised by epidemiologists as a critical reservoir for the emergence and global dissemination of novel influenza strains, making it a potential epicentre for future influenza pandemics. Despite this significant risk, most SEAR countries lack comprehensive seasonal influenza vaccination policies, resulting in low vaccine uptake across the region. This review analysed the latest WHO National Influenza Programme factsheets from the 11 SEAR member states and supplemented this with extensive manual literature searches using electronic databases and government websites. As of October 2022, only three countries—India, Bhutan and Thailand—had established seasonal influenza vaccination policies. Among them, Bhutan and Thailand have policies that cover all five WHO-recommended high-risk groups. While national influenza surveillance systems are in place across SEAR, only India and the Democratic People's Republic of Korea claim full population coverage. Influenza vaccine production capacity is limited to Bangladesh, India and Indonesia. The region's varied climatic conditions and insufficient local data have further obscured the true burden of influenza. Thailand offers a successful model for other countries in the region, beginning with the most vulnerable groups and gradually expanding coverage. To effectively develop and implement national influenza vaccination policies, SEAR countries must close the evidence gap by strengthening surveillance systems to provide accurate, timely data and prioritise context-specific research, leverage existing vaccine infrastructure, enhance public education and finally engage with local and international stakeholders to establish strong international cooperation to support these efforts and improve pandemic preparedness.

INTRODUCTION

Influenza, an acute viral infection of the respiratory tract, remains a significant cause of global morbidity and mortality. Like antimicrobial-resistant bacteria, Ebola virus, Nipah virus and other variants of SARS-CoV-2, it is also considered one of the leading candidates for the next large-scale pandemic following COVID-19.^{1 2} Each year, it infects approximately 5%–10% of adults

SUMMARY BOX

- ⇒ Despite the high population density and its potential as an epicentre for future influenza pandemics, most WHO South-East Asian Region (SEAR) countries lack comprehensive seasonal influenza vaccination policies, resulting in low vaccine uptake across the region.
- ⇒ We analysed the latest WHO National Influenza Programme factsheets from the 11 SEAR member states and supplemented this with extensive manual literature searches and found out only 3 countries—India, Bhutan and Thailand—had established partial to complete seasonal influenza vaccination policies.
- ⇒ All 11 countries have established national influenza surveillance systems of varying population coverage and diagnostic capacity. Thailand offers a successful phased vaccination policy implementation model for other countries in the region.
- ⇒ To effectively reduce the burden of influenza, developing context-specific vaccination policies along with the enhancement of public education and strengthening surveillance are necessary. Strong regional and international cooperation can play a critical role in supporting these efforts and improving pandemic preparedness.

and 20%–30% of the global children population, but the mild nature of most cases leads to widespread under-reporting and underdiagnosis.³ Nonetheless, the WHO attributes 3–5 million cases of severe respiratory illness and 290 000–650 000 deaths annually to influenza.⁴ The global economic burden of influenza, including direct and indirect costs, absenteeism, and years of life lost due to both mild and severe respiratory illness, is substantial, with low-income and lower-middle-income countries (LICs and LMICs) bearing the brunt of this impact.⁵ Influenza A, the primary driver of global influenza seasons, is responsible for annual outbreaks, periodic epidemics, and sporadic pandemics, while influenza B outbreaks occur every 2–4 years.⁶ Historically, four out of the five pandemics in the last century have been caused by



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influenza, resulting in approximately 55 million deaths worldwide.⁷

Since 1952, the WHO has been conducting worldwide influenza surveillance through the Global Influenza Surveillance and Response System (GISRS). Currently, 192 member states of the WHO have GISRS components that share viral samples and data to benefit one another.⁸ Surveillance plays a critical role in monitoring, reporting and controlling the dynamics of the influenza virus in the respective areas. It also enables in early detection of outbreaks, the selection of appropriate strains for vaccine development and guides in policy development and implementation.⁹

Immunisation remains the best-known strategy for the prevention of influenza illness. The WHO Strategic Advisory Group of Experts on Immunisation prioritises the seasonal influenza vaccine for high-risk groups including healthcare workers (HCWs), children under 59 months, older adults (over 65), pregnant women and those with underlying medical conditions.¹⁰ WHO advocates the establishment of robust influenza surveillance systems, the implementation of seasonal influenza immunisation policies and programmes and further research in key areas across all member states.¹¹

Over 25% of the global population, nearly two billion people reside in the WHO South-East Asia Region (SEAR).¹² SEAR encompasses 11 densely populated countries: Bangladesh, Bhutan, the Democratic People's Republic of Korea (DPRK), India, Indonesia, Maldives, Myanmar, Nepal, Sri Lanka, Thailand and Timor-Leste (figures 1 and 2).¹³ According to the World Bank, eight of these countries are classified as LICs or LMICs.^{12 14} Despite the high-risk environment created by this dense population, socioeconomic vulnerability and the evident burden, influenza prevention and control measures remain inadequate in SEAR, with only a minority of

member states having implemented comprehensive vaccination policies.¹⁵ This region has been hypothesised as a potential source reservoir for the emergence and global spread of new influenza strains, underscoring the heightened risk of future pandemics originating from this area.¹⁶ Given the combination of high population density, socioeconomic challenges and limited vaccination coverage, a future influenza pandemic could have catastrophic consequences in these vulnerable, under-protected countries.

In this review, we have reviewed the influenza surveillance status, compared the surveillance status of the member states, and critically assessed the current influenza prevention policies and their implementation in SEAR, aiming to provide a comprehensive understanding of the region's challenges. Our analysis seeks to inform policy-makers at both national and regional levels, offering insights to guide the development of effective strategies for influenza control and ultimately safeguard the region against the persistent threat of influenza.

METHODS

The primary data source for our analysis was the WHO National Influenza Programme factsheets, which provide the latest reported national data on influenza surveillance, vaccination policies and pandemic preparedness. We extracted data from the latest 2021 factsheets, updated on 4 October 2022, as published on the WHO's official website.¹⁷ No further factsheets were published afterwards till August 2024.

To ensure comprehensive coverage and inclusion of updated information postreporting of 2021 factsheets, we supplemented these data with an extensive manual search of PubMed and Google Scholar for relevant literature on influenza vaccination policies across the 11 SEAR

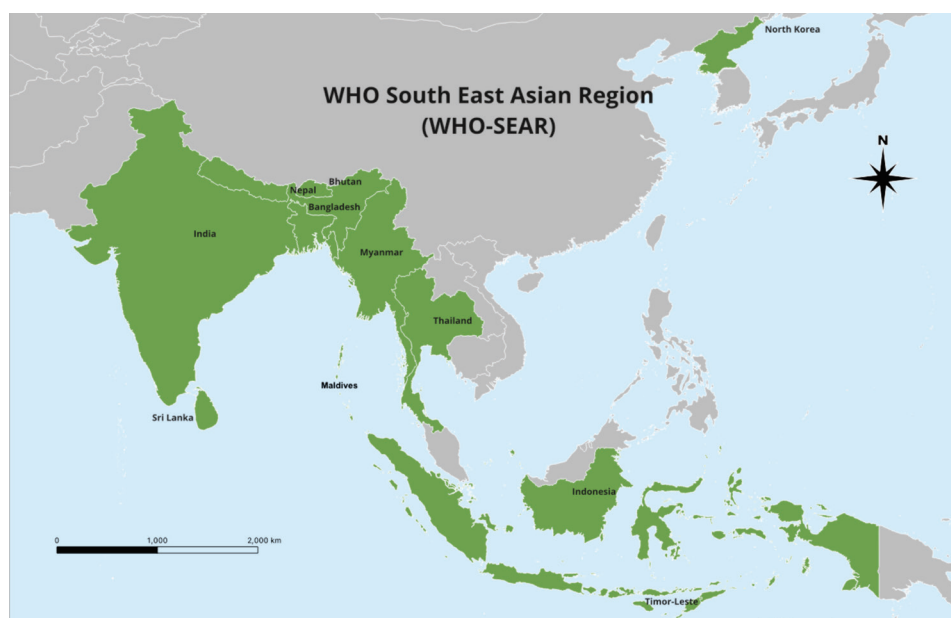


Figure 1 WHO-SEAR, the figure was created using QGIS V.3.32.

Population density, 2024

The number of people per km² of land area

Our World
in Data

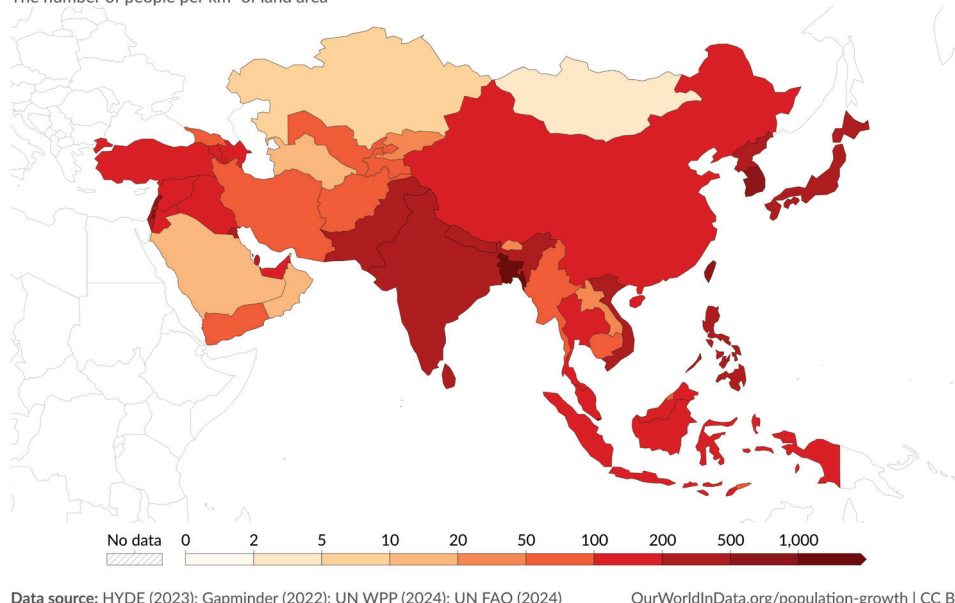


Figure 2 Population density of SEAR countries including other Asian countries, adapted from OurWorldInData.org.¹³ SEAR, South-East Asian Region.

countries, capturing any updates post-2022 till August 2024. These included policy analyses, policy briefs, original research, reviews, government documents available online and news articles.

In our study, we used a structured search approach using Boolean operators with the following primary search string:

“((influenza[Title]) AND (policy[Title] OR surveillance[Title])) AND (Country name)) NOT (Avian[Title] OR Swine[Title])”.

The names of the 11 SEAR member states were substituted individually for ‘country name’ in each search iteration. To focus specifically on surveillance and policy, we restricted the search for these terms to appear in the titles, while the country name search was applied across all fields. Papers with ‘Avian’ or ‘Swine’ in the title were excluded to isolate studies on human influenza.

The initial search yielded 393 papers across databases. Titles and, in some cases, abstracts were manually reviewed to identify relevant studies specifically from SEAR member states. Non-SEAR papers mentioning only the names of the SEAR countries within the text were excluded. We found no country-specific papers on surveillance or policy for DPRK and Timor-Leste. For these countries, we broadened the search criteria, making policy and surveillance optional, to include any influenza-related papers.

We also conducted supplementary searches using the same keywords in Google Scholar and general web searches to identify additional resources, such as news articles and web publications. Furthermore, we employed a snowball search technique, reviewing bibliographies of potential papers to discover further relevant studies. We examined the official websites of WHO and national

health departments of SEAR countries for the most recent policy and surveillance updates.

Additionally, we reviewed the official websites of the WHO and National Health Departments of SEAR countries for the latest policy and surveillance updates and recommendations. In case of discrepancies in information between multiple sources, the latest data were used. Our search was restricted to literature published in the English language only.

RESULTS

Seasonal influenza vaccination policy and vaccine recommendation

As of the last update in October 2022, only 3 out of the 11 SEAR countries—India, Bhutan and Thailand—had established a seasonal influenza vaccination (SIV) policy. Bhutan and Thailand recommend SIV for children aged 6 months to 2 years and older adults (≥ 65 years), while Indonesia and Maldives, despite lacking a formal SIV policy, also recommend vaccination for these age groups, with Maldives extending the recommendation to all children aged 6 months to 5 years in their respective national guidelines. National guidelines are formal documents developed by a professional body authorised by the government’s health authority. These guidelines provide evidence-based, non-compulsory but standardised principles for the prevention and management of specific illnesses. They are designed to ensure consistent clinical practices across the country.¹⁸ The guidelines help to maintain a consistent standard clinical practice across the country. On the other hand, a ‘formal policy’ refers to an official mandate or regulation issued by the government or its authorised entities, which carries a

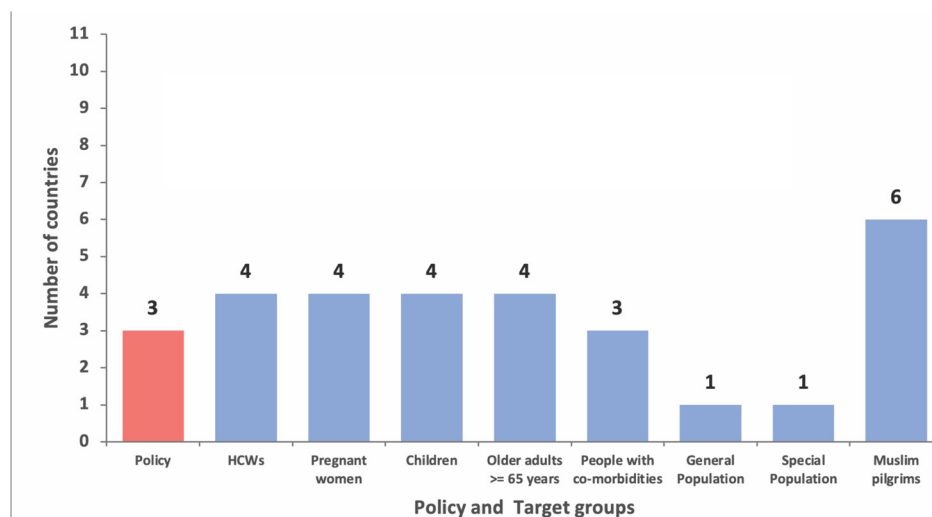


Figure 3 Distribution of SAGE-recommended vaccination target groups included in the national policy and recommendation in WHO South-East Asian Region, 2022. HCWs, healthcare workers; SAGE, Strategic Advisory Group of Experts on Immunisation.

degree of enforceability and serves as a framework for public health action.

For individuals with comorbidities, chronic illnesses or immunosuppression, SIV is recommended by Bhutan, Thailand and Maldives (which lacks a formal policy). Notably, Thailand's recommendations also cover individuals with obesity and mental disabilities.

SIV for pregnant women is advised in Bhutan, Thailand, Indonesia and Maldives, though India, despite having an SIV policy, excludes pregnant women from its priority list.

Myanmar, although without a national policy, recommends SIV for HCWs, joining the three countries with established national SIV policies. Thailand, which has faced repeated outbreaks of Highly Pathogenic Avian Influenza between 2004 and 2008, includes poultry cullers among its recommended groups due to the ongoing risk of re-emergence.¹⁹

The WHO has recommended multiple vaccines for the Hajj and Umrah pilgrims in Saudi Arabia, where millions of Muslim pilgrims from the corners of the world gather every year, creating one of the largest global human gatherings that may serve as a potential epicentre for many outbreaks including flu.^{20 21} Six out of the 11 countries recommend SIV for Hajj and Umrah. Bangladesh, India, Indonesia, Maldives and Thailand offer it through their national programmes, while Sri Lanka provides it via the private sector, and Indonesia through both sectors (figure 3 and table 1).

Seasonal influenza surveillance

All 10 SEAR countries, except India, employed sentinel national influenza surveillance systems. India, uniquely, used a universal or non-sentinel surveillance approach, which began as multisite surveillance in 2004 and using a widespread network of local viral research and diagnostic labs, it evolved into a pan-India universal influenza

surveillance by integrating with the SARS-CoV-2 surveillance in 2021.²² The DPRK also claims total population coverage through their sentinel surveillance system comprising 68 sites throughout all 13 of their administrative areas.¹⁷ Therefore, in terms of population coverage for influenza-like illness (ILI) and severe acute respiratory infection (SARI) surveillance, India and DPRK claim to have achieved 100% coverage that could not be verified by any supporting data, while Timor-Leste had the lowest coverage at 15% and 20%, respectively. Sentinel surveillance is a cost-effective and practical approach for influenza monitoring and individual universal surveillance for influenza alone is not cost-effective and necessarily needed in LMICs.²³ Intensive care units (ICUs) were included in the surveillance systems of only Bhutan, Maldives and DPRK.

Virological surveillance was implemented across all countries, though the extent varied depending on the number of sites involved, the average number of samples processed per week, RT-PCR capacity, genomic sequencing availability, the integration of epidemiological data with lab results and the use of the rapid diagnostic testing kits. The average number of samples processed per week are higher in India (270), Bangladesh (200), Sri Lanka (150–200) and lower in DPRK (30), Maldives (20) and the least in Timor-Leste (2–3). Rapid diagnostic testing for influenza was available in only five countries: Nepal, Bhutan, Myanmar, DPRK and Timor-Leste. Genomic sequencing capacity is available in most countries, except Bhutan, DPRK, Sri Lanka and Timor-Leste.

All 11 countries have their own dedicated National Influenza Centre (NIC), which was absent in Bhutan, Maldives and Timor-Leste before 2023 and they used National influenza laboratories instead. As per the fact-sheets of 2021, all countries contributed data to FluNet, while most also reported to FluID, with the exception of India, Maldives, Myanmar and Timor-Leste (table 2).

Table 1 Status of influenza vaccination policies across SEAR countries, 2022

Country	SIV policy	Recommended risk group							Introduced at public sector	Offered in the private sector
		HCWs	Pregnant women	Children <2 years	Older adults ≥65 years	People with comorbidities	General population	Special population group		
Bangladesh	No	No	No	No	No	No	No	Pilgrims* (Govt)	No	Yes
Bhutan	Yes	Yes	Yes	Yes	Yes	Yes	Yes ⁴³	No	2019	No
DPRK	No	No	No	No	No	No	No	No	No	No
India	Yes	Yes†	No	No	No	No	No	Pilgrims* (Govt)	2015	Yes
Indonesia	No	No	Yes	Yes	Yes	No	No	Pilgrims* (Govt, Pvt)	2014	Yes
Maldives	No	No	Yes	Yes	Yes	Yes	No	Pilgrims* (Govt)	2017	Yes
Myanmar	No	Yes	No	No	No	No	No	No	2018	Yes
Nepal	No	No	No	No	No	No	No	No	No	Yes
Sri Lanka	No	No	No	No	No	No	No	Pilgrims* (Pvt)	No	No
Thailand	Yes	Yes	Yes	Yes	Yes	Yes‡	No	► Pilgrims* ► Poultry Cullers	2004	Yes
Timor-Leste	No	No	No	No	No	No	No	No	No	No

*Hajj/Umrah pilgrims, Govt-Through government or national programme, Pvt-through private sector.

†Yes, but only includes HCWs working in emergencies, ICU, RRTs, laboratory staff and drivers involved in handling influenza patients.

‡Includes people with obesity and mental disability.

DPRK, Democratic People's Republic of Korea; HCW, healthcare worker; ICU, intensive care unit; RRT, Rapid Response Team; SEAR, South-East Asian Region; SIV, seasonal influenza vaccination.

The graph of influenza specimen positivity rates and subtypes in SEAR from January 2020 to August 2024 illustrates that the prepandemic double-peak pattern of seasonal influenza in SEAR is returning, that was disrupted during the COVID-19 pandemic in 2020–2021. The graph also highlights the competition for dominance among subtypes A/H1N1pdm09, A/H3N2 and B Victoria in recent years (figure 4).²⁴

Vaccine type and formulation

Among the 11 SEAR countries, only Bangladesh, India and Indonesia possess the capacity for seasonal influenza vaccine (SIV) production. Six (Bhutan, India, Indonesia, Maldives, Myanmar and Thailand) countries have introduced SIV in the public sector, while eight (all countries except Bhutan, DPRK and Timor-Leste) offer it through the private sector.

Indonesia, Maldives, Myanmar and Thailand provide the vaccine in both sectors. In contrast, DPRK and Timor-Leste do not offer SIV in either the public or private sectors. In Indonesia, Maldives and Myanmar, both trivalent and quadrivalent vaccines are available in both public and private sectors (table 3).

DISCUSSION

Our review underscores the significant challenges in influenza control across the WHO SEAR, where only 3 of the 11 countries—Bhutan, India and Thailand—currently maintain an active SIV policy. The fluctuation in policy adoption, with DPRK, Sri Lanka and Nepal revoking their SIV policies after 2018, reflects the region's sociopolitical and economic instability, as well as the challenges in sustaining public health initiatives in resource-limited

settings.¹⁵ The vaccine policy coverage in SEAR remains one of the lowest globally, ranking slightly above the African region.

Compounding these challenges, the region's diverse climatic conditions contribute to varying influenza circulation patterns and strain diversity, making it difficult to establish a one-size-fits-all vaccination strategy.²⁵ The vast geographical area of India leads to subregional variations in circulating strains, seasonality dynamics and optimal vaccination timings.²⁶ Similarly, differences in climate types—tropical, subtropical, humid continental and temperate—within the SEAR region create additional challenges in aligning strain selection and vaccination schedules. Achievement of nearly 90% or higher EPI coverage rates for most vaccines in the majority of SEAR countries (excluding DPRK, Indonesia, Myanmar and Timor-Leste) indicates that challenges such as logistical issues, vaccine storage, manpower, distribution and healthcare infrastructure limitations have largely been addressed.²⁷ However, integrating a new vaccine into the immunisation programme may require additional efforts like enhancing cold-chain capacity, additional fund securing and conducting human resource training. Addressing these issues requires strengthening regional cooperation and ensuring sustained political commitment. Establishing regional hubs for policy development and implementation, modelled on successful frameworks like the Association for Southeast Asian Nations' (ASEAN) vaccine security and self-reliance initiative coupled with support from regional and international stakeholders including WHO Regional Office for South-East Asia and GAVI (Gavi, the Vaccine Alliance), could stabilise and expand vaccine policies, ensuring more consistent coverage across the region.

Table 2 Influenza surveillance system in SEAR member states by 2022

Country	National influenza surveillance	ILI surveillance (outpatient department)		SARI surveillance (inpatient department)		Virological surveillance				
		Type of ILI surveillance	% of population covered	Type of SARI surveillance	% of population covered	ICU surveillance	Death surveillance	Present or not	Rapid diagnostic testing	National influenza centre
Bangladesh	Yes	Sentinel	~20	Sentinel	~38	No	No	Yes	No	Yes
Bhutan	Yes	Sentinel	35	Sentinel	40	Yes	No	Yes	Yes (ICG)	Yes ⁴⁴
DPRK	Yes	Sentinel	100	Sentinel*	100	Yes	Yes	Yes	Yes (ICG)	Yes
India	Yes	Universal/Non-Sentinel/National	100	Universal/Non-Sentinel/National	100	No	No	Yes	No	Yes
Indonesia	Yes	Sentinel	>30	Sentinel*	<50	No	No	Yes	No	Yes
Maldives	Yes	Sentinel	100	Sentinel	100	Yes	No	Yes	No	Yes ⁴⁵
Myanmar	Yes	Sentinel	Undefined	Sentinel	Undefined	No	Yes	Yes	Yes (ICG)	Yes
Nepal	Yes	Sentinel	Undefined	Sentinel	Undefined	No	No	Yes	Yes	Yes
Sri Lanka	Yes	Sentinel	79	Sentinel	33	No	Yes	Yes	No	Yes
Thailand	Yes	Sentinel	Undefined	Sentinel	Undefined	No	Yes	Yes	No	Yes
Timor-Leste	Yes	Sentinel*	15	Sentinel	20	No	No	Yes	Yes	Yes ⁴⁶

*These countries perform ILI surveillance through Primary or community healthcare centres. DPRK, Democratic People's Republic of Korea; ICG, immunochromatography; ICU, intensive care unit; ILI, influenza-like illness; SARI, Severe Acute Respiratory Infection; SEAR, South East Asian Region.

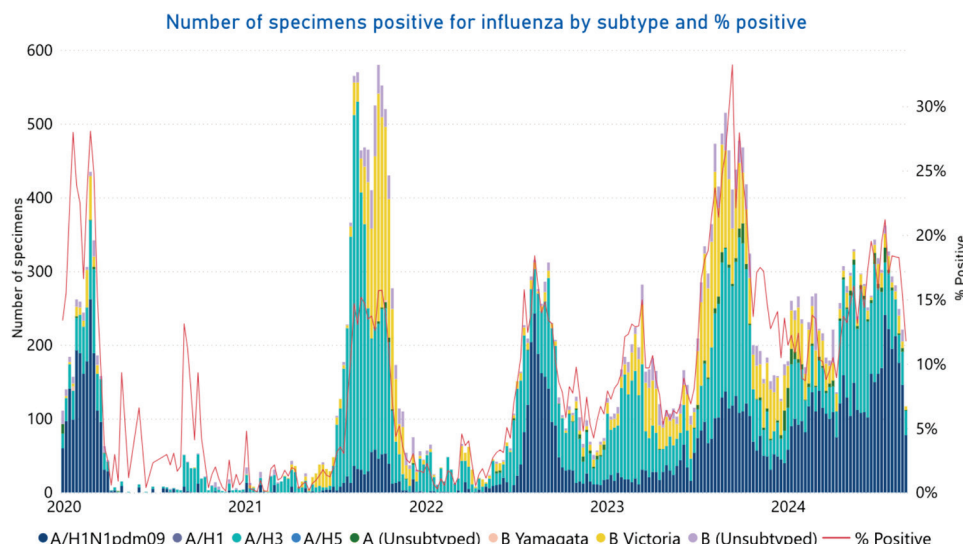


Figure 4 Number of specimens positive for influenza by subtype and % positive in the South-East Asian Region (SEAR) from January 2020 to August 2024 (Created by WHO SEAR Influenza Dashboard application).

The effectiveness of influenza control is heavily dependent on robust surveillance systems, which are essential for accurately assessing disease burden, identifying circulating strains and informing vaccine composition.²⁸ Although all SEAR countries have national influenza surveillance programmes, significant gaps remain in coverage. For instance, Timor-Leste's surveillance covers only a small fraction of its population (table 2) which may limit the region's ability to monitor and respond effectively to influenza outbreaks, which is critical given SEAR's potential as a hotspot for emerging influenza strains.¹⁶ To address these gaps, SEAR countries must invest in expanding their surveillance infrastructure including increasing the number of sentinel sites to cover all variations of geographical regions within the country, enhancing laboratory capacity, integrating surveillance with other public health systems and fostering international collaboration for data sharing and best practices. Influenza surveillance might be integrated or complemented by broader respiratory disease surveillance systems, such as those monitoring RSV or pneumococcal diseases, as this could provide a context for enhancing influenza surveillance systems.

Additionally, public education programmes like media engagement through posters, radio and television, and community outreach programmes before the influenza season and vaccination campaigns will play crucial roles in increasing public awareness and engagement. This could boost participation in surveillance and vaccination programmes, thereby providing more accurate and comprehensive data that can guide timely and effective public health responses.

Thailand has set a benchmark in the region by gradually expanding its influenza vaccine policy from initially covering HCWs in 2005 to including all at-risk groups by 2009.²⁹ In Thailand, childhood and adult vaccination, both are integrated with the EPI under the National

Immunisation Programme. People are vaccinated through immunisation clinics or vaccination centres nationwide.^{30 31} The phased approach has allowed Thailand to build its capacity incrementally while addressing the most vulnerable populations first. In contrast, other SEAR countries face significant hurdles in implementing comprehensive SIV policies due to economic constraints, limited healthcare infrastructure and competing public health priorities. Developing and simultaneously implementing full-spectrum SIV policies across the region may not be feasible for many countries, especially those with constrained resources. Additionally, cultural barriers, disbelief in vaccine efficacy, doubt over safety and perception of non-vulnerability are important and common barriers throughout the region.³² Country-specific barriers like political and international discord in DPRK and geographical accessibility challenges for Nepal and the remote islands of Maldives and Indonesia significantly affect policy development and vaccine uptake.^{33 34} A more pragmatic approach would involve prioritising vaccination for the most vulnerable groups, such as HCWs, pregnant women and young children, and gradually expanding coverage as resources and capacity grow. This approach, supported by regional cooperation and international funding, could help smaller or less economically stable countries adopt similar strategies and sustain their vaccination programmes over the long term.

Bhutan's more recent experience further underscores the importance of evidence-based decision-making in policy development. The Expanded Programme on Immunisation in Bhutan is integrated within the Vaccine Preventable Disease Programme (VPDP), which regulates SIV programmes for both pregnant mothers and children.³⁵ Like Thailand, Bhutan also used a pre-existing vaccination apparatus to establish SIV programmes instead of setting up a new one. Later in 2019, VPDP expanded SIV to the high-risk groups and then to the

Table 3 Influenza vaccines offered in public and private sectors and production capacity in the SEAR countries, 2022

Country	SIV policy	Vaccine production capacity	Offered in public sector			Offered in private sector		
			Vaccine type	Vaccine hemisphere	Vaccination period	Vaccine type	Vaccine hemisphere	Vaccination period
Bangladesh	No	Yes	N/A	N/A	N/A	Quadrivalent	Northern	All year
Bhutan	Yes	No	Trivalent	Northern	November–February	N/A	N/A	N/A
DPRK	No	No	N/A	N/A	N/A	N/A	N/A	N/A
India	Yes	Yes	Quadrivalent	Northern	Winter	Quadrivalent	–	–
Indonesia	No	Yes	Both	Both	All year	Both	Both	All year
Maldives	No	No	Both	Southern	All year	Both	Both	All year
Myanmar	No	No	Both	Southern	May–July	Both	Southern	May–July
Nepal	No	No	N/A	N/A	N/A	Quadrivalent	Northern	All year
Sri Lanka	No	No	N/A	N/A	N/A	Trivalent	Both	All year
Thailand	Yes	No	Trivalent	Southern	May–September	Quadrivalent	Southern	All year
Timor-Leste	No	No	N/A	N/A	N/A	N/A	N/A	N/A

DPRK, Democratic People's Republic of Korea; N/A, not available; SEAR, South East Asian Region; SIV, seasonal influenza vaccination.

entire population in 2020 likely as a temporary measure in response to the COVID-19 pandemic.³⁶ This decision was driven by findings from a 2017 SARI study, which led the National Immunisation Technical Advisory Group (NITAG) to recommend the introduction of SIV. Subsequently, the programme reverted to vaccinating only high-risk groups. Leveraging this infrastructure, Bhutan also successfully implemented its COVID-19 vaccination program.³⁶ Bhutan's approach highlights the critical role of local, population-specific data in guiding policy-makers. Evidence on disease burden, cost-effectiveness, vaccine acceptance and barriers is essential for the successful adoption and implementation of new vaccine policies.³⁷ Countries across SEAR should focus on generating this critical evidence through national influenza surveillance programmes and independent research to support informed decision-making and stakeholder engagement.

The vaccination coverage rates are mostly meagre and unclear for most countries except Bhutan and Thailand. The national vaccination rates for under-5 children, individuals with chronic medical conditions, HCWs, older adults aged >65 years and pregnant women are respectively 74.09%, 100%, 50.41%, 78.71% and 49.30% for Bhutan and 2.14%, 27.8%, 47%, 43.3% and 8.3% in Thailand in 2023.³⁸ Although the vaccine coverage rates were higher during the early years of the policy implementation, similar to Europe, these two countries have also shown a declining trend in vaccination coverage since the 2020–2021 season in almost all risk groups except the adults with chronic illness or comorbidities.^{38 39} Such trends, if continue, pose a significant threat and should be carefully investigated.

Despite their robust capacity for local vaccine production, Bangladesh, India and Indonesia have not fully leveraged this capability to enhance vaccine accessibility within SEAR. The challenge lies in insufficient domestic and regional demand for influenza vaccines, as well as lower vaccine uptake. This results in the lack of a profitable market in LMICs and the absence of strong demand-driven mechanisms.⁴⁰ Expanding local vaccine production to meet not only domestic needs but also to supply neighbouring countries could significantly improve influenza vaccine coverage across the region. Public–private partnerships could play a crucial role in enhancing production capacity and market reach. These partnerships can be instrumental in enhancing vaccine production capacity and market reach, thereby improving affordability and accessibility. For instance, Brazil's public–private partnership model offers a valuable lesson in balancing the interests of public and private sectors while ensuring equitable competition for funding sources and creating a level playing field.⁴⁰

Furthermore, advocating for the inclusion of influenza vaccines in future Gavi strategic goals could unlock new funding opportunities, supporting wider distribution and uptake in SEAR. Although the current influenza vaccine market LMICs is not very encouraging

for pharmaceutical companies and some of the SEAR countries are transitioning to full self-financing, proactive exploration of funding opportunities like GAVI, The Coalition for Epidemic Preparedness Innovations, etc can be a way forward. The current priorities of Gavi 6.0 (2026–2030) focus on vaccines for measles, typhoid and diphtheria and two newer vaccines—Mpox and Hepatitis E. Although SIV is not currently included in Gavi's vaccine goals, there remains a possibility for its inclusion in future strategic goals, as Gavi has already expressed concerns regarding influenza preparedness and vaccination.^{41 42} Establishing a regional vaccine procurement pool could also help stabilise demand and pricing, making influenza vaccination programmes more financially sustainable and equitable across the region.

On 24 November 2023, the WHO published a policy brief on developing and strengthening the national SIV programme. The literature offers primary outlines of the different steps of the development and strengthening of national policy for SIV. These include optimum use of the surveillance system, target group estimation, roles of the NITAG, vaccine type selection and production, supply chain and markets, administration, communication for vaccination, documentation, reporting, evaluation, research and funding. This document is a valuable resource for LMICs that are struggling with the development of a sustainable SIV policy.³⁷

This analysis has some limitations. Our primary data source was the WHO National Influenza Program fact-sheets from 2021, published in October 2022, which may not capture more recent changes in policy or programme implementation. As there were no updated fact-sheets available till the date of submission in August 2024, we did a manual literature search to cover this gap as much as possible. Our reliance on manual literature searches may have led to the omission of relevant unpublished studies or works published in languages other than English. Throughout the preparation of the manuscript, the greatest challenge we faced was the lack of nationally representative local data, which we tried to compensate for with regional and global reports, news articles and government documents. However, the scarcity of comprehensive local data, reviews or analyses constrained our ability to fully assess the influenza control landscape in SEAR, highlighting the need for more localised research and data collection efforts in the region.

CONCLUSIONS

The need for effective SIV policies in WHO SEAR is both urgent and complex. The region grapples with significant challenges such as low public awareness, inadequate healthcare infrastructure and competing health priorities that hinder vaccination efforts. Additionally, SEAR's high population density and frequent human–animal interactions increase the risk of influenza epidemics and the emergence of novel strains. These factors collectively underscore the critical need for targeted and sustained

interventions to protect the region's populations from the ongoing threat of influenza.

Addressing these challenges requires a multifaceted approach. Public education campaigns must be intensified to raise awareness of the importance of vaccination, while surveillance systems need to be strengthened to provide timely and accurate data on influenza activity. Furthermore, the development of adaptable, context-specific policies is essential to ensure that vaccination efforts are both practical and effective. International cooperation will play a crucial role in supporting these initiatives, providing the necessary resources, expertise and coordination. By focusing on these strategic areas, SEAR countries can reduce the burden of influenza, improve vaccination coverage and enhance preparedness for future pandemics, thereby contributing to global health security.

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