

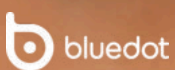


ASEAN BIODIASPORA VIRTUAL CENTER

VACCINE-PREVENTABLE DISEASES

FOCUS REPORT

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VACCINE-PREVENTABLE DISEASES



Introduction

This report will further explore the situation of vaccine-preventable diseases (VPD) in the ASEAN region, epidemiology, policy, and strategy being done by the ASEAN Member States.

Vaccines have become a powerful tool in our fight against illness. They offer a safe and effective way to prevent a whole host of diseases that could wreak havoc on our health.

By getting vaccinated, we're not just protecting ourselves. We're also creating a shield for those around us – our families, friends, co-workers, and even strangers in our communities (Mantel and Cherian, 2020). This protective effect, known as herd immunity, helps stop the spread of diseases in its tracks. Researchers are constantly on the lookout for new vaccines, working tirelessly to expand our defenses against even more illnesses (Maurice and Davey, 2009).

Vaccine-preventable diseases (VPDs) are illnesses that can be

effectively prevented by vaccination. Vaccines have revolutionized global health, saving millions of lives every year, and are widely recognized as one of the most cost-effective health interventions (CDC, 2020).

The most common and serious VPDs include diphtheria, measles, meningitis, mumps, pertussis, poliomyelitis, rubella, tetanus, etc. Eradication of a disease is defined as the worldwide absence of a specific disease-causing agent in nature. Elimination of disease is categorized into two types: elimination of VPD transmission and elimination of a VPD as a public health problem. Control of vaccine-preventable disease is defined as the reduction of disease and death to low levels locally (Hamborsky et al., 2015).

Method

This report explores the landscape of vaccine-preventable diseases in the ASEAN region, investigating factors such as disease burden, case definition for surveillance, preventive measures, policy, and strategies. We focus on several vaccine-preventable diseases which common and still becoming a problem in the ASEAN region such as pertussis, diphtheria, measles, and polio.

A. Data Bases

This report utilizes certain academic literature databases such as PubMed, Embase, and Scopus to support the data gathered from the official sources.

B. Update Reports

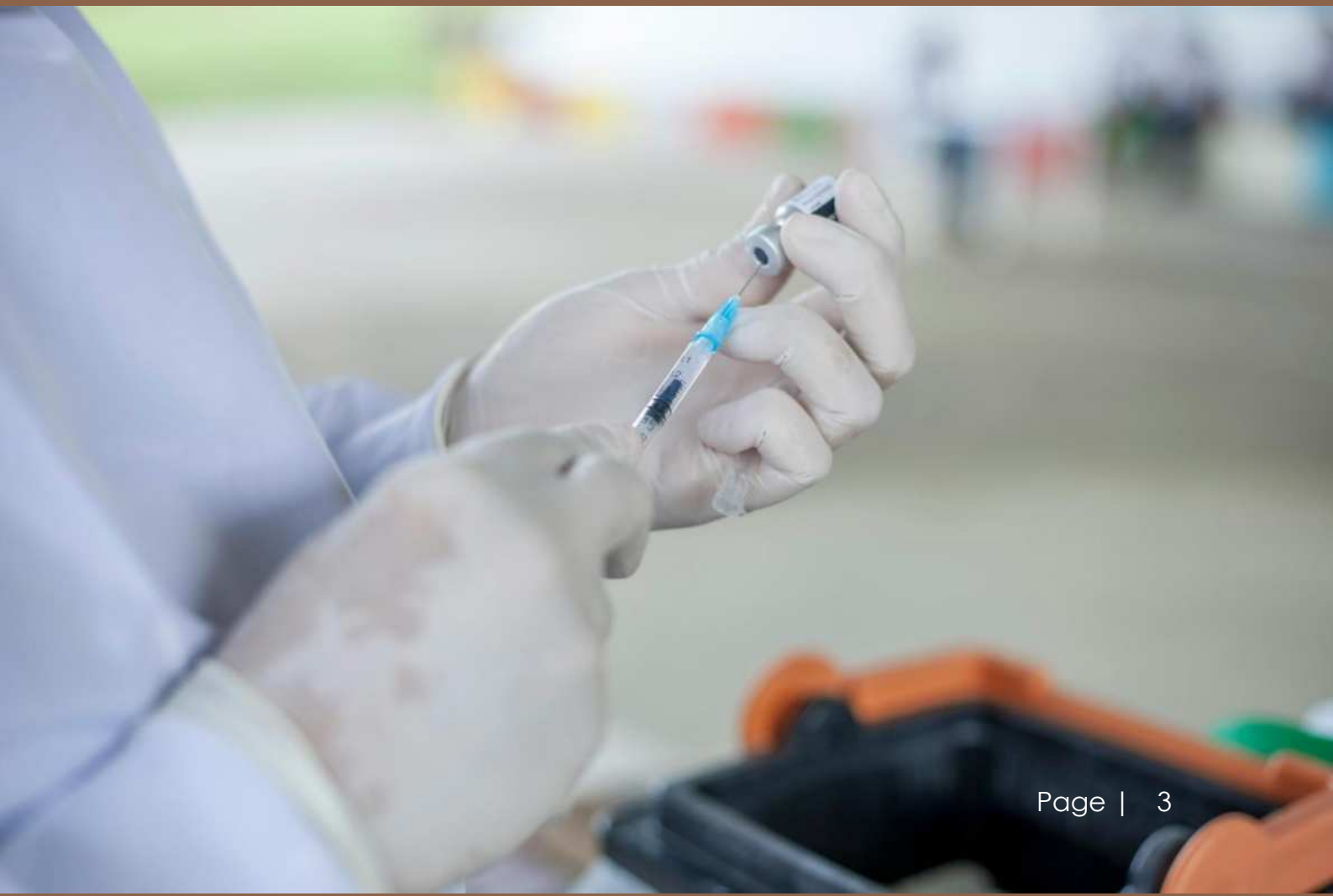
The analysis incorporates near-real-time information gathered from official reports and news articles detailing cases of vaccine-preventable diseases.

C. Coherence

The report constructs a coherent narrative that reveals trends, patterns, and existing challenges in the ongoing efforts to combat vaccine-preventable diseases in the ASEAN region.

D. Enhanced Insight

The report will provide a thorough understanding of the disease and associated strategies in the ASEAN Region.



Diphtheria



Introduction

Diphtheria is a contagious disease that is caused by *Corynebacterium diphtheriae*. It can spread from person to person when an infected person coughs or sneezes. Some people may not develop disease manifestations but can still transmit the bacteria to others. Others will develop mild disease, although severe disease, complications, and death can also occur. Diphtheria can affect anyone but is most common in unvaccinated children (WHO, 2023).

Case Definition

Suspected Case Definition for Case Finding (WHO, 2018)

For case finding, the definition of a suspected case of diphtheria is an illness of the upper respiratory tract characterized by the following:

pharyngitis, nasopharyngitis, tonsillitis or laryngitis, and adherent pseudomembrane of the pharynx, tonsils, larynx, and/or nose. A diphtheria pseudomembrane is an exudate that is greyish, thick, firmly adherent, and patchy to confluent. Dislodging the pseudomembrane is likely to cause profuse bleeding.

Some countries can choose to expand the suspected case definition to include the following:

- mild cases without a *pseudomembrane*
- non-healing ulcers in a person with a travel history to countries with endemic disease or countries with diphtheria outbreaks

Signs and Symptoms (WHO, 2023)

- Symptoms begin 2–5 days after exposure to the bacteria such as a **sore throat, fever, swollen neck glands, and weakness.**
- Within 2–3 from infection, the dead tissue in the respiratory tract forms a thick, grey coating that can cover tissues in the nose, tonsils, and throat, making it **hard to breathe and swallow.**
- Most severe diseases and deaths from diphtheria occur as a result of the diphtheria toxin and its effects. Complications can include inflammation of the heart and nerves. The overall case-fatality rate is 5–10%, with higher death rates (up to 20%) in those younger than 5 years of age.

Table 1. Final Case Classification Diphtheria

Final Case Classification (WHO, 2018)	
Laboratory-Confirmed Case	<ul style="list-style-type: none"> • A laboratory-confirmed case is a person with <i>Corynebacterium</i> spp. isolated by culture and positive for toxin production, regardless of symptoms. Toxigenicity must be confirmed by the phenotypic Elek test in all instances. Polymerase chain reaction (PCR) can complement surveillance and may qualify as laboratory-confirmed after reviewing the epidemiology and clinical manifestations of the case. Laboratory-confirmed cases may be further classified into three subcategories. • Laboratory-confirmed classic respiratory diphtheria cases meet the suspected case definition and are laboratory-confirmed as defined above. • Laboratory-confirmed mild respiratory/asymptomatic diphtheria cases have some respiratory symptoms such as pharyngitis and tonsillitis, but no pseudomembrane, or no symptoms (usually identified via contact tracing). • Non-respiratory laboratory-confirmed diphtheria cases have a skin lesion or non-respiratory mucosal infection (for example, eye, ear or genitalia) from which <i>Corynebacterium</i> spp. is isolated by culture and tests positive for toxin production.
Epidemiologically Linked Case	<p>An epidemiologically linked case meets the definition of a suspected case and is linked epidemiologically to a laboratory-confirmed case.</p>

<p>Clinically compatible case</p>	<p>This type of case meets the definition of a suspected case and lacks both a confirmatory laboratory test result and epidemiologic linkage to a laboratory-confirmed case.</p>
<p>Discarded Case</p>	<p>A discarded case is a suspected case that meets either of these criteria:</p> <ul style="list-style-type: none"> • Corynebacterium spp. but negative Elek test (non-toxigenic Corynebacterium) • negative PCR for the diphtheria toxin (tox) gene.
<p>Classifying Asymptomatic or Mild Cases</p>	<p>Sometimes during outbreak investigations in which household contacts are investigated, a person may be identified with Corynebacterium and have evidence of toxigenicity but does not meet the suspected case definition because the person is asymptomatic or has only mild disease.</p>

Diphtheria in the ASEAN Region from 2002 to 2022

From 2002 to 2022, Diphtheria cases in the ASEAN region had been fluctuated. Brunei Darussalam has no report on the cases. In the last 20 years, Indonesia

has had the highest contribution of the incident rates which had the peak of the cases in 2012.

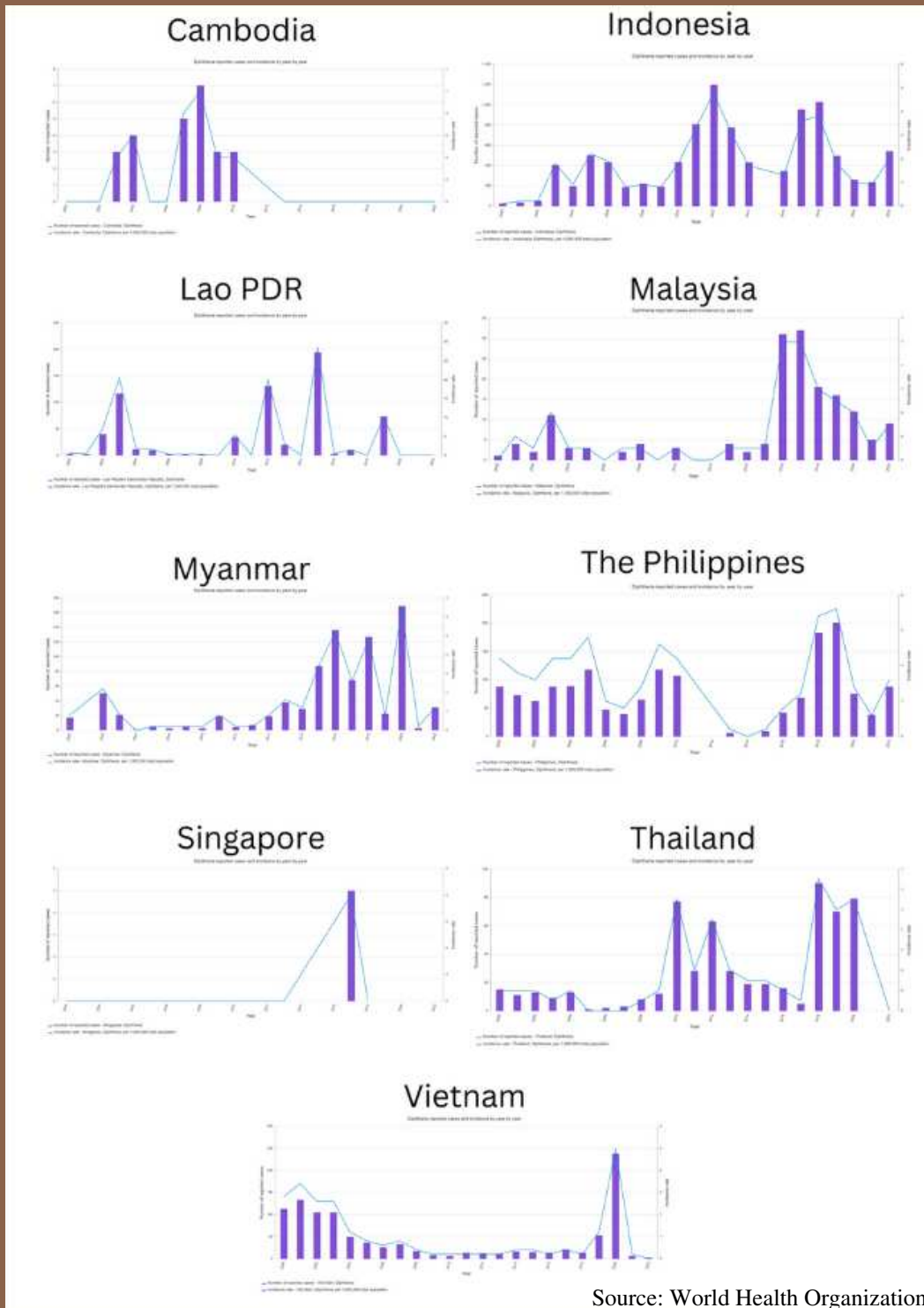


Figure 1 Graphs Interpretation Diphtheria in The ASEAN Region 2002 to 2022

Measles



Introduction

Measles is caused by a single-stranded, enveloped RNA virus with 1 serotype. It is classified as a member of the genus *Morbilliviru* in the *Paramyxoviridae* family. This disease spreads easily when an infected person breathes, coughs, or sneezes. It can cause severe disease, complications, and even death. Measles can affect anyone but is most common in children. Being vaccinated is the best way to prevent getting sick with measles or spreading it to other people. The vaccine is safe and helps your body fight off the virus (WHO,2023).

Case Definition

Table 2 Final Case Classification Measles

Suspected Case Definition for Case Finding (WHO, 2018)	
A suspected case is one in which a patient with fever and maculopapular (non-vesicular) rash, or in whom a healthcare worker suspects measles.	
Final Case Classification (WHO, 2018)	
Laboratory-confirmed case	A suspected case of measles that has been confirmed positive by testing in a proficient laboratory, and vaccine-associated illness has been ruled out.
Epidemiologically linked case	A suspected case of measles that has not been confirmed by a laboratory, but was geographically and temporally related with dates of rash onset occurring 7–23 days apart from a laboratory-confirmed case or another epidemiologically linked measles case.
Clinically compatible case	A suspected case with fever and maculopapular (non-vesicular) rash and at least one of cough, coryza or conjunctivitis, but no adequate clinical specimen was taken and the case has not been linked epidemiologically to a laboratory-confirmed case of measles or other communicable disease.

<p>Non-measles Discarded Case</p>	<p>A suspected case that has been investigated and discarded as a non-measles (and non-rubella) when any of the following are true:</p> <ul style="list-style-type: none"> • negative laboratory testing in a proficient laboratory on an adequate specimen collected during the proper period after rash onset • epidemiological linkage to a laboratory-confirmed outbreak of another communicable disease that is not measles • confirmation of another etiology • failure to meet the clinically compatible measles case definition
<p>If the case is also negative for rubella, this is a non-measles non-rubella discarded case.</p>	

Signs and Symptoms (WHO, 2023)

The Symptoms usually begin 10–14 days after exposure to the virus. A prominent rash is the most visible symptom, early symptoms usually last 4–7 days including

- **Running nose**
- **Cough**
- **Red and watery eyes**
- **Small white spots inside the cheeks**

The rash begins about 7–18 days after exposure, usually on the face and upper neck. It spreads over about 3 days, eventually to the hands and feet. It usually lasts 5–6 days before fading.

Most deaths from measles are from complications related to the disease. Complications are most common in children under 5 years and adults over age 30. They are more likely in children who are malnourished, especially those without enough vitamin A or with a weak immune system from HIV or other diseases. Complications can include:

- **Blindness**
- **Encephalitis (an infection causing brain swelling and potentially brain damage)**
- **Ear infections**
- **Severe breathing problems including pneumonia**

A woman during pregnancy can be dangerous for the mother and can result in her baby being born prematurely with a low birth weight (WHO, 2023a).

Measles in the ASEAN Region from 2002 to 2022

From 2002 to 2022, Measles cases in the ASEAN region had decreased vividly. However, this trend is highly unlikely experienced in Myanmar. In 2019, Myanmar reached the peak of the incident rate, making this the only state that has higher incident rates than it was in the early period.

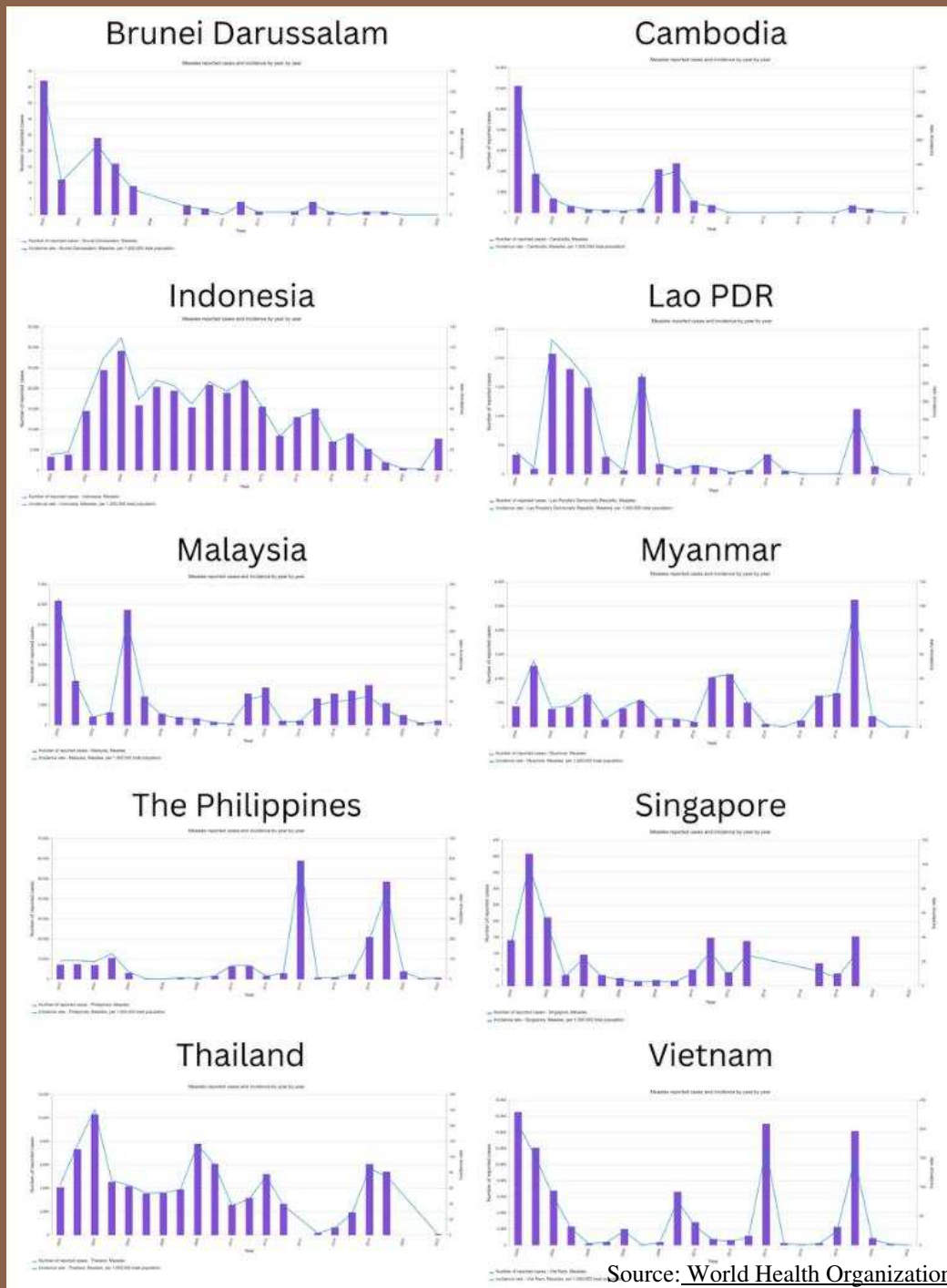


Figure 2. Graphs Interpretation Measles in The ASEAN Region 2002 to 2022

Pertussis



Introduction

Pertussis, also known as whooping cough, is a highly contagious respiratory infection caused by the bacterium *Bordetella pertussis*. In 2018, there were more than 151,000 cases of pertussis globally. Pertussis spreads easily from person to person mainly through droplets produced by coughing or sneezing. The disease is most dangerous in infants and is a significant cause of disease and death in this age group. People with pertussis are most contagious up to about 3 weeks after the cough begins, and many children who contract the infection have coughing spells that last 4 to 8 weeks. Antibiotics are used to treat the infection (WHO,2023).

Case Definition

Suspected Case Definition for Case Finding (WHO, 2018)	
<p>Suspected case: a person of any age with a cough 1 lasting ≥ 2 weeks, or of any duration in an infant or any person in an outbreak setting, without a more likely diagnosis and with at least one of the following symptoms, based on observation or parental report:</p>	
<ul style="list-style-type: none">• Paroxysms (fits) of coughing• Inspiratory whooping• Post-tussive vomiting, or vomiting without other apparent cause• Apnea (only in < 1 year of age) OR• Clinician's suspicion of pertussis	
<p>Note: pertussis in immunized or previously infected individuals can present without the classic signs of pertussis, and therefore might not be captured by the above case definition.</p>	

Table 3. Final Case Classification Pertussis

Final Case Classification (WHO, 2018)	
Laboratory-confirmed case	<p>A laboratory-confirmed case is a person who meets the suspected case definition with laboratory confirmation by one of the following:</p> <ul style="list-style-type: none">• Isolation of B. pertussis• Detection of genomic sequences of B. pertussis using polymerase chain reaction (PCR) assay, if polymerase chain reaction (PCR) meets the performance criteria outlined below• Elevated IgG antibodies to pertussis toxin in an individual ≥ 11 years of age, one year or longer after the last vaccine dose.

	Culture and PCR detection of acute pertussis infection have higher specificity and are preferred diagnostic methodologies over serology. Serology should be reserved for cases ≥ 4 weeks from cough onset; however, IgG can sometimes remain elevated for more than a year after infection or vaccination, leading to potential false positives.
Epidemiologically linked case	An epidemiologically linked case is a person meeting the suspected case definition with close contact to a laboratory-confirmed case (or another epidemiologically linked case in an outbreak setting) in the three weeks prior to onset of cough.
Possible	A person who meets the suspected case definition but does not meet confirmed classification as defined above should be considered a possible case. This includes suspected cases who did not have laboratory testing done and those who tested negative.

Sign and Symptoms (WHO, 2023)

Early symptoms can last for 1 to 2 weeks and usually include:

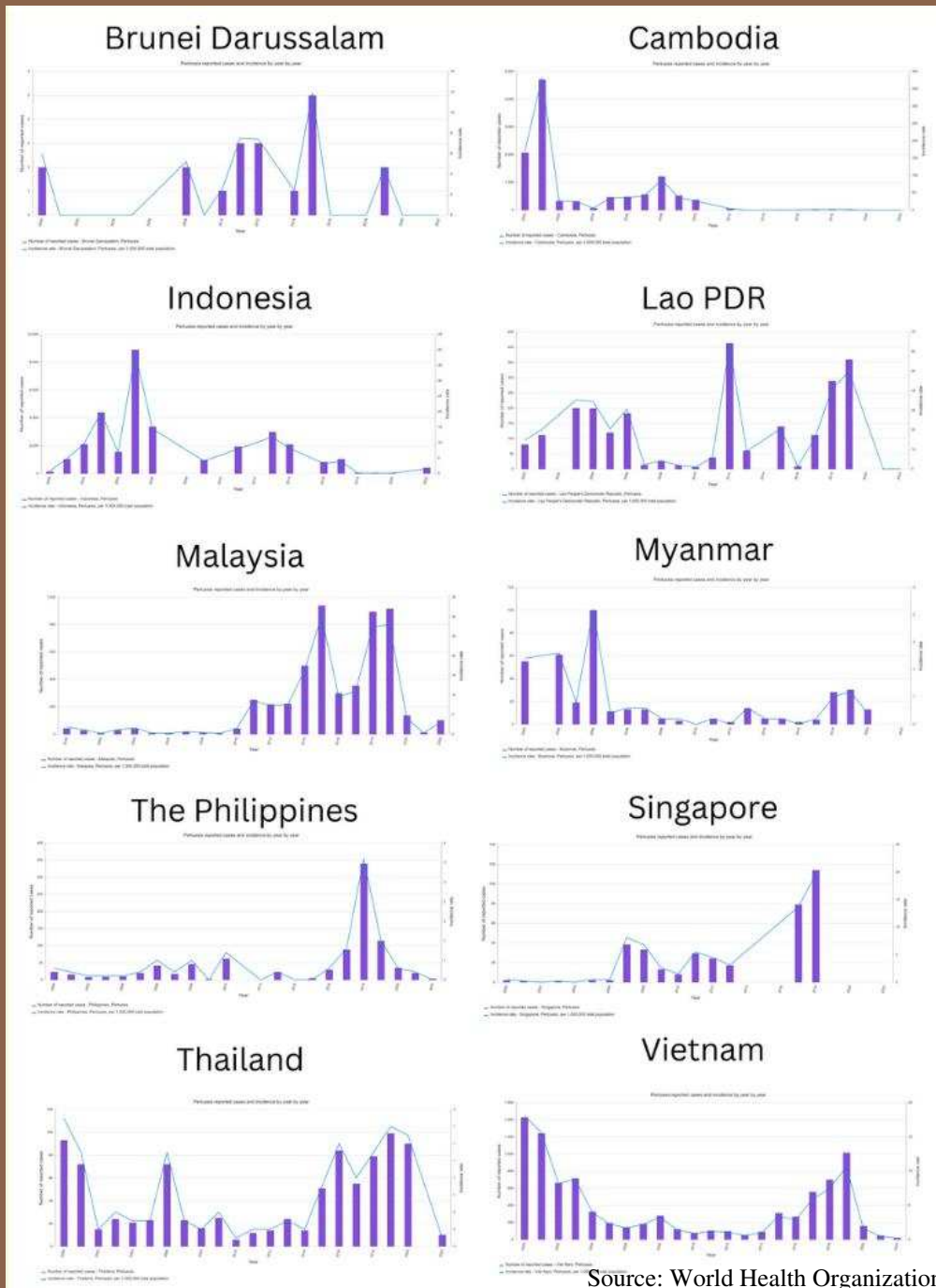
- **Runny or stuffed-up nose**
- **Low-grade fever (less than 100.4°F)**
- **Mild, occasional cough (babies do not do this)**
- **Apnea (life-threatening pauses in breathing) and cyanosis (turning blue or purple) in babies and young children**

In its early stages, whooping cough appears to be nothing more than the common cold. Therefore, doctors often do not suspect or diagnose it until the more severe symptoms appear. One to 2 weeks after the first symptoms start, people with whooping cough may develop paroxysms—rapid, violent, and uncontrolled coughing fits. These coughing fits usually last 1 to 6 weeks but can last for up to 10 weeks. Coughing fits generally get worse and become more common as the illness continues. Coughing fits can cause people to:

- **Make a high-pitched “whoop” sound when they are finally able to inhale at the end of a coughing fit**
- **Vomit during or after coughing fits**
- **Feel very tired after the fit, but usually seem well in between fits**
- **Struggle to breathe**

Pertussis in the ASEAN Region from 2002 to 2022

From 2002 to 2022, Pertussis incidences had different trends in the ASEAN Member States. Half of the state members showed a decrease in the cases, while the other half of states experienced an upward trend. These differences may be caused by differences in risk factors that were associated with each of the state members.



Source: World Health Organization

Figure 3. Graphs Interpretation Pertussis in The ASEAN Region 2002 to 2022

Poliomyelitis



Introduction

Poliomyelitis is a crippling disease that results from infection with any one of the three related poliovirus types (referred to as types P1, P2, and P3), members of the enterovirus (picornavirus) family. Poliovirus is transmitted from one person to another by oral contact with secretions or faecal material from an infected person. Once viral reproduction is established in the mucosal surfaces of the nasopharynx, poliovirus can multiply in specialized cells in the intestines and enter the bloodstream to invade the central nervous system, where it spreads along nerve fibers. When it multiplies in the nervous system, the virus can destroy nerve cells (motor neurons) which activate skeletal muscles (WHO,2012).

Case Definition

Table 4. Final Case Classification Poliomyelitis

Suspected Case Definition for Case Finding (WHO, 2018)	
Any case presenting with <i>Acute Flaccid Paralysis (AFP)</i> . An AFP case is defined as a child < 15 years of age presenting with recent or sudden onset of floppy paralysis or muscle weakness due to any cause, or any person of any age with paralytic illness if poliomyelitis is suspected by a clinician.	
Final Case Classification (WHO, 2018)	
Laboratory-confirmed case	A suspected case with isolation of WPV or VDPV in stool specimens collected from the suspected case or from a close contact
Compatible	A suspected case with no adequate specimens (see Specimen collection section below); no isolation of WPV or VDPV from the case or close contacts; and residual paralysis after 60 days follow up that is deemed by the national expert review committee to be clinically and epidemiologically compatible with poliomyelitis. The expert review committee may classify compatible cases presented to the committee as poliomyelitis when there is insufficient clinical and epidemiological data to rule it out.

Discarded

A suspected case that was adequately investigated (including collection of adequate stool specimens) and resulted in any of the following:

- No laboratory evidence of WPV or VDPV infection
- Inadequate specimens collected and resolution of weakness within 60 days of paralysis onset
- Deemed by the national expert review committee to not be compatible with poliomyelitis.

Note: Given that tOPV is no longer used, a full investigation should be done if any Sabin-like type 2 isolate is detected in stool, sewage, or other samples collected, or detected more than four months after the last use in those countries that have used mOPV2 as part of an outbreak response. The investigation should determine whether tOPV (or mOPV2) is still in use or if there may be a containment breach.



Poliomyelitis in the ASEAN Region from 2002 to 2022

As we can see from the graphs, Poliomyelitis cases had only a few reported cases in the ASEAN Member States. This disease, in the last 20 years, has remained low in each of the state members. Indeed, Brunei Darussalam did not have this diseases reported based on the WHO data from 2002 to 2022.

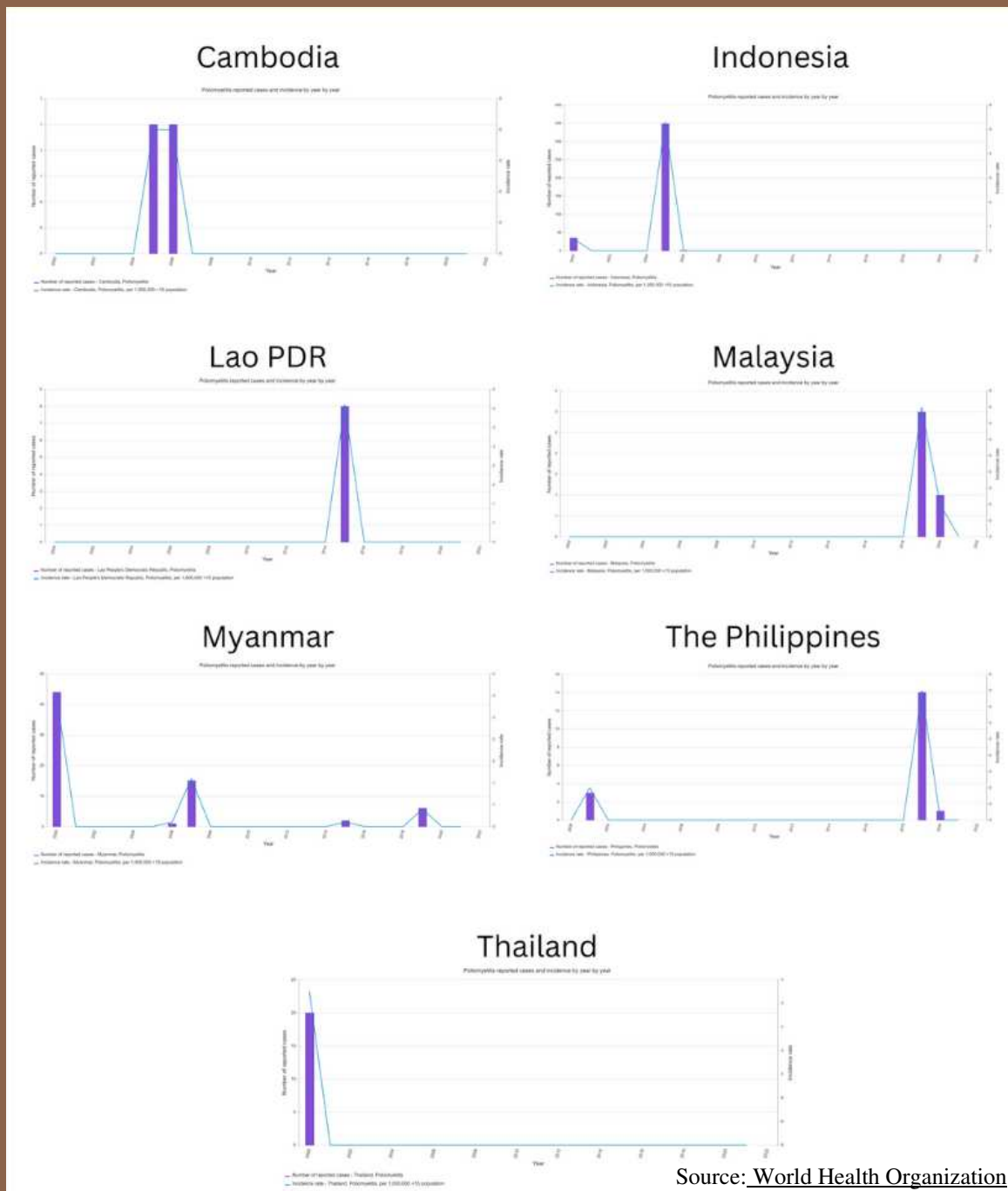


Figure 4. Graphs Interpretation Poliomyelitis in The ASEAN Region 2002 to 2022

Policy and Strategy

A framework for VPD and Immunizations has been developed by the WHO Regional Office for the Western Pacific to expand the scope of immunization maximize the benefits of vaccines and immunization programs, and further accelerate control and achieve and sustain the elimination of additional VPDs beyond those traditionally targeted. Although Indonesia, Thailand, and Myanmar are located in different regions (Southeast Asia), these countries also follow similar guidelines, aiming to free from vaccine-preventable morbidity, mortality, and disability by 2030. (WHO, 2022)

Strategy 1	Strengthening and expanding immunization systems and programmes.
Strategy 2	Managing health intelligence on VPDs and immunization
Strategy 3	<ul style="list-style-type: none">• Ensuring preparedness for and response to public health emergencies related to VPDs,• vaccines and immunization programmes
These Strategic Objectives will be achieved by implementing 18 Strategies, in the appropriate country-specific context.	

18 Strategies for Achieving Its Strategies Objectives

1. Leaving no one behind in childhood immunization
2. Expanding immunization services along the life course
3. Closing immunity gaps through tailor-made immunization strategies
4. Ensuring vaccine security in all countries and areas in the Region.
5. Accelerating the use of new and underutilized vaccines and biologicals
6. Ensuring vaccine safety and safe immunization.
7. Enhancing vaccine confidence, acceptance, and demand.
8. Securing sustainable domestic financing for immunization
9. Strengthening governance and program management
10. Enhancing strategic use of epidemiologic intelligence through optimized and integrated VPD surveillance systems
11. Ensuring prompt detection, confirmation, and characterization of pathogens through integrated VPD laboratory capacity and networks
12. Generating quality data for ensuring continuous improvement of immunization programs and strengthening the overall health system

13. Driving evidence-based decision-making and action for immunization disease control and elimination
14. Ensuring preparedness for and response to events, outbreaks, or the resurgence of VPDs under the targets for control, accelerated control, elimination, or eradication
15. Ensuring preparedness for and response to a safety event related to vaccines or immunization programs
16. Ensuring preparedness for and response to events, outbreaks or the resurgence of diseases that are not under targets for accelerated control, elimination, or eradication by vaccines and immunization programs, but may require an immunization response
17. Ensuring preparedness for and response to public health emergencies affecting immunization systems and programs and/or interrupting deliveries of immunization services.
18. Ensuring preparedness for and response to events or outbreaks of novel diseases requiring an immunization response

An update on COVID-19 vaccines (as of 31 May 2020) and considerations on the immunization response to COVID-19.

The Regional Strategic Framework, through the implementation of its 18 Strategies for achieving its three Strategic Objectives, has been prepared to help enhance synergies with:

- Health system strengthening and UHC;
- Prevention of noncommunicable diseases and promotion of the life-course approach to health; and
- Health security and emergencies, including antimicrobial resistance.



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