Regional Strategic Framework for Vaccine-Preventable Diseases and Immunization in the Western Pacific 2021–2030
Regional Strategic Framework for Vaccine-Preventable Diseases and Immunization in the Western Pacific 2021–2030
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<tbody>
<tr>
<td>ACT</td>
<td>Access to COVID-19 Tools</td>
</tr>
<tr>
<td>AEFI</td>
<td>adverse event following immunization</td>
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<tr>
<td>AESI</td>
<td>adverse event of special interest</td>
</tr>
<tr>
<td>AMR</td>
<td>antimicrobial resistance</td>
</tr>
<tr>
<td>aP</td>
<td>acellular pertussis vaccine</td>
</tr>
<tr>
<td>APSED III</td>
<td>Asia Pacific Strategy for Emerging Diseases and Public Health Emergencies</td>
</tr>
<tr>
<td>ASEAN</td>
<td>Association of Southeast Asian Nations</td>
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<tr>
<td>CCEEVs</td>
<td>cell culture and embryonated egg-based rabies vaccines</td>
</tr>
<tr>
<td>CFR</td>
<td>case fatality rate</td>
</tr>
<tr>
<td>CI</td>
<td>confidence interval</td>
</tr>
<tr>
<td>COVID-19</td>
<td>coronavirus disease</td>
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<td>CRS</td>
<td>congenital rubella syndrome</td>
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<tr>
<td>cVDPV</td>
<td>circulating vaccine-derived poliovirus</td>
</tr>
<tr>
<td>cVDPV2</td>
<td>circulating vaccine-derived poliovirus, type 2</td>
</tr>
<tr>
<td>DAT</td>
<td>diphtheria antitoxin</td>
</tr>
<tr>
<td>DHS</td>
<td>Demographic and Health Survey</td>
</tr>
<tr>
<td>DTP3</td>
<td>diphtheria-tetanus-pertussis, three doses</td>
</tr>
<tr>
<td>EOC</td>
<td>emergency operations centre</td>
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<tr>
<td>EPI</td>
<td>Expanded Programme on Immunization</td>
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<tr>
<td>ERC</td>
<td>Expert Resource Consultation</td>
</tr>
<tr>
<td>EUA</td>
<td>emergency use authorization</td>
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<tr>
<td>EUL</td>
<td>emergency use listing</td>
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<tr>
<td>FAO</td>
<td>Food and Agriculture Organization of the United Nations</td>
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<tr>
<td>GAP III</td>
<td>Global Action Plan III (for polio containment)</td>
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<td>GPEI</td>
<td>Global Polio Eradication Initiative</td>
</tr>
<tr>
<td>GPW13</td>
<td>Thirteenth General Programme of Work 2019–2023</td>
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<td>GVAP</td>
<td>Global Vaccine Action Plan 2011–2020</td>
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<tr>
<td>HAV</td>
<td>hepatitis A virus</td>
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<tr>
<td>HBeAg</td>
<td>hepatitis B e-antigen</td>
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<tr>
<td>HBsAg</td>
<td>hepatitis B surface antigen</td>
</tr>
<tr>
<td>HBig</td>
<td>hepatitis B immune globulin</td>
</tr>
<tr>
<td>HBV</td>
<td>hepatitis B virus</td>
</tr>
<tr>
<td>Hib</td>
<td>Haemophilus influenzae type b</td>
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<tr>
<td>HIMS</td>
<td>health information management system</td>
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<tr>
<td>HPV</td>
<td>human papillomavirus</td>
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<tr>
<td>HRIG</td>
<td>human rabies immune globulin</td>
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<tr>
<td>IA2030</td>
<td>Immunization Agenda 2030</td>
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<tr>
<td>IBD</td>
<td>invasive bacterial disease</td>
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<tr>
<td>ICT</td>
<td>information and communications technology</td>
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<tr>
<td>IMD</td>
<td>invasive meningococcal disease</td>
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<tr>
<td>IMS</td>
<td>incident management system</td>
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<tr>
<td>IPV</td>
<td>inactivated poliovirus vaccine</td>
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<tr>
<td>ITP</td>
<td>immune thrombocytopenic purpura</td>
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<tr>
<td>JE</td>
<td>Japanese encephalitis</td>
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<td>JRF</td>
<td>Joint Reporting Form</td>
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<tr>
<td>Acronym</td>
<td>Description</td>
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<tr>
<td>KAP</td>
<td>knowledge, attitude and practice</td>
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<tr>
<td>LAIV</td>
<td>live attenuated influenza vaccine</td>
</tr>
<tr>
<td>LMICs</td>
<td>low- and middle-income countries</td>
</tr>
<tr>
<td>LMIS</td>
<td>logistics management information system</td>
</tr>
<tr>
<td>M&amp;E</td>
<td>monitoring and evaluation</td>
</tr>
<tr>
<td>MCH</td>
<td>maternal and child health</td>
</tr>
<tr>
<td>MCV</td>
<td>measles-containing vaccine</td>
</tr>
<tr>
<td>MMR</td>
<td>measles-mumps-rubella [vaccine]</td>
</tr>
<tr>
<td>MNT</td>
<td>maternal and neonatal tetanus</td>
</tr>
<tr>
<td>MR</td>
<td>measles-rubella [vaccine]</td>
</tr>
<tr>
<td>NCD</td>
<td>noncommunicable disease</td>
</tr>
<tr>
<td>NIP</td>
<td>national immunization programme</td>
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<tr>
<td>NITAG</td>
<td>National Immunization Technical Advisory Group</td>
</tr>
<tr>
<td>nOPV2</td>
<td>novel oral polio vaccine type 2</td>
</tr>
<tr>
<td>NRA</td>
<td>National Regulatory Authority</td>
</tr>
<tr>
<td>NT</td>
<td>neonatal tetanus</td>
</tr>
<tr>
<td>OCV</td>
<td>oral cholera vaccine</td>
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<tr>
<td>OIE</td>
<td>World Organisation for Animal Health</td>
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<tr>
<td>OPV</td>
<td>oral polio vaccine</td>
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<tr>
<td>PCV</td>
<td>pneumococcal conjugate vaccine</td>
</tr>
<tr>
<td>PEP</td>
<td>post-exposure prophylaxis</td>
</tr>
<tr>
<td>PHC</td>
<td>primary health care</td>
</tr>
<tr>
<td>PID</td>
<td>primary immunodeficiency</td>
</tr>
<tr>
<td>POCT</td>
<td>point-of-care testing</td>
</tr>
<tr>
<td>PrEP</td>
<td>pre-exposure prophylaxis</td>
</tr>
<tr>
<td>RV</td>
<td>rotavirus</td>
</tr>
<tr>
<td>RVGE</td>
<td>rotavirus gastroenteritis</td>
</tr>
<tr>
<td>SARS</td>
<td>severe acute respiratory syndrome</td>
</tr>
<tr>
<td>SARS-CoV-2</td>
<td>severe acute respiratory syndrome coronavirus 2</td>
</tr>
<tr>
<td>SDG</td>
<td>Sustainable Development Goal</td>
</tr>
<tr>
<td>SIA</td>
<td>supplementary immunization activity</td>
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<tr>
<td>sIPV</td>
<td>Sabin-derived inactivated polio vaccine</td>
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<tr>
<td>SOP</td>
<td>standard operating procedure</td>
</tr>
<tr>
<td>TAG</td>
<td>Technical Advisory Group</td>
</tr>
<tr>
<td>Td</td>
<td>tetanus and low-dose diphtheria toxoid</td>
</tr>
<tr>
<td>TT</td>
<td>tetanus toxoid</td>
</tr>
<tr>
<td>UAV</td>
<td>unmanned aerial vehicle</td>
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<tr>
<td>UHC</td>
<td>universal health coverage</td>
</tr>
<tr>
<td>UNICEF</td>
<td>United Nations Children’s Fund</td>
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<tr>
<td>VDPV</td>
<td>vaccine-derived poliovirus</td>
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<tr>
<td>VPD</td>
<td>vaccine-preventable disease</td>
</tr>
<tr>
<td>VZV</td>
<td>varicella-zoster virus</td>
</tr>
<tr>
<td>WASH</td>
<td>water, sanitation and hygiene</td>
</tr>
<tr>
<td>WHO</td>
<td>World Health Organization</td>
</tr>
<tr>
<td>wP</td>
<td>whole-cell pertussis vaccine</td>
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FOREWORD

Immunization is one of the most effective and successful public health interventions.

Over the past two decades, the World Health Organization (WHO) Western Pacific Region has maintained polio-free status and continued to significantly reduce the prevalence of hepatitis B infection among children. The Region achieved historically low incidences of both measles and rubella in 2017 and 2018. As of September 2019, nine countries and areas in the Region had achieved measles elimination, while five countries and areas had achieved rubella elimination. All but one of the previously high-burden countries in the Region have achieved the elimination of maternal and neonatal tetanus.

Despite these successes, many people continue to be left behind by national immunization efforts, with the number of unvaccinated people even increasing in some countries. Immunity gaps led to the emergence, resurgence and large-scale, import-related outbreaks of several vaccine-preventable diseases (VPDs) in high-risk communities in the Region in 2018 and 2019. Rapid demographic changes tied to population growth and movement, epidemiologic shifts due to ageing populations with immunity gaps, and difficult socioeconomic challenges, such as the growing number of urban poor, must be urgently addressed.

While additional vaccines are now available for older people, as well as adolescents and adults, immunization service delivery has not expanded sufficiently beyond childhood immunization programmes. Immunization throughout the life course is not a part of the overall health system in many countries. Recent health security issues in the Region, such as natural disasters, adverse events following immunization and COVID-19, have revealed the urgent need to ensure that immunization systems and programmes are an integral part of the response to public health emergencies.

Member States at the October 2019 session of the WHO Regional Committee for the Western Pacific requested increased WHO support to fight VPDs and strengthen immunization programmes. In response, WHO worked in close collaboration with Member States, stakeholders, partners and experts to develop the *Regional Strategic Framework for Vaccine-Preventable Diseases and Immunization in the Western Pacific 2021–2030*.

Endorsed by the Regional Committee in October 2020, the Regional Strategic Framework is intended to expand the scope of immunization, maximize the benefits of vaccines and immunization programmes, further accelerate control and achieve and sustain elimination of additional VPDs beyond those traditionally targeted. In addition, the Regional Strategic Framework is intended to support countries and areas in the Region to achieve the vision and the seven strategic priorities of the *Immunization Agenda 2030*, which was endorsed by the World Health Assembly in August 2020.

With this Regional Strategic Framework, I believe Member States, stakeholders, partners and WHO will work more effectively together towards making the Region free from vaccine-preventable morbidity, mortality and disability by 2030.

Takeshi Kasai, MD, Ph.D.
Regional Director
EXECUTIVE SUMMARY

The prevention, control and elimination of vaccine-preventable diseases (VPDs) have long been a priority for the World Health Organization (WHO) and its Member States in the Western Pacific Region. The WHO Regional Committee for the Western Pacific over the last three decades has taken decisive action to eradicate poliomyelitis (1988), eliminate measles (2003) and accelerate the control of hepatitis B (2003). In 2014, the Regional Committee endorsed the Regional Framework for Implementation of the Global Vaccine Action Plan in the Western Pacific as a road map to expand immunization initiatives in the Region and support Member States in implementing the Global Vaccine Action Plan 2011–2020, endorsed by the World Health Assembly in 2012. The Regional Framework specified eight regional immunization goals: (1) sustaining polio-free status; (2) maternal and neonatal tetanus elimination; (3) measles elimination; (4) rubella elimination; (5) accelerated control of hepatitis B; (6) accelerated control of Japanese encephalitis; (7) introduction of new vaccines; and (8) meeting regional vaccination coverage targets.

These efforts by WHO and its Member States have led to significant achievements in the fight against polio, hepatitis B, maternal and neonatal tetanus, measles, and rubella. In addition, many countries and areas have introduced vaccines to combat Haemophilus influenzae type b (Hib), human papillomavirus, Japanese encephalitis, pneumococcal disease, rotavirus gastroenteritis and other diseases.

Despite these efforts, many people continue to be left behind by immunization services, with resulting immunity gaps having led in 2018 and 2019 to the emergence, resurgence and large-scale, import-related outbreaks of several VPDs in high-risk communities in the Region. The growing number of people who are not being reached by immunization exposes the inequity in the provision of health services, and it also causes immunity gaps within populations that in turn trigger and expand VPD outbreaks.

All countries and areas of the Western Pacific Region can – and should – further reduce and eliminate any VPD-related morbidity, mortality and disability by maximizing the benefits of vaccines and immunization. However, in many instances, immunization programmes have not fully utilized the potential of traditional and newly introduced vaccines for VPDs, such as cervical cancer, diphtheria, Hib, pneumococcal disease, typhoid and other challenges.

This Regional Strategic Framework for Vaccine-Preventable Diseases and Immunization in the Western Pacific 2021–2030 was developed by the WHO Regional Office for the Western Pacific in close collaboration with Member States, stakeholders, partners and experts. It is intended to expand the scope of immunization, maximize the benefits of vaccines and immunization programmes in the Region, and further accelerate control and achieve and sustain elimination of additional VPDs beyond those traditionally targeted, aiming to make the Region free from vaccine-preventable morbidity, mortality and disability by 2030.

The Regional Strategic Framework proposes to achieve three Strategic Objectives:

(1) Strengthening and expanding immunization systems and programmes.
(2) Managing health intelligence on VPDs and immunization.
(3) 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.
The Regional Strategic Framework also is intended to support countries and areas of the Region to achieve the vision and seven strategic priorities of the *Immunization Agenda 2030*, which was endorsed in August 2020 by the World Health Assembly. The Agenda calls for action to reduce VPD-related mortality and morbidity, to ensure no one is left behind by increasing equitable access to and the use of new and existing vaccines, and to ensure good health and well-being for everyone by strengthening immunization within primary health care, thus contributing to universal health coverage (UHC) and sustainable development.

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

1. health system strengthening and UHC;
2. prevention of noncommunicable diseases and promotion of the life-course approach to health; and
3. health security and emergencies, including antimicrobial resistance.

Implementation of the 18 Strategies should be firmly supported by key areas of the immunization programme and VPD control and elimination initiatives. The Regional Strategic Framework describes the importance of research and innovation, as well as partnership and collaboration, in achieving the three Strategic Objectives, which are intended to make the Region free from vaccine-preventable morbidity, mortality and disability by 2030.
The prevention, control and elimination of vaccine-preventable diseases (VPDs) have long been a priority for the World Health Organization (WHO) and its Member States in the Western Pacific Region, beginning with the 1974 launch by WHO of the Expanded Programme on Immunization and the establishment and strengthening in the 1980s of national immunization programmes (NIPs). And, over the past three decades, the WHO Regional Committee for the Western Pacific has taken decisive action to eradicate poliomyelitis (1988), eliminate measles (2003) and accelerate the control of hepatitis B (2003).

In 2014, the Regional Committee endorsed in resolution WPR/RC65.R5 the Regional Framework for Implementation of the Global Vaccine Action Plan in the Western Pacific to expand immunization initiatives in the Region and to support Member States in implementation of the Global Vaccine Action Plan 2011–2020 (GVAP), endorsed by the World Health Assembly in 2012. The 2014 Regional Framework specified eight regional immunization goals: (1) sustaining polio-free status; (2) maternal and neonatal tetanus elimination; (3) measles elimination; (4) rubella elimination; (5) accelerated control of hepatitis B; (6) accelerated control of Japanese encephalitis; (7) introduction of new vaccines; and (8) meeting regional vaccination coverage targets.

At the end of 2019, vaccines for *Haemophilus influenzae* type b (Hib) were being used in 35 countries and areas in the Western Pacific Region, 19 countries and areas were deploying vaccines for human papillomavirus (HPV), 10 were using the vaccine for Japanese encephalitis (JE), 25 were using the pneumococcal conjugate vaccine, and nine countries and areas were using the rotavirus vaccine.

With steady progress and significant achievements over the last 20 years in strengthening immunization systems and programmes, eliminating several VPDs and introducing new vaccines, WHO and its Member States in the Western Pacific Region over the next decade have an opportunity to take the necessary action to expand the scope of immunization and VPD control and elimination to save more lives and improve global and regional public health.

This first section of this Regional Strategic Framework presents an overview of diseases whose morbidity, mortality and disability can – and should – be further reduced and eliminated in the Region over the next decade by vaccines and immunization programmes, along with other public health interventions. The section can help Member States identify and set their own disease control goals and targets, shown in the Framework as “proposed goals and targets”, as well as reaffirm and recommit themselves to regional or global control and elimination goals and targets, listed in the Framework as “regional or global goals and targets”. Strategic Directions with associated Strategies also are proposed for the three Strategic Objectives listed in Section B, as guidance for countries and areas.
Definitions

Level of disease occurrence

**Endemic disease:** The constant presence of a disease or infectious agent within a given geographic area or population group; may also refer to the usual prevalence of a given disease within such area or group.¹

**Epidemic:** The occurrence in a community or region of cases of an illness, specific health-related behaviour or other health-related events clearly in excess of normal expectancy. The community or region and the period in which the cases occur are specified precisely. The number of cases indicating the presence of an epidemic varies according to the agent and the size and type of the population exposed, previous experience or lack of exposure to the disease, and the time and place of occurrence. Epidemicity is thus relative to the usual frequency of the disease in the same area, among the specified population, at the same season of the year.¹

Level of disease control

**Control:** Reduction of disease incidence, prevalence, morbidity or mortality to a locally acceptable level as a result of deliberate efforts; continued intervention measures are required to maintain the reduction (e.g. diarrhoeal diseases).²

**Accelerated control:** encompassing epidemic prevention¹ and characterized by certain features: (a) sets a specific global or regional targets for impact; (b) relies on strong routine immunization systems; (c) organizes periodic supplementary immunization activities (SIAs); and (d) carries out intensive surveillance activities. Accelerated disease control initiatives are highly visible activities that attract attention and support to immunization, especially during campaigns; they are, however, not a substitute for strong routine immunization systems. In fact, they depend on a platform of strong routine immunization for their success (e.g. hepatitis B, Japanese encephalitis).⁴

**Elimination of disease:** Reduction to zero of the incidence of a specified disease in a defined geographic area as a result of deliberate efforts; continued intervention measures are required (e.g. neonatal tetanus).²

**Elimination of infection:** Reduction to zero of the incidence of infection caused by a specific agent in a defined geographic area as a result of deliberate efforts; continued measures to prevent re-establishment of transmission are required (e.g. polio, measles, rubella, Guinea worm).²

**Eradication:** Permanent reduction to zero of the worldwide incidence of infection caused by a specific agent as a result of deliberate efforts; intervention measures are no longer needed (e.g. smallpox).²

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1. **Poliomyelitis (polio)**

1.1 **Disease**

Poliomyelitis is a highly infectious disease caused by a poliovirus; it mainly affects children under 5 years of age but also can affect older age groups. Polioviruses are spread by faecal-to-oral and oral-to-oral transmission. Lack of access to clean water and adequate sanitation is a major risk factor for transmission. Most infected people have no symptoms but can transmit infection to others by excreting the virus in their faeces. It is estimated that one in 200 infections leads to irreversible paralysis. Among those paralysed, 5–10% die when their breathing muscles become immobilized. There is no cure for polio; however, it can be prevented by vaccination.

1.2 **Regional epidemiology and context**

Following the 1988 World Health Assembly resolution to eradicate poliomyelitis globally by the year 2000, the World Health Organization (WHO) Regional Committee for the Western Pacific later that year adopted a resolution to eradicate poliomyelitis in the Western Pacific Region by 1995. The key strategies to eradicate polio included: (i) >80% coverage with poliovirus vaccine; (ii) implementation of supplementary immunization activities (SIAs); (iii) strengthening surveillance and establishing a regional laboratory network; and (iv) aggressive outbreak control. The last case of poliomyelitis due to indigenous wild poliovirus was reported in Cambodia in 1997, and on 29 October 2000, the Western Pacific Regional Commission for Certification of Poliomyelitis Eradication certified the Region as polio-free.

The main ongoing challenges for the Region are new outbreaks of circulating vaccine-derived polioviruses (cVDPVs). Recent outbreaks in the Lao People’s Democratic Republic (2015), Papua New Guinea (2018), China (2019), the Philippines (2019) and Malaysia (2019) resulted in many paralytic cases. The surest way to prevent the emergence and circulation of vaccine-derived polioviruses (VDPVs) in the future is to stop use of oral polio vaccine (OPV) and use only inactivated poliovirus vaccine (IPV) in the routine immunization schedule. The remaining challenges also include:

1. insufficient national capacity in outbreak preparedness and response;
2. the lack of a national commitment, resources and legislation to implement the WHO Global Action Plan to minimize poliovirus facility-associated risk after type-specific eradication of wild polioviruses and sequential cessation of oral polio vaccine use (GAP III) for polio laboratory containment (to remove or properly contain sources of poliovirus); and
3. decreased funding for polio essential functions due to the ramp-down of support from the Global Polio Eradication Initiative (GPEI).

1.3 **Proposed goal and target for 2030**

- **Goal**: Elimination of infection (regional eradication, including VDPV).
- **Target**: Zero incidence of polio due to any type of poliovirus infection.

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1.4 Strategic Directions and related Strategies proposed in Section B

(1) Sustain high-level population immunity against poliovirus (Strategies 1.1, 1.2, 1.3).
(2) Withdraw OPV from use and immunize populations with IPV (Strategies 1.4, 1.5, 1.6, 1.7).
(3) Sustain highly sensitive polio surveillance systems and the Regional Polio Laboratory Network (Strategies 2.1, 2.2, 2.3).
(4) Ensure sustainable domestic funding for polio essential functions (Strategy 1.8).
(5) Be fully prepared for and promptly and thoroughly respond to polio events and outbreaks (Strategy 3.1).
(6) Fully implement GAP III (Disease-specific strategy).
2. Measles

2.1 Disease

Measles virus causes a febrile rash illness that can cause severe complications, including pneumonia, encephalitis and blindness. Measles can be fatal, with mortality of 2–15% among young children in developing countries. Measles virus is one of the most highly contagious human pathogens and is very capable of infecting even small and isolated measles-susceptible populations; outbreaks can occur unless a very high proportion of the population (≥95%) is immune. There is no specific treatment; however, the measles vaccine is safe, effective and inexpensive, and measles elimination can be achieved solely through maximizing the use of this single preventive tool.

2.2 Regional epidemiology and context

Before introducing the measles vaccine, measles was a seasonal disease that affected nearly every person in a given population before reaching adolescence. After the introduction of measles vaccine during the 1960s, countries that had achieved high vaccine coverage experienced a 98% or greater reduction in the number of reported cases; however, large outbreaks would occur periodically through steady accumulation of a pool of susceptible individuals, which occurs quickly if coverage is not high. In 2003, the WHO Regional Committee for the Western Pacific first established a measles elimination goal. Between 2003 and 2012, the Western Pacific Region greatly increased coverage with first- and second-dose measles-containing vaccine (MCV) and established a strong laboratory-supported surveillance system. Measles cases and incidence continued to decline significantly until 2012, the target date for measles elimination that was set by the Regional Committee in 2005.

A resurgence of measles transmission occurred in 2013–2016, which identified new and emerging challenges in the Region. To directly address the resurgence’s root causes and newly recognized issues and challenges for measles elimination, the WHO Regional Office for the Western Pacific developed the new Regional Strategy and Plan of Action for Measles and Rubella Elimination in the Western Pacific. During 2018–2019, a global resurgence of measles occurred, affecting all WHO regions, including the Western Pacific, which further highlighted the new challenges and issues facing the Region that must be overcome to achieve and sustain the elimination of measles.

Even when overall immunization coverage is high, many countries have variability and weaknesses in their immunization system and in broader health service delivery capacity at the subnational and local levels. Risk groups in many countries, such as migrants, ethnic minorities or cross-border populations, may be persistently unreached by both routine and supplemental immunization. As the achievement and maintenance of measles elimination requires very high population immunity (i.e. >95%), vaccination effectiveness should be assured by optimal potency of the measles vaccine, which is heat sensitive, at vaccination, as well as high coverage of vaccination. Measles cases among older children, adolescents and adults are increasingly occurring, including among fully vaccinated people. Even in countries achieving measles elimination or low incidence, persistent immunity gaps...
among adults create an ongoing risk of outbreaks after importation that may lead to large numbers of cases among unvaccinated infants. In the peri- and post-elimination setting where population immunity is broadly high, measles transmission may be intensified and propagated through exposure in congregate settings such as health-care facilities, airports and schools rather than in the community.

2.3 **Regional goal and target**

- **Goal:** Elimination of infection.
- **Target:** Zero incidence of measles due to endemic measles virus infection.

2.4 **Strategic Directions and related Strategies proposed in Section B**

1. Achieve and sustain high-level population immunity against measles among the whole population through strong and correctly targeted systems and programmes, including opportunistic vaccination initiatives, such as school- and hospital-based screening and immunization *(Strategies 1.1, 1.2, 1.3, 1.7).*

2. Sustain highly sensitive measles surveillance systems and a strong regional measles laboratory network, and use health intelligence data to identify populations left out from routine and supplemental immunization and other health services *(Strategies 2.1, 2.2, 2.3, 2.4).*

3. Strengthen capacity to rapidly detect and to implement a coordinated, timely and effective response to measles outbreaks *(Strategies 2.2, 3.1).*

4. Develop capacity to prevent the spread of measles in health-care settings, including appropriate use of post-exposure prophylaxis with MCV and immunoglobulin *(Strategies 1.5, 3.1).*

5. Develop novel strategies, in collaboration with non-health sectors such as labour, tourism, education and defence, to provide outbreak response and preventive immunization for adults and adolescents (e.g. vaccination for international migrants from endemic countries) *(Strategies 1.1, 1.2, 1.3, 1.7).*

6. Develop coordinated multi-country and cross-border policy and vaccination initiatives to reach chronically unreached migrant and cross-border populations, and to prevent outbreaks and the re-establishment of endemic measles due to importation from endemic areas *(Strategies 1.3, Disease-specific strategy).*

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3. Rubella

3.1 Disease
Rubella is usually a mild viral disease in children, but infection in a pregnant woman can be devastating to the fetus. Congenital rubella syndrome (CRS) occurs in 90% of cases of rubella infection in early pregnancy. Miscarriage or stillbirth can occur, and babies born with CRS can suffer from a range of problems, including ophthalmic, cardiac, auditory and craniofacial defects, and mental retardation. There is no specific treatment; however, the rubella vaccine is safe, effective and inexpensive, and rubella elimination can be achieved solely through maximizing the use of this single preventive tool.

3.2 Regional epidemiology and context
In the absence of a functional immunization programme, rubella is a seasonal disease with epidemics occurring every several years. The primary morbidity, mortality and disability caused by rubella is due to CRS; however, the true burden of CRS in the Region is unknown. In 2010, the Regional Committee urged Member States to accelerate the control of rubella and prevention of CRS, and in 2012, it urged Member States to integrate measles and rubella immunization and surveillance activities. In 2017, the Regional Committee endorsed the new Regional Strategy and Plan of Action for Measles and Rubella Elimination in the Western Pacific, and urged Member States to eliminate rubella as soon as possible, and for each Member State to set individual target dates for rubella elimination.

Over the last decade, rubella incidence has dramatically decreased in the Region as immunity gaps have been filled using measles- and rubella-containing vaccines as part of measles elimination activities, though outbreaks have occurred among adults in several countries, including large outbreaks in Japan and Viet Nam.

Rubella elimination faces a number of challenges, including lack of surveillance for CRS, and insufficient mechanisms to reach non-immune older adolescents and adults who may be at highest risk of rubella, and who therefore present a risk for cases of CRS. Some countries and areas have insufficient surveillance and health intelligence capacity to describe the major risk groups for rubella infection, and may not be able to rapidly detect and mount an appropriate response to outbreaks when they occur.

3.3 Regional goal and target
- Goal: Elimination of infection.
- Target: Zero incidence of rubella due to endemic virus infection; zero cases of domestically acquired CRS.

3.4 Strategic Directions and related Strategies proposed in Section B
(1) Achieve and sustain high-level population immunity against rubella among the whole population through strong and correctly targeted systems and programmes, including opportunistic vaccination initiatives, such as school- and hospital-based screening and immunization (Strategies 1.1, 1.2, 1.3, 1.7).

Regional strategy and plan of action for measles and rubella elimination in the Western Pacific.
(2) Sustain highly sensitive rubella surveillance systems and a strong regional measles and rubella laboratory network, and establish effective surveillance for CRS (Strategies 2.1, 2.2, 2.3, 2.4).

(3) Strengthen the capacity to rapidly detect and to implement a coordinated, timely and effective response to rubella outbreaks (Strategies 2.2, 3.1).

(4) Develop novel strategies, in collaboration with other health sectors (e.g. maternal and child health department) and non-health sectors such as labour, tourism, education and defence, to provide outbreak response and preventive immunization for adults and adolescents (Strategies 1.1, 1.2, 1.3, 1.7).

(5) Develop coordinated multi-country and cross-border policy and vaccination initiatives to reach chronically unreached migrant and cross-border populations, and to prevent outbreaks and the re-establishment of endemic rubella due to importation from endemic areas (Strategies 1.3, Disease-specific strategy).
4. **Tetanus**

### 4.1 Disease

Tetanus is an acute, often fatal, disease caused by an exotoxin produced by the bacterium *Clostridium tetani*. The common first signs of tetanus are headache and muscular stiffness in the jaw, followed by stiffness of the neck, difficulty in swallowing, rigidity of abdominal muscles, spasms, sweating and fever. The case fatality rate (CFR) of neonatal tetanus (NT), mainly caused by unclean deliveries and umbilical cord care practice, approaches 100% without treatment, though with intensive care, the ratio can be decreased to 10–20%. The disease is a marker of socioeconomic inequity since most cases occur in disadvantaged populations with poor access to immunization and other maternal, newborn and child health services.

### 4.2 Regional epidemiology and context

In 1988, WHO estimated that 787,000 newborns died of tetanus. Thus, in the late 1980s, the estimated annual global NT mortality rate was approximately 6.7 per 1000 live births. In 1989, the World Health Assembly called for NT elimination by 1995. In 1999, when progress was reviewed by WHO, the United Nations Children’s Fund (UNICEF) and the United Nations Population Fund, the initiative was reconstituted and elimination of maternal tetanus was added to the goal with a 2005 target date. In 1999, 57 countries had not eliminated maternal and neonatal tetanus (MNT). Six countries of the Western Pacific Region were included on this list: Cambodia, China, the Lao People’s Democratic Republic, Papua New Guinea, the Philippines and Viet Nam.

In 2014, the Regional Committee endorsed the *Regional Framework for Implementation of the Global Vaccine Action Plan in the Western Pacific*, which specifies MNT elimination as one of eight regional immunization goals for the Western Pacific. MNT targets include: (i) achieve MNT elimination (defined as <1 neonatal tetanus case/1000 live births in each district) in the Region by 2015; and (ii) maintain MNT elimination in every country and area. Five countries subsequently were validated as having achieved MNT elimination: Viet Nam in 2005, China in 2012, the Lao People’s Democratic Republic in 2013, Cambodia in 2015 and most recently the Philippines in 2017.

Issues that remain for MNT elimination include: (i) achieving MNT elimination in Papua New Guinea; (ii) sustaining MNT elimination; (iii) insufficient tetanus toxoid-containing vaccine booster doses in the national immunization schedules; and (iv) replacing tetanus toxoid (TT) vaccine with tetanus and low-dose diphtheria toxoid (Td) (replacement has been recommended by the Strategic Advisory Group of Experts in its several meetings over the last decade, but uptake by countries has been very slow). A few countries are using single-antigen TT rather than combination vaccines.

### 4.3 Global goal and target

- **Goal:** Elimination of disease.
- **Target:** (1) achieve MNT elimination (defined as <1 neonatal tetanus case/1000 live births in each district) in the Region; and (2) maintain MNT elimination in every country and area.

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4.4 Strategic Directions and related Strategies proposed in Section B:

(1) Achieve and sustain MNT elimination with recommended immunization strategies (i.e. immunization of women during pregnancy, at fixed sites or through outreach, with TT or Td vaccine, and women of reproductive age with TT or Td vaccine, through SIAs in high-risk areas)\(^{11}\) in all countries of the Region that are validated using WHO guidance for sustaining elimination status (Strategies 1.1, 1.2, 1.3, 1.7).

(2) Use TT combination products containing diphtheria toxoid (Strategy 1.5).

(3) Use MNT elimination to further strengthen immunization system (e.g. inclusion of booster doses targeting age groups, school-based immunization, etc.) (Strategies 1.1, 1.2, 1.3, 1.7).

(4) Use MNT elimination to strengthen coordination and collaboration with other public health interventions (e.g. antenatal screening, access to skilled birth attendants, etc.) and the overall health system and to promote UHC and primary health care (PHC) services (Disease-specific strategy).

(5) Use MNT elimination to address equity\(^{12}\) in health service delivery (Disease-specific strategy).

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\(^{12}\) Equity is one of the essential health system attributes for UHC. As described in Section 5.4 and given its strong association with social disadvantage, integrating, achieving and sustaining MNT elimination with the health system should be a key indicator for UHC.
5. **Hepatitis B**

### 5.1 Disease

Hepatitis B is a serious liver infection caused by the hepatitis B virus (HBV) that is transmitted by the exposure of mucosal membranes to infected blood or other body fluids. Perinatal or early postnatal transmission is the most important source of chronic HBV infection in the Western Pacific Region. Perinatally acquired HBV infection has an approximately 90% risk of progressing to chronic infection. The risk of chronic infection decreases to between 20% and 50% between the ages of 1 and 5 years and to 5% if acquired in adulthood. Of those who are chronically infected, 20–30% will develop cirrhosis or liver cancer.

### 5.2 Regional epidemiology and context

The Western Pacific Region bears a significant burden of hepatitis B. The estimated prevalence of hepatitis B surface antigen (HBsAg) – a marker of chronic hepatitis B infection – among children in the 1990s in the Region was >8%. In 2003, Member States agreed on a goal to reduce HBsAg prevalence to <2% by 2012 as an interim milestone towards a regional goal of less than 1% prevalence in 5-year-old children born after hepatitis B immunization began in 2017. Currently, about 115 million people are living with chronic hepatitis B in the Western Pacific Region, which results in 50% of hepatitis B-related deaths worldwide.

By February 2017, 17 countries and areas in the Region had been verified as meeting the 2017 goal with an estimated regional prevalence of 0.93% among children born in 2012, indicating that the 2017 target of reducing HBsAg seroprevalence among 5-year-old children to <1% was met, and as of June 2019, 21 countries and areas were verified as meeting this target. As a result of successful hepatitis B vaccination programmes, an estimated 37 million cases of chronic hepatitis B infection and over 7 million deaths have been averted among children born in the Region since 1999.

In 2016, the **Regional Action Plan for Viral Hepatitis in the Western Pacific Region 2016–2020** proposed that in line with the proposed **Global Health Sector Strategy for Viral Hepatitis 2016–2021**, countries of the Western Pacific Region should undertake to eliminate the mother-to-child transmission of hepatitis B resulting in chronic infection by 2030. The **Regional Framework for the Triple Elimination of Mother-to-Child Transmission of HIV, Hepatitis B and Syphilis in Asia and the Pacific, 2018–2030** is working to establish a coordinated approach towards achieving triple elimination of mother-to-child transmission of HIV, hepatitis B and syphilis through access to quality reproductive, maternal, newborn and child health services for all women, their children and families, in the context of UHC. Elimination of mother-to-child transmission of hepatitis B is defined as achievement of a 90% reduction in new cases of chronic HBV infection, equivalent to 0.1% HBsAg seroprevalence among children aged 5 years.

Challenges include preventing HBV transmission from pregnant women with chronic hepatitis B infection to their infants, reaching all infants with a hepatitis B vaccine birth dose within 24 hours of delivery and ensuring that all infants receive at least three doses of hepatitis B vaccine.
5.3 **Proposed goal and target for 2030**

- **Goal:** Elimination of mother-to-child transmission.
- **Target:** Reduce chronic hepatitis B infection to less than 0.1% among 5-year-old children.

5.4 **Strategic Directions and related Strategies proposed in Section B**

1. Identify and treat pregnant women with chronic hepatitis B infection and the infants that are born to them (*Strategies 1.2, 1.3, 2.2, Disease-specific strategy*).
2. Sustain high immunization coverage for hepatitis B vaccine, with particular attention to ensuring a timely birth dose of hepatitis B vaccine (*Strategies 1.1, 1.3*).
3. Achieve and sustain high-level population immunity against hepatitis B through strong systems targeting infants (*Strategies 1.1, 1.3, 1.7*).
4. Conduct serosurveys to assess prevalence of chronic hepatitis B infection to assess whether targets are met (*Strategies 2.3, 2.4*).
6. Diphtheria

6.1 Disease
Diphtheria is an acute communicable upper respiratory illness mainly caused by a toxin produced by *Corynebacterium diphtheria*. The disease primarily affects the respiratory tract and skin and occasionally mucous membranes at other sites, i.e. genitalia and conjunctiva. Transmission is most often spread person to person from the respiratory tract. The toxin characteristically causes the formation of a pseudomembrane in the upper respiratory tract. Acute respiratory obstruction, acute systemic toxicity, myocarditis and neurologic complications are typical causes of death from diphtheria. Diphtheria antitoxin (DAT) is the mainstay of the treatment. A full course of vaccination consists of six appropriately spaced doses to ensure long-term protection.

6.2 Regional epidemiology and context
Diphtheria was one of the leading causes of childhood death in the pre-vaccine era. After the diphtheria toxoid vaccine was developed in 1923, incidence subsequently decreased in many industrialized countries in the 1940s and 1950s, and continued to dramatically decline as vaccination coverage with three doses of diphtheria-tetanus-pertussis (DTP3) increased.

Since 2009, the Region as a whole has sustained high coverage for DTP3 above 95%, and overall case counts have declined, with many countries reporting no cases in recent years. However, despite this decline, diphtheria is still prevalent in several countries and areas of the Region and remains a public health issue due to its high CFR. A number of challenges are faced by the Region in preventing deaths due to diphtheria, including insufficient capacity for laboratory-supported surveillance, an insufficient number of booster doses in most national immunization schedules, and inadequate case management, including usage of DAT.

6.3 Proposed goal and target for 2030
- **Goal:** Accelerated control.
- **Target:** Zero deaths caused by infection with *Corynebacterium diphtheria*.

6.4 Strategic Directions and related Strategies proposed in Section B
1. Achieve and sustain high-level population immunity against diphtheria, through the introduction of two booster doses of diphtheria-containing vaccine, i.e. diphtheria-tetanus vaccine or DTP, in all countries and areas (Strategies 1.1, 1.2, 1.3, 1.7).
2. Strengthen diphtheria surveillance systems to support outbreak response and to identify specific risk groups for targeted interventions (Strategies 2.1, 2.2, 2.4, 3.1).
3. Work with WHO in establishing regional stockpiles and mechanisms for using DAT appropriately for case management and during outbreaks (Strategies 1.5, 3.1).
4. Use TT combination products containing diphtheria toxoid, rather than TT alone, when immunization against tetanus is indicated (Strategy 1.5).
5. Strengthen capacity to rapidly detect and to implement a coordinated, timely and effective response to diphtheria outbreaks (Strategies 2.2, 3.1).
6. Establish a mechanism for validation of the elimination of diphtheria as a public health problem (Disease-specific strategy).
7. **Pertussis**

7.1 **Disease**

Pertussis, caused by *Bordetella pertussis*, is a highly infectious, vaccine-preventable bacterial disease of the respiratory tract that predominantly affects infants and children. It is endemic in all countries. Following an incubation period of seven to 10 days, symptoms include mild fever, runny nose and a cough. After the initial two weeks of symptoms, the cough typically develops into a characteristic pattern of prolonged coughing fits followed by a high-pitched whooping noise on inspiration. This is known as the paroxysmal phase, which can last four to eight weeks in duration. During the initial two to three weeks of coughing symptoms, the infection is highly transmissible. Pertussis is one of the leading causes of vaccine-preventable deaths worldwide, particularly affecting infants (CFR around 4%) and young children below the age of 5 years (CFR around 1%). Pneumonia with high mortality is the most important complication associated with pertussis. Pertussis vaccines are given as a three-dose primary series in infancy, usually in combination with DTP3. A booster dose is recommended by WHO for children ages 1–6 years. Pertussis vaccine is available in two formulations as whole-cell pertussis vaccine (wP) and acellular pertussis vaccine (aP). Combination vaccines including aP are increasingly used in developed countries as they are associated with fewer mild adverse events following immunization (AEFIs) compared to wP-containing combination vaccines.

7.2 **Regional epidemiology and context**

In 1980, nearly 1 million cases of pertussis were reported in the Western Pacific Region, most from China, Cambodia and the Philippines. Overall immunization coverage with DTP3 rose rapidly during the 1980s as countries introduced pertussis-containing combination vaccines and improved national coverage, from 8% in 1980 to 96% in 1990. Reported pertussis cases fell from >800,000 in 1980 to ~36,000 in 1990. Cases further fell slightly during the 1990s as countries improved subnational immunization coverage. However, while most countries have experienced a sustained decline in incidence, the disease remained endemic. In addition, superimposed outbreaks occurred every two to four years in several countries in the Region, including Australia, Cambodia, China, the Lao People’s Democratic Republic, New Zealand, Papua New Guinea and Viet Nam.

Since 2000, a resurgence of pertussis cases has occurred in some countries that have achieved high coverage with the acellular form of pertussis vaccine, such as Australia, China, Japan and the Republic of Korea. In those countries, the age distribution of pertussis cases has shifted to older age groups. In low- and middle-income countries with lower coverage of pertussis-containing combination vaccine, such as the Lao People’s Democratic Republic, Papua New Guinea and the Philippines, recurrent outbreaks have occurred among young children. In 2018, 53,322 cases of pertussis were reported by Western Pacific Region countries and areas.

Achieving control of pertussis and preventing severe disease and deaths in the Region will require overcoming a number of challenges. The resurgence of pertussis in countries with high coverage of aP vaccine has revealed that age-related waning of protective immunity after receiving the aP vaccine may occur more quickly.
than was previously known, leading to risk of outbreaks among adults. Some countries and areas have insufficient surveillance and health intelligence capacity to describe the major risk groups for pertussis infection, and may not be able to rapidly detect and mount an appropriate response to outbreaks when they occur.

7.3 Proposed goal and target for 2030

- Goal: Accelerated control.
- Target: Zero deaths caused by infection with *Bordetella pertussis*.

7.4 Strategic Directions and related Strategies proposed in Section B

1. Achieve and sustain high-level population immunity against pertussis, through high coverage of a three-dose pertussis vaccine series and at least one booster dose of DTP at ages 1 to 6, preferably at age 1 (*Strategies 1.1, 1.2, 1.3, 1.7*).

2. Develop strategies to provide booster doses in adolescents to extend the durability of pertussis immunity and in pregnant women to protect young infants through maternal antibodies (*Strategies 1.2, 1.3*).

3. Strengthen pertussis surveillance systems to support outbreak response and to identify specific risk groups for targeted interventions, such as health-care workers and adult caregivers of young children (*Strategies 2.1, 2.2, 2.4, 3.1*).

4. Adapt national immunization strategies to include new vaccine technologies under development, such as improved wP that may be less reactogenic while providing more durable immunity (*Strategy 1.5*).
8. Japanese encephalitis

8.1 Disease

Japanese encephalitis (JE) virus is the leading cause of viral encephalitis in Asia. JE virus is transmitted in an enzootic cycle between mosquitoes and vertebrate amplifying hosts, primarily pigs and wading birds. Domestic pigs are the most important source of infection for mosquitoes that transmit JE virus to humans. Although most people who are infected with JE virus do not develop clinical disease, the CFR can be as high as 50% among those that develop encephalitis and up to 30–50% of survivors can develop long-term neurologic sequelae. Vaccination is the cornerstone of JE control and prevention measures. WHO recommends integration of JE vaccination into national immunization schedules in all areas where the disease is a public health problem.

8.2 Regional epidemiology and context

In October 2014, the Regional Committee endorsed the Regional Framework for Implementation of the Global Vaccine Action Plan in the Western Pacific, which specified accelerated control of JE as one of eight regional immunization goals for the Western Pacific. In June 2015, the Technical Advisory Group (TAG) requested WHO to develop targets, timelines and strategies for accelerated JE control. In March 2016, the JE Expert Resource Consultation (ERC) proposed strategies and targets to achieve the regional goal for accelerated control of JE. In July 2016, the TAG reviewed the targets proposed at the ERC and recommended the following targets: (1) a primary target for all Member States – JE incidence <0.5 cases per 100,000 population in the targeted population in affected areas (national and subnational); and (2) an intermediate target for Member States that do not have high-quality JE surveillance – coverage of ≥95% with primary JE vaccine series among the targeted population in affected areas.

Eight of the 12 countries with JE virus transmission risk in the Region have introduced JE vaccine in some or all JE risk areas; two countries have very low levels of disease without vaccination; one country conducted a subnational JE vaccination campaign in 2019 and has yet to decide when to introduce the vaccine nationally; and one country has not yet decided when to introduce JE vaccine.

Challenges include a lack of or weak JE surveillance systems, which hinders the ability of countries to estimate disease burden, define target populations and monitor progress; JE vaccines have not been introduced and/or coverage is not high in all areas with JE transmission risk in three countries in the Region because of competing priorities for vaccine introductions.

8.3 Regional goal and target

- Goal: Accelerated control.
- Target: Reduce incidence to <0.5 cases per 100,000 children <15 years of age in the targeted area.

8.4 Strategic Directions and related Strategies proposed in Section B

(1) Establish, sustain and strengthen surveillance for JE (Strategy 2.1).
(2) Strengthen laboratory capacity to detect JE (Strategy 2.2).
(3) Introduce JE vaccines in all countries with JE virus transmission risk (Strategies 1.1, 1.3, 1.4, 1.5, 1.6, 1.8).
(4) Sustain high immunization coverage for JE vaccines (Strategies 1.1, 1.3).
(5) Establish a mechanism for verification of the achievement of the target for accelerated control of JE (Strategies 2.2, 2.3, 2.4).
9. Human papillomavirus

9.1 Disease

Human papillomavirus (HPV) is the most common viral infection of the reproductive tract and is the cause of a range of conditions in both men and women, including precancerous lesions that may progress to cancer. Although the majority of HPV infections do not cause symptoms and resolve spontaneously, persistent infection with HPV may result in disease. In women, persistent infection with specific HPV types (most frequently HPV-16 and HPV-18) may lead to precancerous lesions which, if untreated, may progress to cervical cancer. Cervical cancer is the fourth most common cancer among women worldwide. HPV infection is also associated with oropharyngeal and anogenital cancers and other conditions in men and women. The first HPV vaccine was licensed in 2006, and there are currently three HPV vaccines.

9.2 Regional epidemiology and context

The Global Cancer Observatory estimated that in 2018 there were over 142,000 cases of cervical cancer, or a cervical cancer incidence of 10.7 cases per 100,000 women in the Western Pacific Region. HPV vaccines were first introduced in the Region in 2006. As of March 2020, HPV vaccine has been introduced into the national immunization programmes of 15 countries and six areas in the Region. Four Pacific island countries are planning to introduce HPV vaccine in 2020 and 2021. The WHO Global Strategy towards Eliminating Cervical Cancer as a Public Health Problem envisions a world without cervical cancer. It includes 2030 control targets of 90% of girls fully vaccinated against HPV by 15 years of age, 70% of women screened with a high precision test at 35 and 45 years of age, and 90% of women identified with cervical cancer disease receive treatment and care.

Challenges with HPV vaccination include a limited supply of HPV vaccine, the cost of HPV vaccines (which are not affordable for many countries), a high cost of delivery, vaccine hesitancy because of concerns about AEFIs with HPV vaccine, and low vaccine coverage following introduction. Most of the countries in the Region that have introduced HPV vaccine have been high-income or Gavi-eligible countries. Introduction in middle-income countries not supported by Gavi, the Vaccine Alliance, have lagged.

9.3 Global goal and target for 2030

- Goal: Accelerated control.
- Target: >90% of girls fully vaccinated with HPV vaccine by 15 years of age.

9.4 Strategic Directions and related Strategies proposed in Section B

1. Introduce HPV vaccines (Strategies 1.1, 1.2, 1.4, 1.5, 1.6, 1.7, 1.8).
2. Develop strategies to provide doses to adolescents that are integrated with other school-based health programmes and that reach girls who are out of school (Strategies 1.1, 1.3, 1.4, 1.7).
3. Promote confidence, acceptance and demand to address vaccine hesitancy (Strategy 1.7).

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(4) Achieve and sustain high immunization coverage (≥90%) for girls fully vaccinated with HPV by 15 years of age (Strategies 1.1, 1.3, 1.4, 1.7).

(5) Ensure stable supply of HPV vaccines (Strategy 1.4).

(6) Secure sources of funding for introducing and sustaining HPV vaccine programmes (Strategy 1.8).
10. Hib disease

10.1 Disease

*Haemophilus influenzae* type b (Hib) is a bacterium that causes severe pneumonia, epiglottitis, meningitis and other invasive diseases, almost exclusively in children aged less than 5 years. It is transmitted through the respiratory tract from infected to susceptible individuals. The incubation period of the Hib infection is between two and 10 days. The most common symptoms of meningitis are acute onset of fever, headache, seizures and one or more of the following signs: neck stiffness, altered consciousness or photophobia. Even with adequate medical treatment, 5% of children with Hib meningitis die and 20–40% of survivors suffer severe sequelae, including blindness, deafness and learning disabilities.

10.2 Regional epidemiology and context

Prior to widespread vaccine use, Hib was the most common cause of bacterial meningitis and an important cause of severe pneumonia in children under 5 years old worldwide. In 2000, before widespread introduction of the Hib vaccine in resource-poor countries, Hib was responsible for at least 8.13 million cases of serious disease in children aged 1–59 months (95% confidence interval (CI): 7.33–13.2 million) and 371 000 deaths (95% CI: 247 000 to 527 000).

Hib conjugate vaccines have been in use since the early 1990s and vaccination with these vaccines is considered a highly effective public health intervention. In the Western Pacific Region, by the end of 2019, all countries and areas, except two, have included Hib conjugate vaccines in their routine immunization programmes – China is reviewing its Hib disease burden data and Hong Kong SAR (China) found out that the Hib vaccination programme would not be cost-effective based on their very low incidence of Hib disease. The use of Hib conjugate vaccines has led to dramatic declines of >90% in invasive Hib disease in the countries where Hib vaccine has been introduced.

The remaining burden of Hib disease warrants sustained and intensified efforts, including the introduction of vaccine in countries that have not yet introduced the vaccine and dedicated efforts to maintain or enhance immunization coverage. There is a need for continued surveillance to monitor and evaluate the impact of Hib vaccine as well as the change of epidemiology of Hib disease.

10.3 Proposed goal and target for 2030\(^{17}\)

- **Goal:** Control.
- **Target:** Maintain high routine immunization programme coverage.

10.4 Strategic Directions and related Strategies proposed in Section B

1. Introduce Hib-containing vaccine (*Strategies 1.4, 1.5, 1.6, 1.8*).
2. Sustain high immunization coverage for Hib-containing vaccines (*Strategies 1.1, 1.3*).
3. Establish, sustain and strengthen surveillance for invasive Hib disease (*Strategy 2.1*).
4. Strengthen laboratory capacity to detect Hib isolates from suspected patients with Hib disease (*Strategy 2.2*).

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11. Pneumococcal disease

11.1 Disease

*Streptococcus pneumoniae* is a Gram-positive, encapsulated diplococcus. Pneumococcal infection and disease can affect various organ systems, resulting to pneumonia, meningitis, otitis, sinusitis and bacteraemia. Pneumococcal disease can be treated with antimicrobials. The choice of an antimicrobial and the duration of treatment depend on the site of infection and the pattern of susceptibility to antimicrobials.

11.2 Regional epidemiology and context

Before widespread introduction of pneumococcal conjugate vaccine (PCV), the estimates of child deaths caused by *S. pneumoniae* ranged from 700 000 to 1 million every year worldwide. By 2015, of the estimated 5.83 million deaths among children <5 years of age globally, 294 000 (95% CI: 192 000 to 366 000) were estimated to be caused by pneumococcal infections.

By the end of 2015, globally, 129 countries were using PCV. Pneumococcal deaths declined most sharply between 2010 and 2015, when the average annual reduction was 8%, compared with just 3% from 2000 to 2010. As of 2018, in the Western Pacific Region, PCV has been introduced in 17 countries, including 10 in 2010–2018. The following issues and challenges need to be addressed in the next decade:

› An increase in the incidence of non-vaccine-type disease after use of PCV (serotype replacement).
› The use of pneumococcal vaccine should be complementary to other disease prevention and control measures, such as appropriate case management, promotion of exclusive breastfeeding for the first six months of life and reducing known risk factors such as indoor air pollution and tobacco smoke.

11.3 Proposed goal and target for 2030

• Goal: Control.
• Target: Introduce PCVs into routine immunization programmes.

11.4 Strategic Directions and related Strategies proposed in Section B

(1) Introduce PCV into routine immunization programmes in the remaining countries of the Region, prioritizing countries with high childhood mortality, i.e. under-5 mortality rate of >50 deaths/1000 births (*Strategies 1.4, 1.5, 1.6, 1.8*).
(2) Achieve and sustain high immunization coverage for PCV (*Strategies 1.1, 1.3*).
(3) Establish, strengthen and sustain surveillance for invasive pneumococcal disease (*Strategy 2.1*).
(4) Strengthen laboratory capacity to detect pneumococcal isolates from suspected patients with invasive pneumococcal disease (*Strategy 2.2*).
(5) Conduct nasopharyngeal carriage surveys to monitor changes in disease and the circulation of pneumococcal serotypes in the community after the introduction of PCV into the routine immunization programme (*Disease-specific strategy*).

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12. Rotavirus diarrhoea

12.1 Disease
Rotavirus (RV) is a very contagious virus that causes diarrhoea that can infect nearly every child by the age of 3–5 years and is globally the leading cause of severe, dehydrating diarrhoea in children aged <5 years. The clinical spectrum of rotavirus disease is wide, ranging from transient loose stools to severe diarrhoea and vomiting causing dehydration, electrolyte disturbances, shock and death. The virus is transmitted by the faecal–oral route. It infects and damages the cells that line the small intestine and causes rotavirus gastroenteritis (RVGE). The Global Rotavirus Surveillance Network estimates that 30–40% of diarrhoeal hospitalizations among children aged <5 years in the Western Pacific Region are attributable to RV infection.

12.2 Regional epidemiology and context
WHO estimated that in 2008, approximately 453 000 (95% CI: 420 000 to 494 000) RVGE-associated child deaths occurred worldwide. These fatalities accounted for about 5% of all child deaths and a cause-specific mortality rate of 86 deaths per 100 000 population aged <5 years. About 90% of all RV-associated fatalities occur in low-income countries in Africa and Asia and are related to poor health care.

After introduction of RV vaccine in several countries, an estimated 215 000 children died of RV infections as of 2013, accounting for 37% of diarrhoea-related deaths worldwide. As of 2018, RV vaccine has been introduced in eight countries in the Western Pacific Region.

Since 2009, WHO has recommended the use of RV vaccines in all NIPs. In the Western Pacific Region, a smaller percentage of countries have introduced RV vaccine into their NIPs, compared to other WHO regions (26% versus 48% globally), partially due to the lack of recognition of the burden of RV disease and the cost-effectiveness of vaccination, competing priorities in introduction of new vaccines and concerns about financial sustainability of immunization programmes following introduction of additional new vaccines.

12.3 Proposed goal and target for 2030\(^{19}\)
- Goal: Control.
- Target: Introduce RV vaccine into routine immunization programmes.

12.4 Strategic Directions and related Strategies proposed in Section B
1. Introduce RV vaccine into routine immunization programmes in the remaining countries of the Region, particularly in countries with high diarrhoeal morbidity and mortality (Strategies 1.4, 1.5, 1.6, 1.8).
2. Achieve and sustain high immunization coverage for RV vaccine (Strategies 1.1, 1.3).
3. Establish, strengthen and sustain sentinel hospital-based surveillance for RVGE as well as for intussusception (Strategy 2.1).
4. Develop and implement a comprehensive strategy to control diarrhoeal diseases with the scaling up of both prevention (promotion of early and exclusive breastfeeding, handwashing, improved water supply and sanitation) and treatment packages (Disease-specific strategy).

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13. Meningococcal disease

13.1 Disease

*Neisseria meningitidis* (Meningococci) is a Gram-negative, diplococcal bacterium that causes mostly meningitis, which is a life-threatening disease caused by inflammation of the membranes that surround the brain and spinal cord. The majority of invasive meningococcal infections are caused by organisms expressing one of the serogroup A, B, C, X, W135 or Y capsular polysaccharides. Meningococci of these serogroups have the potential to cause both endemic disease and outbreaks, but their relative prevalence varies considerably with time and geographic location. Symptoms of invasive meningococcal disease (IMD) usually occur one to four days after infection. Besides meningitis and septicaemia, meningococci occasionally cause arthritis, myocarditis, pericarditis and endophthalmitis. The diagnosis and treatment goals are focused on speedy confirmation of meningitis and optimal care.

13.2 Regional epidemiology and context

Although the burden of meningitis is greatest in the meningitis belt of sub-Saharan Africa, meningitis is a threat in all countries of the world. Since 2014, epidemics of bacterial meningitis have been seen from Kyrgyzstan to Fiji, to Nigeria and Niger, to Chile and the United States of America, with the spread of some virulent strains across the world emphasizing the need for a global approach to surveillance and prevention.

Despite significant progress over the past 20 years, there were still an estimated 5 million new cases globally and 290 000 deaths from meningitis in 2017. As of 2020, meningococcal vaccine has been introduced into the routine immunization programme only in two countries in the Western Pacific Region (Australia and China). WHO recommends that countries with high (>10 cases/100 000 population/year) or intermediate endemic rates (2–10 cases/100 000 population/year) of IMD and countries with frequent epidemics should introduce appropriate large-scale meningococcal vaccination programmes.

The true burden of meningococcal disease in the Western Pacific Region is unknown because the epidemiology of meningococcal disease is not well described. However, in countries such as Japan and the Republic of Korea, which have frequently reported a low incidence of meningococcal disease, the disease is not considered a high health-care priority. The reasons for lack of disease burden data in the Region appear to be multifactorial and include under-reporting, weak surveillance, lack of guidelines, inconsistent case definitions and varying awareness of meningococcal disease.

13.3 Proposed goal and target for 2030

- **Goal:** Control.
- **Target:** Prevent outbreaks and reduce morbidity and mortality due to meningococcal disease during outbreaks.

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13.4 Strategic Directions and related Strategies proposed in Section B

(1) Prevent and control outbreaks through development and enhanced access to affordable vaccines, effective prophylactic strategies and targeted control interventions (Strategies 2.2, 3.2).

(2) Establish, sustain and strengthen surveillance for meningococcal disease (Strategy 2.1).

(3) Improve diagnostic capacity at all levels of health care and the prompt and effective management/treatment of meningococcal disease (Strategies 1.5, 2.2, 3.4).
14. Mumps

14.1 Disease

Mumps is a vaccine-preventable viral cause of infectious parotitis, characterized by swelling and tenderness of one or more salivary glands following a febrile prodromal period with nonspecific symptoms such as malaise, anorexia and headache. A number of other complications (e.g. deafness) are associated with mumps infection. Mumps may present as a lower respiratory tract infection, particularly in young children. In post-pubertal males, mumps may cause painful orchitis that may lead to sterility. Symptomatic aseptic meningitis may occur in up to 10% of patients. The vaccine is usually given in a combination vaccine with the measles and rubella vaccine as a measles-mumps-rubella (MMR) vaccine.

14.2 Regional epidemiology and context

In unvaccinated populations, mumps is generally an endemic disease with cyclic epidemics predominantly affecting children below age 10 years. As countries and areas improved surveillance for mumps, reported cases in the Region increased from 1998, when 25 111 cases were reported, to a peak in 2012, when 568 050 cases were reported. Case counts declined slightly after 2012, mostly driven by a reduction in cases in China after it introduced mumps vaccine into the national schedule that year. Most cases continue to be reported from Australia, China, Japan, Mongolia, New Zealand, the Republic of Korea and Singapore, possibly due to the fact that mumps surveillance is not well developed in many countries and areas of the Region.

As of 2020, 16 of 37 countries and areas in the Western Pacific Region use at least one dose of mumps-containing vaccine in the routine national schedule. During the last 10 years, outbreaks of mumps have occurred in some countries prior to vaccine introduction, including China and Japan (Japan introduced MMR vaccine in 1989 but discontinued this from the national schedule in 1993 after an unexpectedly large number of severe AEFIs, associated with use of a mumps component derived from the Urabe AM 9 strain). However, outbreaks have also occurred in some countries after vaccine introduction, affecting adolescent and young adult age groups that had received the mumps vaccine, including Australia, Mongolia, New Zealand, the Republic of Korea and Singapore, particularly if a one-dose schedule had been used.

Challenges for achieving mumps control include lack of mumps vaccine in the national schedule in most countries and areas in the Western Pacific Region, and poor understanding of the disease burden of mumps due to lack of strong mumps surveillance capacity in many countries and areas. Durability of the immune response to mumps vaccine may be less than previously understood, leading to an increasing risk of a breakthrough infection due to secondary vaccine failure in adults who were fully vaccinated as children. In addition, many countries and areas lack sufficient strategies to provide outbreak response or preventive vaccination to young adults and adolescents.

14.3 Proposed goal and target for 203021

- Goal: Control.
- Target: Introduce mumps vaccine (monovalent or MMR) into routine schedule in countries and areas where mumps is a public health concern.

14.4 **Strategic Directions and related Strategies proposed in Section B**

1. For countries that have introduced mumps-containing vaccine into the routine schedule or that are considering mumps vaccine introduction, establish, strengthen and sustain sensitive surveillance for mumps with laboratory support (*Strategies 2.1, 2.2*).

2. For countries and areas in which mumps is a public health concern, introduce mumps-containing vaccine (e.g. MMR vaccine) into the routine immunization programme (*Strategies 1.4, 1.5, 1.6, 1.8*).

3. For countries that have introduced a mumps vaccine into the routine schedule, achieve and sustain high routine vaccine coverage through strong and correctly targeted systems and programmes for routine vaccination, including opportunistic vaccination initiatives, such as school- and hospital-based screening and immunization (*Strategies 1.1, 1.2, 1.3, 1.7*).

4. For countries where cases and outbreaks of mumps have occurred due to waning immunity after vaccination, develop novel strategies, in collaboration with non-health sectors such as labour, tourism, education and defence, to provide outbreak response and preventive immunization for adults and adolescents (*Strategies 1.1, 1.2, 1.3, 1.7*).

5. For countries where mumps is a disease of public health concern, strengthen capacity to rapidly detect and to implement a coordinated, timely and effective response to mumps outbreaks (*Strategies 2.2, 3.1*).
15. Varicella

15.1 Disease
Varicella is caused by primary infection with the varicella-zoster virus (VZV). It is a common, highly contagious, vaccine-preventable illness that, in the absence of a vaccination programme, will affect nearly every person by mid-adulthood. VZV is highly transmissible via respiratory droplets or direct contact with characteristic skin lesions of the infected person. Varicella is generally self-limited and vesicles gradually develop crusts, which disappear over a period of seven to 10 days, but severe complications may arise, including bacterial infections (e.g. cellulitis, pneumonia) and neurological complications (e.g. encephalitis), and these can be fatal. Individuals remain contagious until all lesions have crusted over. Following infection, the virus remains latent in nerve cells and may be reactivated, causing a secondary infection – herpes zoster, commonly referred to as “shingles”. This generally occurs in adults aged >50 years or in the immunocompromised and is associated with a painful rash that may result in permanent nerve damage.

15.2 Regional epidemiology and context
Based on conservative estimates, the global annual varicella disease burden would include 4.2 million severe complications leading to hospitalization and 4200 deaths.22 The disease burden data on varicella are very limited across countries in the Western Pacific Region except for some studies in Australia and the Republic of Korea. Varicella disease is not notifiable in several countries and notification criteria and rates vary between countries. Varicella vaccine has been introduced into the routine immunization programmes mainly in high-income countries in the Region, including Australia, Hong Kong SAR (China), Japan, New Zealand and the Republic of Korea, which has led to substantial reductions in varicella-related morbidity and mortality. Varicella vaccines are also available in the private sector in a number of countries in the Region.

No data on cost-effectiveness of routine childhood varicella immunization from low- and middle-income countries (LMICs) are currently available. Parameters such as underlying epidemiology, mixing patterns, vaccine price and health-care costs included in the existing modelling analyses derive from high-income countries; no assumption can be made from these models regarding cost-effectiveness in low- and middle-income settings. Concerns have been raised that the introduction of widespread childhood varicella vaccination would decrease exposure to VZV in the population, resulting in an older age distribution of the remaining cases.

15.3 Proposed goal and target for 2030
- Goal: Control.
- Target: Introduce varicella vaccine into routine immunization programmes.

15.4 Strategic Directions and related Strategies proposed in Section B
(1) Introduce varicella vaccine into routine immunization programme where varicella is an important public health burden (Strategies 1.4, 1.5, 1.6, 1.8).
(2) Achieve and sustain high immunization coverage for varicella vaccine (Strategies 1.1, 1.3).
(3) Establish, strengthen and sustain sentinel surveillance sites for varicella (Strategy 2.1).

16. Seasonal influenza

16.1 Disease
Influenza A and B viruses are important human respiratory pathogens that are transmitted mainly by droplets and aerosols originating from the respiratory secretions of infected people, but occasionally also through virus-contaminated fomites. Both A and B viruses cause seasonal influenza epidemics and out-of-season sporadic cases and outbreaks. Influenza occurs globally with an annual attack rate estimated at 5–10% in adults and 20–30% in children. In temperate climates, seasonal epidemics are experienced mainly during the winter; while in tropical regions, influenza may occur throughout the year, causing outbreaks more irregularly. Influenza A viruses may also cause worldwide pandemics characterized by rapid dissemination of new influenza A subtypes that have the capacity for human-to-human transmission.

16.2 Regional epidemiology and context
The Western Pacific Region is thought to have a similar burden of influenza to countries with temperate climates. As in the rest of the world, most influenza illness in the Region is caused by influenza A viruses. However, influenza A and B co-circulate with varying patterns, and in some seasons influenza B is the dominant strain. Between 2011 and 2015, peaks in the percentage of influenza-like illness were generally consistent with the percentage of positive trends, particularly in the northern temperate and southern zones. All countries and areas with national influenza centres in the Region exhibited expected seasonal influenza prevalence and trends, and influenza A was the predominant influenza type from 2011 to 2015.

Six quadrivalent seasonal influenza vaccines and 13 trivalent seasonal influenza vaccines are prequalified by WHO. For countries considering the initiation or expansion of programmes for seasonal influenza vaccination, WHO recommends that pregnant women should have the highest priority. Additional risk groups to be considered for vaccination are children aged 6–59 months, older people, individuals with specific chronic medical conditions and health-care workers. In the Region, awareness of the public health importance of influenza and the need for seasonal influenza vaccination to reduce the morbidity and mortality of seasonal influenza and as part of pandemic influenza preparedness has increased in recent years. Most countries in the Region report that they have developed formal policies for the introduction of seasonal influenza that target specific risk groups, but few countries have implemented widespread seasonal influenza vaccination of the general population or of high-risk groups.

Challenges include lack of information about the burden of seasonal influenza in many countries, the cost of vaccination, the need for annual seasonal vaccines, lower priority placed on seasonal influenza vaccination than on other vaccination programmes, and low acceptance by health workers and the public.
16.3 Proposed goal and target for 2030\textsuperscript{23,24}

- Goal: Control.
- Target: Promote immunization for high-risk groups, including pregnant women, children aged <5 years, older people, individuals with chronic medical conditions and health-care workers.

16.4 Strategic Directions and related Strategies proposed in Section B

(1) Initiate or expand influenza vaccination among risk groups, particularly pregnant women (Strategies 1.2, 1.3, 1.4, 1.6, 1.7, 1.8).
(2) Strengthen and expand surveillance for seasonal influenza (Strategy 2.1).
(3) Conduct programme assessments and special studies to determine who is most affected by seasonal influenza in terms of incidence and the severity of disease in the Region to guide decisions about which groups to target for vaccination (Strategies 2.3, 2.4).
(4) Identify funding sources for the initiation or expansion of influenza vaccine programmes targeting risk groups (Strategy 1.8).

17. Rabies

17.1 Disease

Rabies is a fatal encephalomyelitis caused by a lyssavirus, spread via bites and scratches from infected animals. Although rabies can infect and be transmitted by a wide range of mammals, 99% of all rabies transmissions to humans result from the bites of rabid dogs. Rabies is almost invariably fatal once clinical signs appear as a result of acute progressive encephalitis. Over 40% of rabies deaths occur in children <15 years. However, human rabies is 100% preventable by prompt administration of human rabies vaccines, combined with proper wound management and simultaneous administration of rabies immunoglobulins where indicated, even after high-risk exposure. Effective canine rabies vaccines are also available. Control and eventual elimination of dog-mediated rabies can be achieved through improving access to post-exposure prophylaxis to prevent human death due to rabies and enhancing strategic dog vaccination to eliminate transmission at the source.

17.2 Regional epidemiology and context

Eight countries in the Western Pacific Region remain classified endemic for rabies. The top three high-burden countries are China, the Philippines and Viet Nam, where over 19 million people receive post-exposure prophylaxis and over 800 people die of rabies annually. In the absence of a national rabies control programme and functioning rabies surveillance systems, the true burden of rabies in Cambodia and the Lao People’s Democratic Republic is unknown, but an estimate indicates there are over 800 human rabies cases annually in Cambodia. Malaysia was declared rabies-free in 2013 but began to report human rabies cases again in 2017. Mongolia and the Republic of Korea have not reported human rabies cases since 2004 and 2014, respectively.

In 2008, the Association of Southeast Asian Nations (ASEAN) launched an initiative, “Towards the Elimination of Rabies in the ASEAN Member States and the Plus Three Countries (China, Japan and the Republic of Korea)”. This led to the 2014 endorsement by all relevant health and agricultural ministries of the ASEAN Rabies Elimination Strategy to control and eliminate rabies in ASEAN Member States by 2020. Subsequently, WHO, the Food and Agriculture Organization of the United Nations (FAO), the World Organisation for Animal Health (OIE) and the Global Alliance for Rabies Control in 2015 jointly launched the Global Strategic Framework for the Elimination of Dog-mediated Human Rabies; and in 2018, WHO launched Zero by 30: the Global Strategic Plan to End Human Rabies Deaths from Dog-mediated Rabies by 2030. In 2019, the ASEAN Secretariat, WHO, FAO and OIE jointly organized a meeting to review the progress and align the global and ASEAN elimination targets to 2030.

Although effective human and canine vaccines exist, control and elimination of rabies continues to be a struggle in many countries. Approximately 80% of human cases occur in resource-limited, rural communities where awareness among the public and health professionals and access to appropriate post-exposure prophylaxis are limited or non-existent. Challenges also include a global shortage of quality-assured and affordable human rabies vaccines and immunoglobulin, the absence of a functioning surveillance system to enable timely data reporting and sharing between human and animal health sectors, and the persistent lack of national commitment, resources and capacity to improve dog vaccination coverage.
17.3 Global goal and target for 2030

- Goal: Elimination of disease (elimination as a public health problem).
- Target: Zero human deaths caused by dog-mediated rabies.

17.4 Strategic Directions and related Strategies proposed in Section B

1. Ensure access to adequate post-exposure prophylaxis, combined with proper wound management and simultaneous administration of rabies immunoglobulins, in all designated health facilities (Strategies 1.2, 1.4, 1.6, 1.8).

2. Establish and strengthen community-based surveillance systems and a laboratory network for human and animal sectors to rapidly detect, jointly investigate and confirm cases, and implement a timely and effective response (Strategies 2.3, 2.4).

3. Enhance community awareness and motivation to prevent deaths due to dog-mediated rabies (Strategy 1.7).

4. Secure sustainable financing for essential functions to control and eliminate dog-mediated rabies (Strategy 1.8).

5. Achieve and sustain herd immunity against rabies among at-risk dog populations through strategic dog vaccination and effective dog population management (Disease-specific strategy).

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18. Hepatitis A

18.1 Disease

Hepatitis A is an acute vaccine-preventable viral infection of the liver. The virus is transmitted orally through faecal contamination of food and water or through direct contact with an infectious person. Lack of access to clean water and adequate sanitation is a major risk factor; however, in areas with good sanitary infrastructure and a low incidence of infection, large outbreaks may occur after consumption of contaminated foods due to higher susceptibility of older age groups who have never been infected and who are unvaccinated. Unlike other infectious hepatitis viruses, the hepatitis A virus (HAV) only causes acute infection and does not result in chronic inflammation leading to cirrhosis or liver cancer. Symptoms are often mild or moderate, including nausea, vomiting, jaundice, fever and abdominal pain lasting approximately eight weeks. However, fulminant infection leading to acute liver failure can rarely occur. The HAV vaccine is effective in preventing infection and is routinely given in some countries to children and some adults at higher risk.

18.2 Regional epidemiology and context

Although hepatitis A incidence data are not widely available from many Western Pacific Region countries and areas, in countries where HAV vaccine has been introduced, the incidence has decreased dramatically, for example in China, where annual incidence fell from more than 50 per 100 000 in 1990 to around 5 per 100 000 as the use of HAV vaccine expanded nationally. Outbreaks have been reported in Australia, China and the Republic of Korea, associated with consumption of contaminated foods. Only seven countries have introduced HAV vaccine into the routine schedule as of 2020: Australia (high-risk groups only), China, Mongolia, New Zealand (high-risk groups only) and the Republic of Korea.

Major challenges associated with reducing the burden of hepatitis A include poor understanding of the burden of HAV in countries and areas that have not introduced the vaccine due to insufficient capacity for sensitive hepatitis A surveillance, the lack of HAV vaccine in the routine schedule or targeted HAV vaccination strategies for high-risk populations in many countries and areas, and the lack of effective strategies for providing outbreak response or preventive vaccination to adolescents and adults.

18.3 Proposed goal and target for 2030

- Goal: Control.
- Target: Introduce HAV vaccine into routine immunization programmes in countries for which hepatitis A is a major public health concern.

18.4 Strategic Directions and related Strategies proposed in Section B

1. Establish, strengthen and sustain sensitive surveillance for HAV with laboratory support in countries for which hepatitis A is a public health concern or that are considering introducing HAV vaccine (Strategies 2.1, 2.2).
2. Introduce HAV vaccine into the routine immunization schedule for children ≥1 year if indicated on the basis of incidence of acute hepatitis A or change in the endemicity from high to intermediate (Strategies 1.4, 1.5, 1.6, 1.8).

(3) Achieve and sustain high routine vaccine coverage through strong and correctly targeted systems and programmes for routine vaccination, including opportunistic vaccination initiatives, such as school- and hospital-based screening and immunization (Strategies 1.1, 1.2, 1.3, 1.7).

(4) Conduct targeted vaccination of high-risk groups in low- and very-low-endemicity settings to provide individual health benefits (Strategies 1.2, 1.3).

(5) Develop novel strategies, in collaboration with non-health sectors such as labour, tourism, education and defence, to provide outbreak response and preventive immunization for adults and adolescents (Strategies 1.1, 1.2, 1.3, 1.7).
19. Typhoid

19.1 Disease

Typhoid fever is an acute generalized infection caused by the bacterium *Salmonella enterica* serovar Typhimurium, or *Salmonella Typhi* (S. Typhi). Typhoid fever is an important public health problem in many LMICs. Transmission of the infection is by the faecal–oral route. Typhoid illness has a wide range of clinical severity, with more severe forms being characterized by persistent high fever, abdominal discomfort, malaise and headache. Estimates of the CFR in typhoid fever range from 1–4% in patients who receive adequate therapy to 10–20% in untreated cases. The risk of transmission of *S. Typhi* is increased in populations lacking access to safe water and adequate sanitation, and in the context of poor hygiene among food handlers. Key interventions to prevent and control typhoid fever include hygiene promotion, improvement of water safety, use of safe water for all purposes, better sanitation infrastructure, and ensuring adequate and timely access to patient care. The disease can be treated with antibiotics, although increasing antimicrobial resistance (AMR) is making treatment more complicated. Typhoid vaccination can contribute to reduction in antibiotics use, which will delay AMR. Typhoid vaccination plays an important role to control endemic typhoid fever and outbreaks as well.27

19.2 Regional epidemiology and context

Global estimates of typhoid fever burden range between 11 million and 21 million cases and approximately 128 000 to 161 000 deaths annually. Modelled typhoid incidence indicate that typhoid incidence in LMICs in the Western Pacific Region is approximately 100 cases per 100 000 population, but there is substantial inter- and intra-country heterogeneity in incidence.

WHO recommends typhoid vaccination in response to confirmed outbreaks of typhoid fever, in humanitarian emergencies depending on the risk assessment, for professional food handlers in typhoid-endemic areas and for travellers from non-endemic to endemic areas. In 2018, WHO recommended the introduction of typhoid conjugate vaccine be prioritized in countries with the highest burden of typhoid disease or a high burden of antimicrobial-resistant *S. Typhi*. Some South Pacific islands have experienced high typhoid fever incidence rates and outbreaks during which typhoid vaccination campaigns have been conducted. In 2010, following a cyclone that caused extensive population displacement and damage to water and sanitation infrastructure, a subnational typhoid vaccination campaign was conducted to prevent a typhoid outbreak.

Challenges include difficulty diagnosing typhoid because of its nonspecific clinical manifestations, lack of data on the national and subnational typhoid burden in the Region, lack of data on the extent to which *S. Typhi* strains are resistant to antimicrobial medications typically used to treat typhoid, lower priority placed on typhoid vaccination than on other vaccination programmes, and mobilization of resources to conduct typhoid vaccination campaigns during outbreaks or humanitarian emergencies during which the risk of typhoid outbreaks might be high.

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19.3 Proposed goal and target for 2030

- Goal: Control.
- Target: Introduce typhoid vaccines in countries with a high burden of typhoid disease.

19.4 Strategic Directions and related Strategies proposed in Section B

1. Establish, sustain and strengthen surveillance for typhoid (Strategy 2.1).
2. Improve diagnostic capacity at all levels of health care and prompt and effective management/treatment of typhoid (Strategies 1.5, 2.2, 3.3).
3. Introduce typhoid conjugate vaccine into the routine immunization schedule nationally or subnationally (universal, risk-based or phased) in countries with a high burden of typhoid disease or a high burden of antimicrobial-resistant S. Typhi (Strategies 1.2, 1.3, 1.4, 1.5, 1.6, 1.7, 1.8).
4. Prevent and control outbreaks through enhanced access to affordable vaccines, effective prophylactic strategies and targeted control interventions (Strategies 2.2, 3.2, 3.3).
5. Conduct vaccination campaigns in response to confirmed outbreaks of typhoid fever (Strategy 3.3).

20. Cholera

20.1 Disease

Cholera is a rapidly dehydrating diarrhoeal disease caused by toxigenic serogroups of the bacterium *Vibrio cholerae*. The disease is closely associated with poverty, poor sanitation and lack of clean drinking water. Historically, devastating outbreaks of cholera resulted in millions of cases and hundreds of thousands of deaths. Improving access to clean potable water and adequate sanitation, as well as the promotion of good water, sanitation and hygiene (WASH) practices, remain the mainstay of prevention of both endemic cholera and cholera outbreaks. In addition, proper case management is vital in reducing mortality from the disease and limiting its spread.

Two types of oral cholera vaccines (OCVs) are currently available (see Strategy 1.5). These vaccines should be used in areas with endemic cholera, in humanitarian crises with high risk of cholera and during cholera outbreaks. The vaccines should always be used in conjunction with other cholera prevention and control strategies. Vaccination should not disrupt the provision of other high-priority health interventions to control or prevent cholera outbreaks. Appropriate case management, WASH interventions, surveillance and community mobilization remain cornerstones of cholera control.

A global stockpile of OCV, initially created by WHO in 2013, ensures rapid access to OCVs in outbreak and humanitarian emergency situations, managed by the International Coordinating Group and for use in endemic areas, managed by the OCV Working Group of the Global Task Force on Cholera Control. As of May 2018, over 25 million doses were administered through mass vaccination campaigns in 19 countries in various settings (outbreaks, endemic areas or in humanitarian crises).²⁹

20.2 Regional epidemiology and context

Cholera has continued to be reported in the Region. From 2009 to 2011, Papua New Guinea was affected by a cholera outbreak with 15,582 cases, 493 deaths and an overall CFR of 3.2%.³⁰ From 2008 to 2013, the Philippines reported 42,071 cholera cases from 87% of provinces and metropolitan areas.³¹ From 2011 to 2015, Malaysia reported 1,417 confirmed cases. While cholera is no longer endemic in Malaysia, more than 90% of the country’s cholera cases occur in the state of Sabah. In Sabah, 20% of cases were identified among migrants coming from neighbouring countries.³² From August to September 2018, the Lao People’s Democratic Republic conducted cholera vaccination campaigns targeting flood-affected communities, and more than 12,000 people received the two doses of the vaccine.³³

20.3 Proposed goal and target for 2030

- Goal: Prevention and control.
- Target: Appropriate vaccination response to cholera outbreaks in conjunction with other cholera prevention and control strategies.

20.4 Strategic Directions and related Strategies proposed in Section B

1. Proactively identify areas and populations at high risk of a cholera outbreak in the national context (*Strategies 2.1, 2.3*).
2. Prepare specific standard operating procedures (SOPs) for the vaccination response to cholera outbreaks (*Strategy 3.3*).
21. Others

21.1 Dengue fever\textsuperscript{34,35}

For control of dengue fever, there is only one licensed dengue vaccine available, CYD-TDV (Dengvaxia), which is a live attenuated recombinant tetravalent vaccine, employing the attenuated yellow fever virus 17D strain as the replication backbone. Several other dengue vaccine candidates are in clinical development: two vaccine candidates currently under evaluation in Phase III trials are also live attenuated recombinant tetravalent vaccines.

21.2 Malaria\textsuperscript{36,37}

More than 30 \textit{Plasmodium falciparum} malaria vaccine candidates are at either advanced preclinical or clinical stages of evaluation. In January 2016, RTS,S vaccine was recommended by WHO for pilot introduction in selected areas of three African countries. RTS,S is being evaluated for use as a complementary malaria-control tool that could be added to (and not replace) the core package of WHO-recommended preventive, diagnostic and treatment measures.


B. Proposed strategies and strategic directions for immunization and VPD control and elimination in the Western Pacific Region through 2030

In 2014, the WHO Regional Committee for the Western Pacific endorsed the *Regional Framework for Implementation of the Global Vaccine Action Plan in the Western Pacific* (WPR/RC65.R5) to expand immunization initiatives in the Region and to support Member States in implementation of the *Global Vaccine Action Plan 2011–2020* (GVAP). In 2017, the Regional Committee endorsed the *Regional Strategy and Plan of Action for Measles and Rubella Elimination in the Western Pacific* (WPR/RC68.R1) in response to a 2013–2016 Region-wide measles resurgence, calling on Member States to develop or update national strategies and plans to eliminate the diseases.

As a result, the Region has maintained polio-free status and continued to significantly reduce the prevalence of hepatitis B infection among children. Only one country in the Region has yet to achieve elimination of maternal and neonatal tetanus. The Region also experienced historically low incidences of both measles and rubella in 2017 and 2018. As of September 2019, nine countries and areas have been verified as having achieved measles elimination. Meanwhile, five countries and areas have been verified as having achieved rubella elimination. In addition, at the end of 2019, vaccines for *Haemophilus influenzae* type b (Hib) were being used in 35 countries and areas in the Western Pacific Region, 19 countries and areas were deploying vaccines for human papillomavirus (HPV), 10 were using the vaccine for Japanese encephalitis (JE), 25 were using the pneumococcal conjugate vaccine, and nine countries and areas were using the rotavirus vaccine.

Despite these successes, many people continue to be left behind by national immunization efforts, with the numbers of unvaccinated people even increasing in some countries at the same time regional plans were being implemented. Urbanization, migration and cross-border population movements are producing communities of individuals unprotected from vaccine-preventable diseases (VPDs) and creating immunity gaps, which led in 2018 and 2019 to the emergence, resurgence and large-scale, import-related outbreaks of several VPDs in high-risk communities in the Region. The segment of the population 65 years of age and older in the Region has increased from under 7.5% in 2000 to over 12% in 2020, and it is expected to reach 17% by 2030. In addition, countries and areas in the Region have recently seen an increased incidence of VPDs among adolescents and adults (e.g. measles, rubella, etc.). And while additional vaccines are now available for older people, as well as adolescents and adults, immunization service delivery has not expanded sufficiently beyond childhood immunization programmes, and immunization throughout the life course is not a part of the overall health system in many countries. Recent health security issues in the Western Pacific Region, such as natural disasters, immunization safety events and coronavirus disease (COVID-19) pandemic, have revealed the urgent need to ensure the resilience of immunization systems and programmes against any public health emergency.

This Regional Strategic Framework proposes to achieve three *Strategic Objectives* through implementing 18 *Strategies* (Figure 1) to expand the scope of immunization, further accelerate control, and achieve and sustain the elimination of the VPDs described in Section A, aiming to make the Region free from vaccine-preventable morbidity, mortality and disability towards 2030 (Figure 2).
Demographic shifts, epidemiologic changes and increased socioeconomic inequities require Member States not only to strengthen childhood immunization programmes, but also to comprehensively expand and systematically integrate immunization systems and programmes to maximize the potential and the benefits of vaccines and immunization for the entire population across the life course.

To holistically strengthen and expand immunization systems and programmes, **Strategic Objective 1** proposes strategies for: (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 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; and (9) strengthening governance and programme management.

Information and data on VPDs and immunization have been not fully utilized, even though surveillance systems, laboratories and laboratory networks have been established and continuously strengthened for VPD control and elimination initiatives in the Western Pacific Region over the last three decades. VPD surveillance systems are vertically organized and fragmented in several countries in the Region. The use of surveillance data to identify populations with immunity gaps, such as mobile populations, informal dwellers and older age groups, is still insufficient in many countries in the Region, resulting in repeated, sudden VPD outbreaks. VPD laboratories also can – and should – be utilized by other programmes to strengthen laboratory capacity for non-VPDs. Evidence-driven decision-making and action have not been widely applied to immunization programmes and VPD control and elimination initiatives.

To strategically manage intelligence on VPDs and immunization, **Strategic Objective 2** proposes strategies for: (1) enhancing strategic use of epidemiologic intelligence through optimized and integrated VPD surveillance systems; (2) ensuring prompt detection, confirmation and characterization of pathogens through integrated VPD laboratory capacity and networks; (3) generating quality data for ensuring continuous improvement of immunization programmes and strengthening the overall health system; and (4) driving evidence-based decision-making and action for immunization and disease control and elimination.

Immunization systems and programmes, including VPD surveillance systems, laboratories and laboratory networks, should have substantial responsibilities and play critical roles, not only in the prevention of VPDs under target for control, accelerated control, elimination or eradication, but also in preparedness for and response to all public health emergencies related to VPDs, vaccines and immunization programmes.

To effectively and adequately prepare for and respond to public health emergencies related to VPDs, vaccines and immunization programmes, **Strategic Objective 3** proposes strategies for ensuring preparedness for and response to: (1) events, outbreaks or the resurgence of VPDs under the targets for control, accelerated control, elimination or eradication; (2) a safety event related to vaccines or immunization programmes; (3) events, outbreaks or the resurgence of diseases that are not under targets for accelerated control, elimination or eradication by vaccines and immunization programmes, but may require an immunization response; (4) public health emergencies affecting immunization systems and programmes and/or interrupting deliveries of immunization services; and (5) events or outbreaks of novel diseases requiring an immunization response. A supplement to Strategy 3.5, “An update on COVID-19 vaccines (as of 31 May 2020) and considerations on the immunization response to COVID-19”, shows a series of critical steps to be taken into account when safe and effective vaccines become available for a novel pandemic disease and how vaccine deployment should be planned, prepared and implemented.
Figure 1. Three Strategic Objectives and 18 Strategies

Strategic Objective 1
Strengthening & Expanding Immunization Systems & Programmes

1-1. Leaving no one behind in childhood immunization
1-2. Immunization services along the life course
1-3. Tailor-made immunization strategies
1-4. Vaccine security
1-5. New and underutilized vaccines and biologicals
1-6. Vaccine safety and safe immunization
1-7. Vaccine confidence, acceptance and demand
1-8. Sustainable domestic financing for immunization
1-9. Governance and programme management

Strategic Objective 2
Managing Health Intelligence on Vaccine-Preventable Diseases & Immunization

2-1. Strategic use of epidemiologic intelligence through VPD surveillance systems
2-2. Prompt detection, confirmation & characterization of pathogens through VPD laboratory capacity and networks
2-3. Generating quality data for ensuring continuous improvement of immunization programme and strengthening overall health system
2-4. Evidence-based decision-making and action

Strategic Objective 3
Preparing for & Responding to Public Health Emergency

3-1. Outbreaks or resurgences of VPDs
3-2. Vaccine & immunization safety events
3-3. Outbreaks requiring immunization responses (e.g. cholera outbreaks)
3-4. Emergency affecting immunization systems & programmes
3-5. Others (e.g. pandemic influenza)

Figure 2. 18 Strategies to establish a foundation to maximize potential of vaccines and immunization to further reduce morbidity, mortality and disability due to more VPDs for all across the life course

Strategic Objective 1
Strengthening & Expanding Immunization Systems & Programmes

1-1. Leaving no one behind in childhood immunization
1-2. Immunization services along the life course
1-3. Tailor-made immunization strategies
1-4. Vaccine security
1-5. New and underutilized vaccines and biologicals
1-6. Vaccine safety and safe immunization
1-7. Vaccine confidence, acceptance and demand
1-8. Sustainable domestic financing for immunization
1-9. Governance and Programme Management

Strategic Objective 2
Managing Health Intelligence on Vaccine-Preventable Diseases & Immunization

2-1. Strategic use of epidemiologic intelligence through VPD surveillance systems
2-2. Prompt detection, confirmation & characterization of pathogens through VPD laboratory capacity and networks
2-3. Generating quality data for ensuring continuous improvement of immunization programme and strengthening overall health system
2-4. Evidence-based decision-making and action

Strategic Objective 3
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3-1. Outbreaks or resurgences of VPDs
3-2. Vaccine & immunization safety events
3-3. Outbreaks requiring immunization responses (e.g. cholera outbreaks)
3-4. Emergency affecting immunization systems & programmes
3-5. Others (e.g. pandemic influenza)

Research & Innovation
Partnership & Coordination
Last, not but least, it should be noted that the 18 Strategies intended to achieve the three Strategic Objectives for the Western Pacific Region will also support countries and areas in the Region to achieve the vision and strategic priorities of the *Immunization Agenda 2030* (Figure 3), which was endorsed by the World Health Assembly in August 2020. The Agenda is intended to reduce mortality and morbidity from VPDs for all people throughout the life course, leave no one behind by increasing equitable access to and the use of new and existing vaccines, and ensure good health and well-being for everyone by strengthening immunization within primary health care, thus contributing to UHC and sustainable development. The World Health Assembly, in endorsing the Agenda, requested WHO to support Member States to achieve the objectives and goals of the Agenda’s seven strategic priority areas: (1) immunization programmes for primary health care and UHC; (2) commitment and demand; (3) coverage and equity; (4) life course and integration; (5) outbreaks and emergencies; (6) supply and sustainability; and (7) research and innovation (Figure 4).

Figure 3. Immunization Agenda 2030 at a glance

**Vision**
A world where everyone, everywhere, at every age...
...fully benefits from vaccines...
...for good health and well-being

**Impact goals**
Reduce mortality and morbidity from vaccine-preventable diseases for everyone throughout the life course.
Leave no one behind, by increasing equitable access and use of new and existing vaccines.
Ensure good health and well-being for everyone by strengthening immunization within primary health care and contributing to universal health coverage and sustainable development.

Figure 4. 18 Strategies to support implementation of the Immunization Agenda 2030

1. Leaving no one behind in childhood immunization
2. Immunization services along the life course
3. Tailor-made immunization strategies
4. Vaccine security
5. New and underutilized vaccines and biologicals
6. Vaccine safety and safe immunization
7. Vaccine confidence, acceptance and demand
8. Sustainable domestic financing for immunization
9. Governance and programme management
10. Strategic use of epidemiologic intelligence through VPD surveillance systems
11. Prompt detection, confirmation & characterization of pathogens through VPD laboratory capacity and networks
12. Generating quality data for ensuring continuous improvement of immunization programme and strengthening overall health system
13. Evidence-based decision-making and action

14. Outbreaks or resurgences of VPDs
15. Vaccine & immunization safety events
16. Outbreaks requiring immunization responses (e.g. cholera outbreak)
17. Emergency affecting immunization systems & programmes
18. Others (e.g. pandemic influenza)
Strategic Objective 1. Strengthening and expanding immunization systems and programmes

Strategy 1.1
Leaving no one behind in childhood immunization

1.1.1 Context
- From 1988 to 2000, immunization systems and programmes in the Western Pacific Region were significantly strengthened by regional polio eradication initiatives. Since 2003, the Region has continued to further strengthen immunization systems and programmes through the new regional initiatives, measles elimination and accelerated hepatitis B control.
- The Regional Framework for Implementation of the Global Vaccine Action Plan in the Western Pacific 2014–2020 (WPR/RC65.R5) set regional vaccination coverage targets at: (i) ≥95% national coverage for all vaccines used in the NIP, unless otherwise recommended; and (ii) ≥90% coverage in every district or equivalent administrative unit for all vaccines used in the NIP, unless otherwise recommended, by 2020. As of 2018, regional DTP3 coverage reached 93.4%. Seventeen countries and areas had reached ≥95% coverage with DTP3. Thirteen countries and areas in the Region reached >90% DTP3 coverage in all districts.

1.1.2 Challenges
- Information on the population of target children for immunization is incomplete and/or inaccurate in several countries, while immunization performances have been impressively improved across the Region.
- Frequency of access to disadvantaged children (e.g. urban poor, remote rural, minority ethnic groups, migrants, non-citizens, etc.) for routine immunization service are insufficient in several countries.
• Monitoring and follow-up of the under-vaccinated population (e.g. no vaccination, drop out, etc.) is limited.
• Follow-up actions beyond infancy are inadequate to complete childhood immunization.
• Missed opportunities for vaccination are not well identified and sufficiently used.
• Routine immunization is inadequately integrated with other public health programmes to best use available resources to achieve the programme objectives.

1.1.3 Childhood immunization through 2030

• All children born in the country fully immunized according to the national childhood immunization schedule.

1.1.4 Strategic Directions

Registering all newborns

(1) Ensure all newborns are enrolled in a timely manner in the national childhood immunization programme through collaboration with other health programmes (e.g. MCH) and other sectors or systems (e.g. civil registration system).

(2) Ensure that the information of all newborns can be easily accessed and fully utilized for the childhood immunization programme.

(3) Provide all newborns with a home-based record (child health card).

(4) Ensure all vaccines administered under the national immunization schedule are accurately recorded both in the home-based record (child health card) and the national immunization registry by public and private immunization providers.

Achieving and maintaining the highest standards of the childhood immunization programme

(1) Ensure that all children are provided with at least four opportunities for vaccination in the first year of life through fixed, mobile or outreach immunization activities.

(2) Establish a second-year-of-life immunization platform to expand vaccination opportunities beyond infancy to complete the childhood immunization schedule (if missed earlier), give booster doses (e.g. second dose of MCV and a booster dose of DTP vaccines) and ensure continuity of routine vaccinations for preschool children and schoolchildren.

(3) Identify missed opportunities for vaccination and monitor completion of vaccinations at every opportunity at any health-care facility visit using home-based records (child health cards).

(4) Introduce school entry check to monitor the completion of vaccination.

(5) Refer children not fully immunized to vaccination sites and ensure completion of all scheduled vaccinations.

(6) Review regularly the subnational data to identify low-performing areas and carry out tailor-made activities to increase vaccine coverage among the most disadvantaged populations, including under-immunized and zero-dose children.

Strengthen childhood immunization programme with priority public health services

(1) Periodically intensify the routine immunization programme with other primary health-care activities (e.g. health promotion, nutrition, deworming programme) and supplementary immunization activities (SIAs) to identify and vaccinate children not fully immunized.
**Strategy 1.2**

**Expanding immunization services along the life course**

### 1.2.1 Context

- In recent years, WHO has recommended additional vaccines beyond infancy. There is increasing focus on a life-course approach to immunization.
- The *Immunization Agenda 2030: A global strategy to leave no one behind* (IA2030) set an ambitious overarching global vision and strategy for vaccine and immunization for the decade 2021–2030. One of the seven strategic priorities (Life Course and Integration) of IA2030 has a goal of strengthening policies and service delivery throughout the life course and establishing integrated delivery points of contact between immunization and other public health interventions for different target age groups.
- Countries that have reached high coverage of their routine childhood immunization programme are encouraged to reach unvaccinated individuals and expand the vaccination schedule to reach people across the entire life course.
- The life-course approach focuses on addressing population health needs over time and, as such, it provides additional opportunities for integration with other age-appropriate interventions.

**Figure 5. Immunization along the life course**

<table>
<thead>
<tr>
<th>Pregnancy</th>
<th>Newborn &amp; Neonatal</th>
<th>Infancy</th>
<th>Early childhood</th>
<th>Adolescents</th>
<th>Youth &amp; Adulthood</th>
<th>Older Age</th>
</tr>
</thead>
<tbody>
<tr>
<td>Early in pregnancy</td>
<td>&lt;24 hrs of life</td>
<td>&lt;1 year</td>
<td>1-9 years</td>
<td>≈10-19 years</td>
<td>20-65 years</td>
<td>&gt;65 years</td>
</tr>
<tr>
<td>Tetanus (Td/Tdap)</td>
<td>Influenza</td>
<td>Hepatitis B</td>
<td>Tuberculosis</td>
<td>Measles (2nd dose)</td>
<td>Diphtheria</td>
<td>Tetanus</td>
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<td></td>
<td></td>
<td>Diphtheria</td>
<td>Tetanus</td>
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<td></td>
<td>Pertussis</td>
<td>Meningococcal disease</td>
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<td>Typhoid</td>
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<td>Hepatitis A</td>
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<td>Pneumococcal disease</td>
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<td>Influenza</td>
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<td></td>
<td></td>
<td></td>
<td>Shingles</td>
</tr>
</tbody>
</table>

- Routine immunization
- In specific regions
- In specific groups
1.2.2 Challenges

- Disease burden data on VPDs among children <5 years has been well documented but limited in older age groups.
- New and underutilized vaccines that target older age groups (e.g. adolescence, adulthood, during pregnancy and in older age groups) are becoming available but provide both challenges and opportunities for the immunization programme.
- Immunization delivery beyond childhood has not been well established in many countries.
- The world population is ageing due to increasing life spans and decreasing birth rates.
- Limited and/or inadequate collaboration within health sector (e.g. other departments and divisions) and beyond health sector (e.g. public and private health services, ministries of education and finance).

1.2.3 Immunization services along the life course through 2030

- Everyone benefits from recommended vaccines throughout the life course and vaccine delivery integrated with other essential health interventions.

1.2.4 Strategic Directions (Figure 5)

1. Determine burden of VPDs beyond childhood by strategic use of epidemiologic intelligence through optimized and integrated VPD surveillance.
2. Expand immunization schedule from childhood along the life course to address the burdens of VPDs determined throughout the life course.
3. Introduce, or accelerate the introduction of, booster doses and new vaccines to address the burdens of VPDs determined throughout the life course (e.g. pneumococcal disease, rotavirus diarrhoea, human papillomavirus, seasonal influenza, etc.) (Strategy 1.5).
   - New vaccines.
   - Booster doses in the second year of life.
   - Vaccination of adolescents, women of child-bearing age and older people.
4. Raise awareness among health-care professionals on the burdens of VPDs throughout the life course and the importance and measures for decreasing and preventing the burden of VPDs through vaccines and the immunization programme.
5. Generate demand among the general population for vaccination through the life course for decreasing and preventing morbidity, mortality and disability caused by VPDs over the life course (Strategy 1.7).
6. Establish integrated delivery points of contact between immunization and other essential health interventions for various target age groups.
7. Expand vaccine delivery through collaboration beyond the health sector and develop and implement context-specific immunization programmes such as:
   - Preschool, school and universities
   - High-risk occupational groups (e.g. health-care workers, military, travel industry)
   - Business settings (e.g. factories)
   - Nursing care homes
   - International travellers.
Strategy 1.3

Closing immunity gaps through tailor-made immunization strategies

1.3.1 Context

- High vaccination coverage rates should be achieved and maintained, and these are crucial to halting the spread of VPDs in the Western Pacific Region.
- An immunity gap will lead to increased disease incidence, outbreaks and deaths from VPDs. Outbreaks due to VPDs continue to occur unless immunity gaps are completely filled by routine immunization activities and as long as susceptibility among the population remains.
- Several countries, although they have reported high coverage of measles vaccination and high quality of measles SIAs at the national level and/or repeatedly conducted measles SIAs, were seriously affected by the resurgence of endemic measles virus transmission or large-scale measles outbreaks following importation.
- Countries need to plan, prepare and conduct high-quality SIAs to fill immunity gaps for VPDs due to inadequate routine immunization.

1.3.2 Challenges

- Current immunization coverage rates are suboptimal, particularly at the subnational level of some countries, to ensure herd immunity and halt the spread of VPDs in the Region.
- Inequities still exist in vaccination coverage among children in several countries (due to socioeconomic status, education, urban/rural residence, gender, etc.).
- The number of measles cases has recently increased among young infants before getting the first dose of measles vaccine, young adults and specific groups that are not well targeted by existing strategies (e.g. specific ethnic groups, cross-border populations, etc.).
- Mild (modified) measles cases and outbreaks have occurred among fully immunized adults with the possibility of waning immunity and its impact on the future vaccination programme.
- Outbreaks of rubella have occurred among adults in several countries. These outbreaks occurred due to lack of insufficient mechanisms to reach non-immune older adolescents and adults.
- Potency of heat-sensitive vaccine, e.g. measles vaccine, may be affected or lost due to improper handling of vaccine or during mobile/outreach vaccination activities, resulting in primary vaccine failure and the creation of an immunity gap or an unimmunized population among the vaccinated population.
- Lack of political will, changes in the mechanisms for financial support, the introduction of new and combined vaccines, political instability, migration and increased mobility, persistence of social inequities, underserved populations, growing parental concerns and, in some cases, refusals of vaccination contribute to the creation of an immunity gap in the population.
- Even a temporary interruption of routine immunization services (e.g. during epidemics and pandemics, including COVID-19) may lead to a secondary health crisis such as measles outbreaks during or after the recovery phase, amplifying the economic damage of the epidemic and exacerbating morbidity and mortality.
1.3.3 Closing immunity gaps through 2030

- Immunity gaps identified and characterized according to age, gender, geographical location and socioeconomic status.
- Immunity gaps closed through tailor-made immunization strategies.

1.3.4 Strategic Directions

**Identification and characterization**

1. Generate disease burden data by age, gender, geographical location and socioeconomic status through the use of epidemiologic intelligence obtained from optimized and integrated VPD surveillance systems (Strategy 2.1).
2. Conduct a prompt and thorough outbreak investigation and risk assessment immediately after the detection of a VPD outbreak to quickly identify and characterize the undetected immunity gap (Strategy 3.1).
3. Conduct a knowledge, attitude and practice (KAP) survey for NIPs to design targeted strategies that increase uptake of vaccination along the life course.
4. Conduct a serosurvey for a defined population over a specified period of time, or establish and conduct serosurveillance for a defined population on a periodical basis to determine the level of antibodies against a given etiologic agent as a direct measure of the population immunity, in an effort to detect age cohorts or special groups with immunity gaps, and to monitor and evaluate vaccine effectiveness.

**Closure of immunity gap**

1. Enhance vaccine confidence, acceptance and demand among the population with an immunity gap (Strategy 1.7).
2. Enhance two-way communication and engagement with communities and health workers.
3. Plan and conduct catch-up immunization activities through the routine immunization programme.
4. Utilize the World Immunization Week (the last week of every April) to raise awareness and conduct catch-up immunization activities for people who were missed by NIPs.
5. Plan and conduct high-quality SIAs to prevent large-scale outbreaks (e.g. cVDPV) and nationwide resurgences (e.g. measles) caused by accumulation of susceptible children missed by NIPs.
6. Plan and conduct SIAs for high-risk groups (e.g. ethnic minorities) or in high-risk areas (e.g. urban slums) and plan and conduct targeted, tailored immunization campaigns to protect high-risk populations (e.g. ethnic minority groups, urban slum dwellers, migrants, non-state citizens, etc.) from morbidity, mortality and disability caused by VPDs and outbreaks of VPDs (e.g. measles, rubella, diphtheria, pertussis, etc.).
7. Conduct outbreak response immunizations in a timely manner after prompt and thorough outbreak investigations and risk assessments to fill residual immunity gaps causing further spread of VPDs (e.g. cVDPV, measles, rubella, diphtheria, etc.) (Strategy 3.1).
Strategy 1.4

Ensuring vaccine security in all countries and areas in the Region

1.4.1 Context

- “Vaccine security” has been defined by UNICEF as the “sustained, uninterrupted and timely supply of affordable vaccine of assured quality”. By definition, three critical elements in ensuring vaccine security are: (i) guaranteed procurement of vaccines through firm contracts with manufacturers; (ii) secured, multi-year allocations for vaccine financing; and (iii) long-term accurate forecasting of vaccine requirements.

- One of the cornerstones of an effective NIP is for its supply chain to ensure a continuous and uninterrupted availability of essential vaccines up to the point of vaccination. Uninterrupted availability of vaccines and logistics from the national level to the service-delivery level is necessary for timely vaccination of the target population.

- Vaccines require effective vaccine storage with rigorous temperature control in the cold chain.

- Vaccines and other logistics require proper handling to prevent the loss of potency of heat-sensitive vaccines (e.g. measles vaccines).

- Currently, there is the UNICEF Vaccine Independence Initiative that has been set up to ensure that national budgeting cycles and procurement requirements are not a barrier to children receiving life-saving vaccines whenever and wherever they are needed. This is a financial mechanism designed for selected countries and regions (e.g. Pacific island countries and areas) to bridge temporary gaps when domestic budgets are not immediately available at the time a procurement must take place.

- In other regions, including the Region of the Americas, there is a mechanism called the Revolving Fund that provides participating Member States and institutions with the assurances of a constant flow of vaccines and related supplies for their immunization programmes.

1.4.2 Challenges

- Countries experience regular stock-outs of key vaccines, and in many cases, these cause interruptions of immunization services due to the following reasons:
  - stock monitoring and forecasting issues;
  - global shortage of the vaccine; and
  - delays in releasing national funds to purchase vaccines on time and ensuring vaccine financing.

- Difference in procurement mechanisms and no pooled procurement mechanism in the Region.

- Different capacity levels of national regulatory authorities (NRAs).

- Outdated or non-functioning cold-chain equipment.

1.4.3 Vaccine security through 2030

- Assured quality and affordable vaccines supplied in the immunization programme by sustainable financing without interruption.

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39 Vaccine security is defined as the sustained, uninterrupted supply of affordable vaccines of assured quality.
1.4.4 Strategic Directions

Quality
(1) Assure quality of vaccine through strengthening national regulatory capacity to allow diversification of manufacturing sources.
(2) Assure quality of vaccine at the service-delivery level by ensuring effective vaccine management by vaccinators and health-care providers.

Affordability
(1) Ensure that new vaccines meet country needs through an evidence-based decision-making process.
(2) Ensure that vaccines are priced affordably to sustain the supply and/or demand through consultation with manufacturers and other international partners.
(3) Consider establishment of a new pooled procurement mechanism by a group of selected countries to reduce the cost of vaccine (such as Vaccine Independence Initiative for 13 Pacific island countries and the Revolving Fund for Latin American countries).
(4) Ensure that vaccines are introduced in a timely manner through an evidence-based decision-making process and well-planned preparation.

Production and supply
(1) Promote integration of the immunization supply chain into the entire primary health-care system.
(2) Strengthen national forecasting, planning and procurement capabilities for all vaccines used in NIPs through close collaboration with manufacturers and other international partners.
(3) Enhance communication and coordination with manufacturers to ensure adequate vaccine production and supply.
(4) Consider feasibility of a new pooled procurement mechanism by a group of select countries to ensure timely and sufficient supply of vaccines.
(5) Improve timely access to quality vaccines through strengthening national regulatory capacity.

Financial sustainability (refer to Strategy 1.8)
Strategy 1.5

Accelerating use of new and underutilized vaccines and biologicals

1.5.1 Context

- Since WHO launched the Expanded Programme on Immunization (EPI) in 1974, vaccination against six diseases (diphtheria, measles, pertussis, polio, tetanus and tuberculosis) has prevented millions of deaths and disabilities. Significant advances have been made in the development and introduction of vaccines, and licensed vaccines are now available to prevent 25 diseases.

- In the past, new and underutilized vaccines (referred to hereafter as “new vaccines”) only became available in LMICs decades after being introduced in high-income countries. However, with the support of global partners, including WHO, UNICEF, and Gavi, the Vaccine Alliance, which provides funding and shapes vaccine markets through forecasting and assurances of demand in low-income countries in exchange for lower vaccine prices, new vaccines are now introduced more rapidly.

- A “vaccine introduction” can mean the addition to an immunization programme of a vaccine against a disease not previously covered by an immunization programme. It can also describe the introduction of a new product formulation of a vaccine already in the programme, a new combination vaccine, or a vaccine that uses a new route of administration in place of a currently used vaccine.

- The decision to introduce a vaccine into the NIP presents many issues in prioritizing investments in the health sector. The challenge is to tackle key issues systematically, in order to provide the best available services in an appropriate, affordable and cost-effective manner.

- The WHO Regional Office for the Western Pacific promotes the evidence-based introduction of new vaccines. The new vaccines of primary focus in the Western Pacific Region are: *Haemophilus influenzae* type b (Hib) vaccine, human papillomavirus (HPV) vaccine, Japanese encephalitis (JE) vaccine, pneumococcal conjugate vaccine (PCV), rotavirus vaccine and other vaccines based on country priorities.

(1) Effective and safe vaccines are available but not used widely

**Hepatitis A vaccine**

- See Section A.18: Hepatitis A

- There are two types of hepatitis A vaccines currently used worldwide: (i) formaldehyde-inactivated vaccines produced in several countries, which are the most commonly used globally; and (ii) live attenuated vaccines. They should be part of a comprehensive plan for the prevention and control of viral hepatitis, including measures to improve hygiene and sanitation and measures for outbreak control.

**Meningococcal vaccine**

- See Section A.13: Meningococcal disease

- There are two types of vaccines available, including polysaccharide vaccines and polysaccharide–protein conjugate vaccines. Although purified capsular polysaccharide antigens elicit protective antibody responses, conjugate vaccines are more immunogenic and also induce immunological memory. Both polysaccharide and conjugate vaccines are available against meningococci of serogroups A, B, C, W135 and Y.
Rabies vaccine
- See Section A.17: Rabies
- WHO recommends two main immunization strategies for the prevention of human rabies: (i) post-exposure prophylaxis (PEP), which includes extensive and thorough wound washing at the rabies virus-exposure site, together with rabies immune globulin administration if indicated, and the administration of a course of several doses of rabies vaccine; and (ii) pre-exposure prophylaxis (PrEP), which is the administration of several doses of rabies vaccine before exposure to the rabies virus. Cell culture and embryonated egg–based rabies vaccines (CCEEVs) have been administered to millions of people worldwide. CCEEVs are intended for use in both PrEP and PEP.

Seasonal influenza vaccine
- See Section A.16: Seasonal influenza
- There are two types of vaccines available: inactivated vaccines and live attenuated influenza vaccines (LAIVs). Most of the current seasonal influenza vaccines include two influenza A strains and one influenza B strain. A quadrivalent LAIV for intranasal application containing two influenza A strains and two influenza B strains was licensed in the United States of America in 2012.

Mumps vaccine
- See Section A.14: Mumps
- There is only one licensed for use in children who are 12 months through 12 years of age. Mumps vaccine is usually given as part of a combination vaccine that protects against three diseases: measles, mumps and rubella (MMR). These children should get two doses of MMR vaccine.

Varicella vaccine
- See Section A.15: Varicella
- Countries where varicella is an important public health burden could consider introducing varicella vaccination in the routine childhood immunization programme. Before countries decide on the introduction of varicella vaccine into routine childhood immunization programmes, they should have set up adequate disease surveillance to assess the disease burden caused by varicella, with the provision of continued surveillance after introduction of vaccination.
- Varicella vaccines based on live attenuated VZV (Oka strain) were developed and clinically tested in the 1970s and 1980s. Currently, several licensed formulations of live attenuated lyophilized varicella vaccines are available, both as refrigerator-stable and frozen vaccine formulations. The vaccines are available either as monovalent (varicella only) or in combination with the MMR vaccine.

(2) New, effective and safe vaccines are available

Typhoid fever vaccine
- See Section A.19: Typhoid
- Three types of typhoid vaccines are licensed for use: (i) typhoid conjugate vaccine; (ii) unconjugated Vi polysaccharide; and (iii) live attenuated Ty21a vaccines.
Cholera vaccine  
- See Section A.20: Cholera
- Two types of oral cholera vaccines are currently available: (i) WC-rBS, killed whole cell monovalent (O1) vaccines with a recombinant B subunit of cholera toxin (Dukoral®); and (ii) WC, killed modified whole cell bivalent (O1 and O139) vaccines without the B subunit (Shanchol®, Euvichol® and mORCVAX®). The vaccines should always be used in conjunction with other cholera prevention and control strategies.

Dengue fever vaccine  
- See Section A.21: Dengue fever
- There is only one licensed dengue vaccine available, CYD-TDV (Dengvaxia®), which is a live attenuated, recombinant tetravalent vaccine employing the attenuated yellow fever virus 17D strain as the replication backbone. Several other dengue vaccine candidates are in clinical development: two vaccine candidates currently under evaluation in Phase III trials are also live attenuated (recombinant) tetravalent vaccines.

Malaria vaccine  
- See Section A.21.2: Malaria
- More than 30 *P. falciparum* malaria vaccine candidates are at either advanced preclinical or clinical stages of evaluation. In January 2016, RTS,S vaccine was recommended by WHO for pilot introduction in selected areas of three African countries. RTS,S is being evaluated for use as a complementary malaria-control tool that could be added to (and not replace) the core package of WHO-recommended preventive, diagnostic and treatment measures.

(3) Effective and safe biologicals are available but not used widely

**Diphtheria antitoxin (DAT)**  
- See Section A.6: Diphtheria
- DAT is the mainstay of the treatment, used for patients who have probable or confirmed respiratory diphtheria. Until the development and use of diphtheria vaccine, DAT was the primary intervention for diphtheria, reducing CFRs from 25–50% in untreated patients to 3% in patients treated early.
- DAT supply is limited due to the small number of manufacturers. The manufacturers known to have current DAT manufacturing capacity include VINS Bioproducts (India) and Butantan Institute (Brazil).

**Hepatitis B immune globulin (HBIG)**  
- See Section A.5: Hepatitis B
- HBIG is immediately recommended following a high-risk exposure for temporary immunity. HBIG prophylaxis in conjunction with hepatitis B vaccination may be of additional benefit for: (i) newborn infants whose mothers are HBsAg-positive, particularly if they are also HBeAg (hepatitis B e-antigen)-positive; (ii) people who have had percutaneous or mucous membrane exposure to HBsAg-positive blood or body fluids; (iii) unvaccinated people who have been sexually exposed to an HBsAg-positive person; and (iv) patients who need protection from recurrent HBV infection following liver transplantation.
- Currently, there are three manufacturers (Cangene Corporation, Grifols, Biotest Pharmaceuticals Corporation) that are producing and distributing HBIG worldwide.

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48 Dengue vaccine: WHO position paper.
49 Malaria vaccine: WHO position paper.
Human rabies immune globulin (HRIG)\textsuperscript{52}

- See Section A.17: Rabies
- HRIG is administered only once, at the beginning of anti-rabies prophylaxis, to previously unvaccinated patients. This will provide immediate antibodies until the body can respond to the vaccine by actively producing antibodies of its own.
- Concerns due to batch-to-batch variation in effectiveness, safety and quality, the short shelf-life (approximately 2 years) even with correct maintenance of cold chain (2–8 °C), as well as hesitancy regarding administration of HRIG, have hindered its use in practice. In endemic countries, HRIG is often in short supply because of insufficient demand and supply forecasting.

1.5.2 Challenges

- Limited progress in new vaccine introduction (e.g. PCV, RV, HPV) in middle-income countries, including those that will be graduating from Gavi:
  - limited disease burden data (e.g. surveillance)
  - prioritization of diseases
  - vaccines (safety, effectiveness, supply, etc.)
  - capacity of the immunization programme
  - domestic financing and sustainability.
- Importance of laboratory-based surveillance for diseases prevented by new vaccines and the critical need to maintain surveillance and laboratory capacity in an era of declining resources.
- Impact of new vaccine introduction on immunization programmes in the countries in the Region, with focus on how new vaccine introductions can enhance programmes and how they might detract from them.
- Lack of capacity to ensure prompt reporting, investigation, diagnosis, case management, including usage of equine DAT, and response to diphtheria cases and outbreaks.

1.5.3 Accelerated use of vaccines and biologicals through 2030

- Introduction and utilization of new and underutilized vaccines and biologicals accelerated based on evidence of disease burden, public health priority of the target disease, and financial and economic aspects.

1.5.4 Strategic Directions\textsuperscript{53}

1. Estimate the magnitude of the disease burden in the country, identify if the disease is a public health priority, and identify the existence and effectiveness of other strategies for preventing and controlling the disease.
2. Identify safety, performance and other characteristics; its economic and financial attributes (cost, affordability and cost-effectiveness) and whether the country can expect a reliable supply of the vaccine.
3. Evaluate capacity of the immunization programme and the underlying health system to successfully introduce the vaccine and to be able to continue to deliver it over the long term.

\textsuperscript{52} Rabies vaccines: WHO position paper.
**Strategy 1.6**

**Ensuring vaccine safety and safe immunization**

**1.6.1 Context**
- Since 2015, 91% of the population from seven Member States (Australia, China, Japan, New Zealand, the Republic of Korea, Singapore and Viet Nam) in the Western Pacific Region have been overseen for the quality of vaccines throughout their life cycle by the NRAs for vaccines that meet WHO assessment criteria.
- The Regional Alliance for National Regulatory Authorities for Vaccines in the Western Pacific was established in 2011 to promote NRA collaborative functions across the Region.
- As of 2018, 29 countries and areas in the Western Pacific Region have reported having a surveillance system for adverse events following immunization (AEFIs), and 14 countries have met the *Global Vaccine Action Plan 2011–2020* (GVAP) reporting indicator of at least 10 AEFI cases per 100,000 surviving infants per year.

**1.6.2 Challenges**
- Limited capacity of NRAs to perform WHO-recommended regulatory functions in resource-limited middle-income countries and Pacific island countries and areas.
- Under-reporting of AEFIs, lack of timely and comprehensive AEFI case investigations, and insufficient capacity for causality assessment.
- Lack of proper immunization waste disposal with environmental safety particularly in small Pacific islands (limited capacity with modern and costly waste-disposal methods).
- Increasing public demand for vaccine injury compensation in some countries.

**1.6.3 Vaccine safety and safe immunization through 2030**
- Vaccine safety ensured by a functional vaccine pharmacovigilance system in close collaboration with NRAs.
- All prescriptions, handling and administration of any vaccine performed appropriately and safely.

**1.6.4 Strategic Directions**

**Vaccine safety**
1. Establish and maintain a fully functional NRA to monitor and evaluate inherent properties and quality defects of vaccine products.
2. Collaborate with other countries to establish a subregional regulatory body to perform NRA functions for Pacific island countries and areas.

**Safe immunization**
1. Strengthen and maintain technical capacity of health-care providers at all levels through regular training on immunization safety and AEFIs.
2. Ensure immunization safety supplies, e.g. auto-disable syringes, reuse prevention syringes for the reconstitution of vaccines during routine immunization services and mass vaccination campaigns, and safety boxes, are adequately available at the service-delivery level.
3. Ensure environmentally responsible waste management is properly carried out with adequate disposal facilities, supplies, and correct practices at the district and service-delivery levels.
Safety surveillance and causality assessment

(1) Detect, report, investigate and respond to AEFIs in a timely manner through a well-functioning immunization safety surveillance in collaboration with NRAs.

(2) Establish and support a national immunization safety expert committee to conduct causality assessments and provide evidence-based recommendations in response to vaccine and immunization safety events.

Injury compensation

(1) Develop a programme or procedures to compensate individuals who experience a vaccine-related injury.
Strategy 1.7

Enhancing vaccine confidence, acceptance and demand

1.7.1 Context
- The gains achieved in immunization and VPDs are largely attributable to support from stakeholders, partners and the community through effective advocacy and communication.
- Countries have reported vaccine hesitancy in the annual WHO–UNICEF Joint Reporting Form (JRF) (2016–2019) and key reasons for hesitancy include knowledge gaps, safety concerns, religious beliefs and distrust of vaccines.
- While traditional printed and electronic media continue to play a role in communication and advocacy, social media has become increasingly popular with wider use among the public across the Western Pacific Region.
- Greater access to information via the Internet has also resulted in increased exposure to misinformation that may be difficult to interpret. The spread of myths and rumours about the safety of vaccination and other health services can lead to reduced health-care seeking behaviour.

1.7.2 Challenges
- Vaccine hesitancy is increasing across the Region.
- Vaccine hesitancy and refusal have caused serious declines in routine immunization coverage (e.g. measles vaccine) followed by resurgence or large-scale VPD outbreaks (e.g. resurgence and large-scale measles outbreaks in several countries of the Region in 2018 and 2019).
- Information on the specific reasons for vaccine hesitancy and refusal, and on the most susceptible groups, is limited.
- Health-care workers in many countries are not provided with sufficient guidance and training on effective interpersonal risk communication for building confidence in vaccines and immunization and effectively counselling caregivers when they come across hesitancy and refusal.
- There is a lack of accurate information on the benefits of vaccination among the public, policy-makers, advocacy groups and media.
- There is no system in place to monitor and respond to rumours and other misinformation online and in communities.
- There is a lack of commitment on the part of immunization programme managers, public and private sector providers, local leadership, and civil society organizations to hear and effectively respond to concerns raised by individuals and communities on vaccines and immunization services.

1.7.3 Vaccine confidence, acceptance and demand through 2030
- Robust public trust established in vaccines, providers and policy-makers for immunization.
- Immunization valued by everyone.
- Immunization services actively sought out and received.
1.7.4 Strategic Directions

Confidence
(1) Provide the public with accurate information on the benefits of vaccines and immunization to mitigate negative behavioural and social drivers of vaccination.
(2) Promote the reliability of vaccination services and competence of health professionals providing those services.
(3) Include the topic of immunization in educational curricula of health-care worker training schools and provide health-care workers with guidance and training for effective and efficient interpersonal communication and advocacy.
(4) Develop information resources, and processes for sharing resources, for policy-makers, advocacy groups and the media.
(5) Monitor and build public confidence through creating forums for public engagement in sharing opinions and concerns on vaccines and immunization.

Acceptance
(1) Promote positive attitudes towards vaccination among the population through expanded community engagement, including through dissemination of information on immunization by trusted public figures and celebrities.
(2) Monitor rumours on social media platforms and in communities and respond in real time with proactive communication using a variety of strategies.
(3) Develop and implement evidence-based, human-centred and tailored solutions to address vaccine hesitancy in the local context.

Demand
(1) Collect information on the most common causes of hesitancy and refusal of vaccination and identify groups most prone to those perspectives.
(2) Encourage immunization programme managers, public and private sector providers, local leadership, and civil society organizations to hear and act on the voices of individuals and communities on vaccines and immunization services.
(3) Foster and enhance the actions of individuals and communities that are proactively seeking and supporting vaccination services, and encourage their participation in advocacy activities.
Strategy 1.8

Securing sustainable domestic financing for immunization

1.8.1 Context

- According to 2018 WHO–UNICEF JRF data, 14 countries and areas in the Western Pacific Region received 100% government funding for vaccines in routine immunizations, while 27 countries and areas have a line item for vaccines within ministerial or government budgets.
- Global and regional partners continue to provide financial support for immunization and VPD activities both at the country and regional levels.
- From 2000 to 2015, Gavi, the Vaccine Alliance, supported seven countries (Cambodia, Kiribati, the Lao People’s Democratic Republic, Mongolia, Papua New Guinea, Solomon Islands and Viet Nam) in the introduction of new vaccines and health system strengthening. As of 2020, only five countries continue to receive Gavi funding support, and both Kiribati and Mongolia are no longer eligible for Gavi support.

1.8.2 Challenges

- As of 2018, vaccines in routine immunization programmes are partially supported by government funds in 22 countries and areas of the Western Pacific Region and dependency on external funds is continuing.
- In some countries, external funding continues covering a part of essential national public health functions, resulting in withdrawal of domestic funds from these functions and delayed transition to self-financing.
- High dependency on external funds in public health emergency response.
- Lack of comprehensive costing and budget planning in terms of transition away from donor support and to annual allocations of government funds in LMICs.
- Absence of clear, long-term procurement strategies or modalities particularly in some middle-income countries.
- Delay in disbursement and allocation of domestic and external funds from the national to subnational level, particularly within administratively decentralized systems.
- Lack of good governance, stewardship and accountability of immunization programme financing in some countries.
- Limited funds for innovations supporting vaccine development and vaccine delivery.

1.8.3 Immunization financing through 2030

- Sufficient domestic funding sustainably secured for vaccines, immunization supplies and operations.
- Immunization financing integrated into the overall financing of priority public health services and UHC.
1.8.4 Strategic Directions

**Transition**

(1) Develop a national plan and enhance institutional capacity to smooth the transition of programme activities from external funding support to domestic funding without compromising immunization programme achievements.

(2) Ensure domestic funds are sufficient for routine immunization programmes in post-transition period while sustaining the immunization programme achievements.

(3) Use external funds only as supplementary sources, such as new vaccine introduction and SIAs.

**Integration**

(1) Incorporate immunization financing into overall national health financing through integration into priority public health service deliveries (e.g. prevention, surveillance, laboratory support, etc.).

**Sufficient and sustainable financing**

(1) Ensure good governance, stewardship and accountability of immunization programme financing and management to achieve high performance.

(2) Promote participation of subnational governments in immunization financing.

(3) Ensure funds for public health emergencies related to VPDs, vaccines and immunization.

(4) Secure funding for research and innovations in the field of vaccines and immunization service delivery.

(5) Advocate with high-level decision-makers for sustainable immunization financing and long-term vaccine procurement strategies.
1.9.1 Context
- Governance and programme management of the NIP should be supported by legislation, policies, strategic plans and evidence-based decisions, and should ensure the leadership and directions for implementation of the immunization programme.
- According to 2018 WHO–UNICEF JRF data, 17 countries and areas in the Western Pacific Region have established a national immunization technical advisory group (NITAG) or similar institutional body to advise the ministry of health on immunization, and 23 countries and areas have prepared multi-year immunization plans.
- Health workforce in both the public and private sectors have expanded in many countries and contributed to enhancing immunization services.

1.9.2 Challenges
- Existing legislative provisions, policies and the capacity of evidence-based decision-making in some LMICs and Pacific island countries and areas are not yet strong enough to meet future needs in immunization services towards 2030.
- Management and coordination of the immunization programme at subnational levels are suboptimal in some countries.
- Functions of NITAGs in some countries are still suboptimal due to lack of standard operating procedures (SOPs), challenges with systematic declaration of conflicts of interest, poor understanding of the need for institutional independence and insufficient expertise.
- Chronic vacancies, high turnover and ageing of the staff in immunization service delivery are still critical issues in some countries.
- Opportunities for field staff to be regularly trained or updated and provided with proper information are still insufficient in several countries, resulting in the insufficient provision of quality and efficient immunization service and the lack of confidence in communication.

1.9.3 Governance and programme management through 2030
- NIP effectively and efficiently led, managed and coordinated at all levels.

1.9.4 Strategic Directions
(1) Ensure adequate legal framework, policies and updated plans (multi-year strategic plans and annual costed operational plans) to sustain a strong immunization programme.
(2) Strengthen functions of the NITAG to meet all six functions recommended by WHO to support evidence-based decision-making.
(3) Establish an intercountry evidence-based technical advisory body for immunization policies in the Pacific (e.g. Pacific Immunization Technical Advisory Group).
(4) Secure and properly distribute knowledgeable, skilled and motivated health workers to manage and monitor the performance of immunization programmes at the service-delivery level.
(5) Strengthen public–private partnership in immunization service delivery.
Strategic Objective 2. Managing health intelligence on VPDs and immunization

Strategy 2.1
Enhancing strategic use of epidemiologic intelligence through optimized and integrated VPD surveillance systems

2.1.1 Context

1. Achieving and sustaining accelerated control, elimination and eradication of VPDs
   - VPD surveillance systems are critical for developing and evaluating strategies for accelerated control, elimination and eradication of VPDs, as well as for monitoring changes in disease epidemiology and the impact of immunization, understanding vaccine effectiveness, making evidence-based decisions on the introduction of new vaccines into NIPs, and guiding priorities in the research.
   - High-quality information and data on every case and case classification should be assured for VPD surveillance systems by strong case-based surveillance, with investigations.
   - Traditionally, investments and enhancement of epidemiological and laboratory surveillance in the Western Pacific Region have mainly occurred after endorsement of disease elimination goals (e.g. polio, measles and rubella, hepatitis B) and in the introduction of new vaccines (e.g. vaccines against JE, RV and invasive pneumococcal disease):
     - For monitoring progress towards and certifying or verifying polio eradication or measles/rubella elimination, eradication or elimination, standard surveillance systems have been developed in all countries of the Region to ensure all suspected cases are reported and investigated with laboratory confirmation. Surveillance approaches have been progressively expanding (e.g. establishing and enhancing polio environmental surveillance and CRS surveillance, etc.).
In countries targeting MNT elimination, a nationwide surveillance system with a clinical investigation of each suspected case has been developed and strengthened to monitor the achievement and maintenance of MNT elimination.

Accelerated control of hepatitis B has been monitored through population-based serosurveys.

As VPD control and elimination goals for 2021–2030 will be expanding with the inclusion of more VPDs, the scope, quality and performance of VPD surveillance should be enhanced. Efforts are needed to ensure that surveillance with investigation of each case is available for a greater number of VPDs such as diphtheria, JE and invasive bacterial disease (IBD), including laboratory confirmation.

2. Supporting health system strengthening and UHC

- VPD surveillance systems, especially case-based surveillance systems, have helped identify unreached populations and higher-risk or emerging risk groups (e.g. mobile, cross-border populations, older age groups).
- VPD surveillance systems have also guided the development of effective immunization delivery strategies throughout the life course and also the strengthening of primary health care (PHC) and the overall health system, and developing strategies to reach out to all for health and to achieve UHC.

3. Supporting health security and emergencies

- VPD surveillance systems have enabled rapid detection of and response to outbreak-prone VPDs. Strengthening linkage between case-based VPD surveillance systems and the Early Warning, Alert and Response Network, as well as improved coordination of activities, will further contribute to prompter confirmation, timely declaration of and rapid response to all VPD outbreaks (e.g. diphtheria, JE, meningococcal meningitis, mumps, pertussis, polio, measles, rubella, typhoid, etc.), as well as other outbreak-prone diseases.
- VPD case-based surveillance with laboratory confirmation provides a useful platform to support strengthening surveillance for other communicable diseases or even broader public health issues (e.g. RV surveillance expanded to paediatric diarrhoeal syndromes, IBD surveillance supporting monitoring of AMR).
- Strengthening VPD surveillance will further contribute to the achievement of the core capacities required under the International Health Regulations (2005), known as IHR (2005), in all countries.

2.1.2 Challenges

- In the Western Pacific Region, with a degree of variability across countries, VPD surveillance systems are vertically organized, are sometimes fragmented and might be difficult to implement and sustain with sufficient quality.
- Main challenges in achieving highly performing VPD surveillance systems include:
  - suboptimal scope, i.e. limited number of VPDs among notifiable diseases and inadequate network of reporting facilities;
  - suboptimal quality of integration of VPD surveillance systems in broader surveillance systems;
  - insufficient coordination for investigation of notified cases, particularly between the curative and preventive sectors;

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54 VPD surveillance could be leveraged to: (i) develop standards and regulations for overall surveillance and data sharing; (ii) develop infrastructures for all laboratory specimen collection and transportation; (iii) develop workforce capacity for overall surveillance, data analysis and outbreak response; (iv) strengthen laboratory capacity for multiple pathogens, including through use of common testing platforms; (v) strengthen data management, including the use of sustainable integrated information systems; and (vi) support the estimation of disease burden and operational research to guide the development and introduction of new vaccines, drugs and service delivery strategies.

insufficient domestic funding to support operational tasks for case investigation, active surveillance, outbreak investigation and rapid response;
suboptimal capacity for management, analysis and visualization of data from VPD epidemiological and laboratory surveillance;
insufficient use of surveillance data to identify populations with immunity gaps; and
insufficient community engagement to surveillance.

2.1.3 Strategic Directions

• Guiding principle: Move towards comprehensive VPD surveillance, defined as the country and regional systems required to meet the minimum WHO-recommended standards for surveillance of a set of priority VPDs, with integration and synergy of surveillance functions across VPDs and other diseases where possible. Comprehensive VPD surveillance builds on existing, high-quality surveillance systems, avoids fragmentation and increases sustainability (Table 1).

Table 1. Proposed comprehensive VPD surveillance and minimum requirements in countries and areas in the Western Pacific Region

<table>
<thead>
<tr>
<th>Diseases included in comprehensive VPD surveillance</th>
<th>Nationwide, case-based with laboratory confirmation of every case</th>
<th>Nationwide, aggregated with laboratory confirmation of outbreaks</th>
<th>Sentinel, case-based with laboratory confirmation of every case</th>
<th>Other (e.g. VPDs have different minimum standards based on context)</th>
<th>VPDs included in the Western Pacific regional surveillance system</th>
</tr>
</thead>
<tbody>
<tr>
<td>Necessary</td>
<td>Measles, Rubella, Poliomyelitis, Diphtheria</td>
<td>CRS, JE</td>
<td>Neonatal tetanus (no laboratory confirmation)</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>Desirable based on country priorities</td>
<td>Meningococcus</td>
<td>Hib, Influenza, Pertussis, Pneumococcus, RV, Typhoid</td>
<td>Non-neonatal tetanus (no laboratory confirmation)</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>Optional</td>
<td>Hepatitis A, Hepatitis B, Mumps</td>
<td>Cholera (event-based), Varicella (no laboratory confirmation)</td>
<td></td>
<td>No</td>
<td></td>
</tr>
</tbody>
</table>

56 This definition is based on the following considerations:

- In 2018, WHO published updated surveillance standards for all VPDs, which detail the minimum standards for each disease to obtain sufficient information to support disease elimination or control goals, guide vaccine introduction and research.
- Priority VPDs could vary across regions and countries within the same region based on the maturity of the immunization programme and epidemiological situation.
- VPD surveillance is based on support functions (e.g. programme management and governance, workforce capacity, logistics and communication, laboratory coordination, supervision, monitoring and evaluation) that are common to all communicable diseases and could be developed or strengthened to serve multiple VPDs or multiple communicable disease surveillance. This approach would lead to total or partial integration of core functions (e.g. case detection, notification, investigation, confirmation, reporting, data analysis, feedback and outbreak response) for multiple diseases.

57 As defined by WHO VPD surveillance guidelines (2018).

(1) Within the Western Pacific Region, establish comprehensive VPD surveillance systems based on regional goals, diseases under IHR (2005) reporting requirements and country priorities:

- all countries should fulfil at least minimum requirements for surveillance of polio, measles, rubella, CRS, diphtheria, NT and JE (in countries at risk);
- most countries should meet at least minimum requirements for surveillance of pneumococcus, meningococcus, Hib, RV, typhoid, pertussis and non-neonatal tetanus, based on country priorities; and
- some countries could consider inclusion of hepatitis A, hepatitis B, mumps, cholera and varicella in the comprehensive VPD surveillance system, based on specific country needs and available resources.
(2) Ensure all facilities, including large hospitals and private sector and non-health sector facilities, promptly report all VPD cases to national surveillance systems.

(3) Integrate VPD surveillance systems into broader communicable diseases surveillance systems, while ensuring minimum requirements for each VPD are properly addressed.

(4) Allocate adequate funds and human resources to achieve and sustain high-quality VPD surveillance systems at all levels.

(5) Develop and implement information and communications technology (ICT) solutions to support comprehensive VPD surveillance for notification, reporting, data management and use of data at all levels.
Strategy 2.2
Ensuring prompt detection, confirmation and characterization of pathogens through integrated VPD laboratory capacity and networks

2.2.1 Context

- WHO has established and coordinated regional VPD laboratory networks with Member States to provide accurate and timely laboratory confirmation of JE, invasive bacterial pathogens, measles, polio, RV, rubella and other VPDs since 1990. Currently, WHO coordinates five regional VPD laboratory networks consisting of 500 public health laboratories (Table 2).
- All laboratories are accredited by WHO using the recommended standard operating protocols, methods and validated kits. Each participates in the quality management system that includes an external quality assurance programme, quality control schemes, and proficiency testing to monitor their performance and identify any gaps or needs. The laboratory network operates a regulated, confirmatory process of primary test results. The global specialized and regional reference laboratories perform highly complex molecular and gene sequencing techniques to characterize the strain type of the pathogen or pathogens to inform and enhance surveillance.

1. Achieving and sustaining accelerated control, elimination and eradication of VPDs

- Timely detection and response to any wild, vaccine-related and Sabin polioviruses have been supporting the Polio Endgame Strategy 2019–2023 and the Global Polio Eradication Initiative (GPEI). Environmental surveillance is being implemented in several countries to support disease-based surveillance for the detection of poliovirus.
- Accurate and timely laboratory confirmation and reporting of measles and rubella cases together with genotype information have been supporting the regional and national initiatives for measles and rubella elimination.
- Provide support for accelerated control of JE in the Region. The JE laboratory network was established to improve the capability for JE case confirmation among countries either known or suspected to be endemic for JE in the Region.58
- The RV laboratory network aims to monitor the impact of vaccination in reducing RV morbidity and mortality, to evaluate vaccine effectiveness, to detect the emergence of RVs that are not prevented by vaccine-induced antibodies and to monitor the safety of RV vaccines.
- The invasive bacterial VPD laboratory network aims to gather standardized data on children under 5 years of age suspected to have contracted invasive, severe infection caused by S. pneumoniae, Hib and N. meningitidis.

2. Supporting health system strengthening and UHC

- VPD laboratories are contributing to the quality of health care in a country by providing early warning signals of health risks.
- VPD laboratory networks contribute to the national capacities of the health system, as well as health security, through provision of continuous technical assistance, training, updated international standard guidelines and items, etc.
- VPD laboratory surveillance is contributing to the gathering of evidence-based data to support decision-making for the immunization programme and reducing morbidity and mortality.

58 Cambodia, China, Lao People’s Democratic Republic, Malaysia, Papua New Guinea, Philippines and Viet Nam.
### Table 2. Laboratory networks in the Western Pacific Region in support of VPD surveillance – 2020

<table>
<thead>
<tr>
<th>Countries</th>
<th>Polio</th>
<th>Measles and rubella</th>
<th>Japanese encephalitis</th>
<th>Rotavirus</th>
<th>IB-VPD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Australia</td>
<td>VIDRL (RRL)</td>
<td>VIDRL (RRL)</td>
<td>-</td>
<td>MCRI (RRL)</td>
<td>MDU (RRL)</td>
</tr>
<tr>
<td>Brunei Darussalam</td>
<td>VIDRL</td>
<td>NL</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Cambodia</td>
<td>NiID</td>
<td>NL</td>
<td>NL</td>
<td></td>
<td></td>
</tr>
<tr>
<td>China</td>
<td>CCDC (RRL) + 31 Prov Lab</td>
<td>CCDC (RRL) + 31 Prov + 331 Pref Lab</td>
<td>CCDC (RRL) + 10 PL</td>
<td>CCDC (RRL) + 20 SL</td>
<td>-</td>
</tr>
<tr>
<td>Papua New Guinea</td>
<td>VIDRL</td>
<td>NL</td>
<td>NL</td>
<td>NL + 1 SL</td>
<td>NL + 8 SL</td>
</tr>
<tr>
<td>Pacific island countries and areas (4)</td>
<td>VIDRL</td>
<td>4 NL: Guam, New Caledonia, Fiji and French Polynesia</td>
<td>-</td>
<td>1 NL Fiji</td>
<td>1 NL Fiji</td>
</tr>
<tr>
<td>Japan</td>
<td>NiID (GSL)</td>
<td>NiID (GSL)</td>
<td>NiID (GSL)</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Lao People’s Democratic Republic</td>
<td>NiID</td>
<td>NL</td>
<td>NL+ (SNL)</td>
<td>NL (Mahosot Hospital)</td>
<td>NL (NCLE) + 1 SL</td>
</tr>
<tr>
<td>Malaysia</td>
<td>NL</td>
<td>NL</td>
<td>-</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>Mongolia</td>
<td>NL</td>
<td>NL</td>
<td>-</td>
<td>NL + 1 SL</td>
<td></td>
</tr>
<tr>
<td>New Zealand</td>
<td>NL</td>
<td>NL</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Philippines</td>
<td>NL</td>
<td>NL</td>
<td>NL</td>
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<td></td>
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<tr>
<td>Republic of Korea</td>
<td>NL</td>
<td>NL</td>
<td>KDCA (RRL)</td>
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<td>Singapore</td>
<td>NL</td>
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<tr>
<td>Viet Nam Hanoi (North)</td>
<td>NL</td>
<td>NL &amp; 2 SNL</td>
<td>NL</td>
<td>NL</td>
<td>NL + 1 SL</td>
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<tr>
<td>Viet Nam Ho Chi Minh City (South)</td>
<td>NL</td>
<td>NL &amp; 2 SNL</td>
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<td>NL</td>
<td>NL + 1 SL</td>
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<tr>
<td>Hong Kong SAR (China)</td>
<td>NL</td>
<td>PHLC (RRL)</td>
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<tr>
<td>Macao SAR (China)</td>
<td>PHLC Hong Kong</td>
<td>NL</td>
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<tr>
<td>Total</td>
<td>43 labs: 1 GSL, 2 RRLs, 9 NLs, 31 prov labs (China)</td>
<td>385 labs: 1 GSL, 3 RRLs, 15 NLs, 34 prov &amp; 31 pref labs</td>
<td>20 labs: 1GSL, 2 RRLs, 7 NLs, 10 prov labs</td>
<td>32 labs: 3 RRLs, 8 NLs, 21 SHLs</td>
<td>20 labs: 2 RRLs, 6 NLs, 12 SHLs</td>
</tr>
</tbody>
</table>

Highlighted in blue are countries with WHO designated regional reference and global specialized laboratories.

GSL: Global Specialized Laboratory, RRL: Regional Reference Laboratory, NL: National Laboratory, SL: Subnational Laboratory

CCDC: Chinese Center for Disease Control and Prevention, KDCA: Korea Disease Control and Prevention Agency, MCRI: Murdoch Children’s Research Institute, MDU: Microbiological Diagnostic Unit, NCLE: National Center for Laboratory and Epidemiology, NiID: National Institute of Infectious Diseases, PHLC: Public Health Laboratory Centre, VIDRL: Victorian Infectious Diseases Reference Laboratory
3. Supporting health security and emergencies

- VPD laboratories in the Region are sustaining high proficiency of testing to respond to outbreaks and for the confirmation of the diseases.
- VPD laboratories contribute to national preparedness and outbreak response plans; investment in infrastructure and training of staff in VPD laboratories has been utilized in other programmes and contributed to strengthening laboratory capacity for other diseases that are not VPDs.
- VPD laboratories, which are part of VPD laboratory networks but have no adequate laboratory capacity, have access to a VPD reference laboratory in an emergency through a well-established referral system for the confirmation of diseases.

2.2.2 Challenges

- Good communication is a key requirement for the development of laboratory capacity and integration of the diagnostic workload within a laboratory network. However, communication among laboratories within and between countries can be difficult. Sharing data among all the appropriate bodies can be a challenge.
- Collaboration between epidemiological surveillance and laboratory support is essential for successful monitoring of disease burden and trends in a country. Challenges exist at all levels but more significantly at the provincial and district levels.
- When change, such as the greater integration of test scope, is considered, there is naturally a reluctance to embrace such a decision and, indeed, there may be some resistance. This is understandable.
- It will be essential to develop the proficiency and maintain the high standards of training of staff. Retraining and regular training sessions may be needed to meet the demand of the expanding scope of service.
- New techniques that are relevant and applicable to countries where they are needed have to be developed and validated for routine use. Point-of-care tests may be more appropriate for smaller countries, states and provinces, and their use could prove to be invaluable. Relevant current research needs to be identified and encouraged.

2.2.3 Strategic Directions

1. Maintain functional and sustainable laboratory surveillance for polio, measles, rubella, JE, RV and IBD.
2. Establish subnational laboratories in countries with large populations and high burdens of VPDs.
3. Integrate VPD surveillance systems with laboratory support for: (i) febrile rash illnesses (measles, rubella, dengue, etc.); (ii) diarrhoeal diseases (norovirus, RV59); (iii) arboviral diseases (JE, Zika); and (iv) bacterial VPDs (diphtheria, pertussis, etc.).
4. Promote collaboration between epidemiologists and laboratory experts with clear and open communication and improved data management using electronic-based methodologies in routine surveillance as well as in outbreak situations.
5. Shift funding from specific disease surveillance to integrated VPD surveillance systems with laboratory support.
6. Regularly assess feasibility and resources needed to establish and maintain laboratory capacity for detection and confirmation of VPDs (Pacific island countries and areas).

(7) Introduce new technologies for the rapid detection and characterization of the diseases to enable fast and accurate detection of pathogens, particularly in resource-limited settings.

(8) Establish and maintain high-quality laboratory capacity to ensure that established disease milestones are not jeopardized.
Strategy 2.3

Generating quality data for ensuring continuous improvement of immunization programmes and strengthening the overall health system

2.3.1 Context

- Availability and use of quality data for monitoring and evaluation of the immunization programme enables a continuous process of performance improvement.
- Over time, the platforms used for collecting, managing and analysing immunization programme data are moving progressively from paper-based reporting to electronic reporting, and from immunization programme-specific systems to broader health information systems. The use of digital solutions based on computers, mobile phones and tablets is increasing exponentially, often linked to overall eHealth national strategies or the availability of donor funds.
- At the country level, the sources of data useful for the immunization programme are multiple and have been increasing in number and complexity over time. A non-exhaustive list of data platforms includes: the health information management system (HIMS); the logistics management information system (LMIS); electronic immunization registries; notification systems (e.g. for AEFIs); birth registries; civil registration systems; the Demographic and Health Survey (DHS); multi-indicator cluster surveys; knowledge, attitude and practice (KAP) and sociobehavioural surveys; serosurveys; electronic medical records; registries of causes of hospital discharge; and registries of causes of deaths.

1. Achieving and sustaining accelerated control, elimination and eradication of VPDs

- Data on immunization programmes provide key information: to assess the quality of service-delivery strategies; to assess immunization programme efficiencies; to identify priorities for implementation, supervision and training; and to determine programme sustainability. It also enables identifying newly emerging and previously unrecognized challenges for the immunization programme.
- Data on performance of the immunization programme is complementary to surveillance to assess strategies to control and eliminate VPDs.
- Ultimately, data support the development of annual plans and micro-plans, and provide key information to regularly revise operational plans and immunization strategies.

2. Supporting health system strengthening and UHC

- Some immunization programme indicators are used as tracer indicators in broader monitoring and evaluation (M&E) frameworks, such as the Sustainable Development Goals (SDGs), the Thirteenth General Programme of Work 2019–2023 (GPW13) and UHC.60

3. Supporting health security and emergencies

- Immunization programme data can be used to predict risks for the occurrence of VPD outbreaks and identify targeted preventive measures.
- Rapid and targeted response to outbreaks can be guided by combined use of multiple sources of data (so-called triangulation) on surveillance and programme performance.

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60 The Monitoring Framework for the Sustainable Development Goals includes the indicator 3.8.1 on “Coverage of essential health services” that is measured through a series of tracer indicators, including percentage of fully immunized children (for the global level it is the percentage of children receiving vaccination against TB [bacille Calmette–Guérin vaccine], hepatitis B, polio, DTP, Hib, PCV, rotavirus, measles, rubella, and adolescent girls [aged 9–13 years] receiving vaccination against HPV). SDGs and the UHC Western Pacific Regional Monitoring Framework include DTP3 and MCV2 coverage as tracer indicators; and the GPW13 Impact Framework includes “HPV vaccines as part of a national immunization schedule” in the NCD Global Monitoring Framework.
- Coverage of the second dose of measles-containing vaccine (MCV) and indicators on vaccine supply and the cold chain are included in the Joint External Evaluation Tool and Annual Country Self-reporting Tool, and are used to assess IHR (2005) capacity in terms of prevention and immunization.\textsuperscript{61}

2.3.2 Challenges

- With a degree of variability across countries, the generation and availability of quality data face challenges of technical data management issues, limited capacity of staff involved in data generation at all levels, and programmatic issues with coordination and funding.
- Main challenges to achieve generation and use of quality data include:
  - uncertain target populations for immunization (denominators of coverage), particularly at the subnational level;
  - inadequate data to monitor immunization among mobile populations, informal dwellers, across different age groups and within the private sector;
  - inadequate data quality (e.g. poor completeness, timeliness, representativeness, etc.) observed at all levels, particularly at the subnational level;
  - insufficient monitoring of key components of immunization programmes (e.g. vaccine management and supply, financing, etc.);
  - surveys and serosurveys without using international standard methodologies;
  - parallel or duplicated systems for collection of immunization-related data, resulting in additional workload and challenges in management and sustainability;
  - insufficient monitoring of key components of immunization programmes when EPI data are integrated in other platforms, (e.g. HIMS, LMIS, etc.); and
  - innovations and technologies for data management and visualization are implemented without long-term planning and tailoring to the country context.
- The immunization programme should benefit from the efforts to improve data for the overall health system through a more systematic approach to create adequate tools and capacity for data.

2.3.3 Strategic Directions

1. Improve the quality of immunization programme data, with disaggregation at the subnational level and by special populations, through:
   - enhanced data standards, SOPs, and data recording and reporting tools that are adapted to emerging needs;
   - capacity-building of the health workforce on data-related capacities as relevant to each level\textsuperscript{62} through effective pre-service and on-the-job training approaches;
   - regular monitoring and periodic assessments of data quality; and
   - triangulation of different data sources.\textsuperscript{63}

2. Conduct quality and representative surveys and serosurveys based on international standard methodologies and ensure use of their results.

3. Enhance coordination between immunization programmes and all relevant stakeholders for integration of immunization programme data in broader HIMS and LMIS systems.

\textsuperscript{61} Technical Framework in Support to IHR (2005) monitoring and evaluation includes the first dose of MCV coverage, proportion of districts with available cold chain and the number of stock-outs.

\textsuperscript{62} At the service-delivery level, data recording, data aggregation and use of data for microplanning; at the district and provincial level, data quality assessment, basic data analysis, basic data management and use of data for planning; at the national level, data quality assessment, advanced data analysis and monitoring of complex indicators, advanced data management and design of tools/SOPs, and use of data for planning and definition of strategies.

\textsuperscript{63} For example, triangulate coverage and surveillance data to identify exclusion of specific populations from coverage calculation; use of administrative and survey data to increase accuracy of coverage estimation and target populations; and immunization coverage and vaccine stock data to rapidly identify issues with vaccine distribution at health facility level.
(4) Engage immunization programmes in understanding and shaping national eHealth strategies, and supporting implementation of ICT solutions and innovative approaches adequate to the country context, including electronic immunization registry.

(5) Increase collaboration between the immunization programme and relevant stakeholders to improve availability and quality of data that are not directly managed by EPI, through:

› strengthening monitoring of financing indicators, behavioural data and social determinants for immunization; and
› strengthening target population data (e.g. through quality birth registration systems, improved census projections and triangulation of data).

64 Comprehensive eHealth strategies exist or are being developed by most countries in the Western Pacific Region to ensure communication across digital information systems already in place in the public and private sector (e.g. China, Mongolia and Viet Nam) and to support rapid adoption of ICT solutions (e.g. the Lao People’s Democratic Republic and Solomon Islands).
Strategy 2.4

Driving evidence-based decision-making and action for immunization and disease control and elimination

2.4.1 Context

- Evidence-based decision-making is supported by use of multiple sources of data and their critical appraisal and interpretation, as well as knowledge coming from more qualitative information, such as the findings of programme reviews. To support evidence-based decision-making, data should be available on time and should be fit for purpose, meaning that they can be useful despite known limitations in the accuracy of the information.
- Multiple data sources are used to generate evidence that guides decision-making on strategies for the immunization programme, VPD control and elimination activities, and more broadly for the health sector (i.e. identify immunity gaps in the general population or specific groups, assess the risk for the emergence of VPD outbreaks, guide the tailored response to prevent or respond to outbreaks, guide the introduction of new vaccines and assess their impact, and identify new areas for research).
- An immunization programme review is a comprehensive assessment of the strengths, weaknesses, opportunities and challenges at the national, subnational and service-delivery levels. This process provides evidence for the immunization programme to guide strategic directions and define priority activities. It also provides evidence for higher-level decision-makers on the allocation of resources, the development of integrated packages of services and other broader interventions.

1. Achieving and sustaining accelerated control, elimination and eradication of VPDs

- Use of evidence provided by an analysis of multiple sources of data and comprehensive programme reviews has driven strategic and operational planning for VPD control and elimination. To accelerate progress towards VPD control and elimination, efforts have been made to ensure the following outputs are derived from an evidence-based decision-making process:
  - a comprehensive multi-year plan for immunization;
  - operational plans for routine immunization and SIAs;
  - leverage of existing platforms for enhanced VPD control (i.e. triple-elimination strategy for hepatitis B, syphilis and HIV through the reproductive, maternal, newborn and child health platform);
  - changes in immunization schedules, types of vaccines used (i.e. OPV versus IPV), type of vaccine delivery platform (i.e. facility- vs school-based); and
  - the introduction of new vaccines.

2. Supporting health system strengthening and UHC

- Evidence generated for the immunization programme can be used for some components of the UHC framework, such as quality and equity, by identifying population groups and geographic areas with inadequate access to the essential services.

3. Supporting health security and emergencies

- Risk assessments support health security by identifying specific needs to strengthen capacity for preparedness and prevention of outbreaks.
- The analysis of all available evidence is critical in all stages of an outbreak of VPDs to define the strategies for an effective response and drive decision-making during emergencies.
• Evidence on the evolving epidemiological situation of VPDs in countries where travellers and migrants come from could drive decision-making of sectors other than health, such as the need to strengthen measures at points of entry.

2.4.2 Challenges

• The use of data for action is still limited, while there is general consensus on the importance of using evidence to drive the decision-making process for the immunization programme and beyond. Evidence-driven decision-making is particularly limited for the implementation of bold measures to prevent VPD outbreaks.

• Challenges are mostly linked to limited availability of data in a timely manner and disaggregation at the subnational level, limited capacity to bring together information from data analysis and qualitative assessments to generate evidence and to effectively communicate evidence to decision-makers, and limited political willingness to base the decision-making process primarily on evidence.

2.4.3 Strategic Directions

(1) Build capacity of the health workforce to use data for action through pre-service training, on-the-job training, and continuous education opportunities on basic epidemiology and data analysis.

(2) Ensure that immunization and VPD surveillance modules are included in: (i) relevant curricula and training materials for health workforce development; and (ii) in-depth epidemiology training courses, such as the Field Epidemiology Training Programme.

(3) Develop standard guidelines and tools to guide analysis and triangulation of key data, and their interpretation and visualization, as relevant at all levels.

(4) Build capacity for the critical appraisal of data by systematically including an analysis of available data (including non-EPI data, such as financing, health-seeking behaviours, social determinants) in programme reviews and evaluations.

(5) Periodically conduct independent immunization programme reviews at the national and subnational levels.

(6) Regularly conduct risk assessments on VPD outbreaks.

(7) Ensure that programme reviews and risk assessments are closely linked to the development and updating of strategic and operational plans for VPD control and elimination.

(8) Use evidence-based programme reviews and risk assessment as the basis for policies, strategies and investments for VPD control and communicate the evidence clearly to non-technical decision-makers and conduct high-level advocacy.
Strategic Objective 3. Ensuring preparedness for and response to public health emergencies related to VPDs, vaccines and immunization programmes

Definitions

Public health emergency

Public health emergency is defined by the Asia Pacific Strategy for Emerging Diseases and Public Health Emergencies (APSED III) as an occurrence or imminent threat of a significant illness or health condition caused by acute exposure to hazards, including biological, chemical, radiological, natural and technological hazards. In APSED III, a public health emergency mainly refers to an emergency caused by emerging diseases and/or other acute public health events that are managed by national public health authorities. If not managed quickly, emergencies may cross national borders and cause a public health emergency of international concern, such as a respiratory disease pandemic.

Public health emergency of international concern is defined by IHR (2005) as an extraordinary event that is determined: (i) to constitute a public health risk to other states through the international spread of disease; and (ii) to potentially require a coordinated international response.

65 Hazard: A dangerous phenomenon, substance, human activity or condition that may cause loss of life, injury or other health impacts, property damage, loss of livelihoods and services, social and economic disruption, or environmental damage, according to the United Nations Office for Disaster Risk Reduction.

66 Emerging diseases: Infections that newly appear in a population, or have existed but are rapidly increasing in incidence or geographic range, including new diseases as well as re-emerging and resurging known diseases, and known epidemic-prone diseases. The term “emerging diseases” is used interchangeably with “emerging infectious diseases”.

67 Public health risk: A likelihood of an event that may adversely affect the health of human populations, with an emphasis on one which may spread internationally or may present a serious and direct danger, according to IHR (2005).
Public health emergencies related to VPDs, vaccines and the immunization programme can be classified into the following five categories:

1. Public health emergency caused by events, outbreaks or a resurgence of VPDs under targets for control, accelerated control, elimination or eradication. These VPDs include polio (including a laboratory breach of poliovirus), measles, rubella, hepatitis B, diphtheria, pertussis, tetanus, JE, meningococcal meningitis, RV, etc.

2. Public health emergency caused by a safety event related to vaccines or immunization programmes; this emergency includes AEFIs, counterfeit vaccines, etc.

3. Public health emergency caused by events, outbreaks or resurgence of diseases that are not under targets for accelerated control, elimination or eradication by vaccines and immunization programmes but may require an immunization response. This type of emergency includes post-disaster outbreaks (or increased risk of an outbreak) of cholera, typhoid, imported Ebola virus disease, imported yellow fever, etc.

4. Public health emergency affecting immunization systems and programmes and/or interrupting immunization service deliveries. This type of emergency includes natural disasters such as earthquakes, typhoons, floods, etc. and disease pandemics where immunization service deliveries may be affected or interrupted by a large-scale population displacement, large-scale restriction of population movement, needs for implementation of large-scale physical distancing, physical damage of the cold chain, etc.

5. Public health emergency caused by events or outbreaks of diseases which currently do not exist in nature or exist but have not yet been discovered and may require an immunization response. This type of emergency includes pandemic influenza, laboratory breach of smallpox virus, coronavirus pandemics (e.g. COVID-19), etc.

Roles of the immunization programme in public health emergencies

- Immunization systems and programmes, including VPD surveillance systems, laboratories and laboratory networks, should have substantial responsibilities and play critical roles, not only in the prevention of VPDs under the targets for control, accelerated control, elimination or eradication, but also in preparedness for and response to all public health emergencies related to VPDs, vaccines and immunization programmes.

- In the COVID-19 pandemic in 2020, it has become more obvious that immunization systems and programmes, including VPD surveillance systems, laboratories and laboratory networks, could play substantial roles in the planning for, preparedness for and response to large-scale outbreaks of communicable diseases, even non-VPDs, such as surge capacity of experienced human resources, case detection and investigation, data management, micro-planning, logistic support, community engagement, etc.
Strategy 3.1
Ensuring preparedness for and response to events, outbreaks or the resurgence of VPDs under the targets for control, accelerated control, elimination or eradication

3.1.1 Context

- **Poliomyelitis:** The main continuous challenge for the Western Pacific Region is outbreaks of cVDPVs. All countries and areas of the Region need to maintain a high level of preparedness to identify and provide timely and aggressive mass vaccination responses to polio outbreaks.

- **Measles and rubella:** The occurrence of any new case of measles or rubella should trigger an immediate coordinated outbreak response that can be further scaled if transmission continues or expands. The measles virus is continually imported across borders from endemic countries and regions, and can rapidly spread if introduced to pockets of non-immune individuals even when overall population immunity is high.

- **Diphtheria:** Outbreaks of diphtheria tend to occur in small clusters with high mortality among young children. Larger outbreaks may occur in settings of mass population movement or crowding. Two temporally (within 14 days) and geographically (country context) linked cases of which at least one is laboratory-confirmed are considered an outbreak of diphtheria; however, a single laboratory-confirmed case of diphtheria should trigger a public health response. Large outbreaks are rare but may require mass vaccination of high-risk groups.

- **Pertussis:** Outbreaks of pertussis can occur in facilities such as schools, hospitals or in larger geographic areas (e.g. districts). An outbreak of high severity among infants suggests gaps in immunization coverage, whereas an outbreak in older age groups might signal changing epidemiology (due to waning immunity) or changes in surveillance.

- **Tetanus:** The burden of MNT is a health-equity issue affecting those who are the most disadvantaged, poor and without access to adequate health services. Outbreaks of MNT are unusual, but cases may increase or occur in clusters related to a contamination of instruments or unhygienic practices in facility- or home-based delivery. These may signal the presence of special risk groups for whom MNT elimination programmes are not effectively functioning.

- **Hepatitis B:** A cluster of new hepatitis B infections may imply a common source of exposure, such as contaminated blood products or surgical tools, requiring an immediate outbreak investigation, including active case finding and source identification.

- **JE:** An outbreak of JE can be defined as an occurrence of the disease in excess of the expected frequency in a given area among a specific group of people over a particular period of time, or two or more epidemiologically linked cases of the illness in a short period. Major outbreaks of JE typically occur every two to 15 years in endemic areas, especially in areas with low use of the JE vaccine. JE transmission normally intensifies during the rainy season, when vector populations increase.

- **Meningococcal disease:** Definitions of meningococcal events and outbreaks are specific to each country and depend on the local meningococcal meningitis epidemiology. Geographically limited clusters are typically managed through intensive identification, monitoring and chemoprophylactic treatment of exposed contacts. Larger outbreaks require mass vaccination rather than mass chemoprophylaxis.

- **RV:** Outbreaks are typically associated with a point source of exposure or contamination, and the public health response should focus on contact tracing and investigation to identify and mitigate sources. Large-scale outbreaks are uncommon outside of disaster settings with mass water-source contamination.
3.1.2 Strategic Directions

**Preparedness**

1. Fully implement recommended strategies and activities to achieve immunity and surveillance targets for VPDs under control, accelerated control, elimination or eradication.

2. Continue strengthening national and subnational performance of case-based VPD surveillance systems with other surveillance systems (e.g. Early Warning, Alert and Response Network) to rapidly identify clusters of disease before extensive person-to-person transmission can occur and trigger a timely public health response.

3. Develop standard operational plans and procedures detailing clear mechanisms for general coordination and response activities within an emergency response framework. SOPs for specific priority diseases should also be developed with specialized response activities.

4. Establish and strengthen cross-ministerial, subnational and relevant stakeholders’ engagement in outbreak preparedness planning.

5. Establish contingency resources for VPD outbreak response, including operational funds, skilled human resources, and specific supplies such as vaccines, antitoxins and laboratory reagents, including necessary regulatory provisions for emergency importation of supplies not licensed or registered in the country.

6. Regularly conduct risk assessments at the national and subnational levels to identify the highest-risk geographical areas and special risk population groups.

7. Regularly conduct outbreak simulation exercises to identify the gaps and strengthen outbreak preparedness and response capacity.

8. Regularly update and optimize national strategies and action plans in response to the changing epidemiological situation, progress towards goals, emerging challenges, issues and risk assessments. Subnational action plans may need to be developed in countries with large or diverse populations.

**Response**

1. Ensure that the confirmation of a VPD outbreak through routine surveillance and rapid investigation triggers an immediate shift from regular prevention and preparedness activities to an outbreak response.

2. Promptly activate the incident management structure and emergency operations centre (EOC), following SOPs and taking into consideration the emergency response framework.

3. The coordinated response should include:
   - an initial field investigation
   - risk assessment
   - deployment of surge support teams for further investigation and response
   - appropriate clinical case management and hospital infection control procedures
   - enhancement of VPD surveillance
   - enhancement of laboratory support and coordination of the laboratory network
   - media monitoring and proactive advocacy and communication
   - planning and implementation of emergency mass vaccination
   - enhancement of the routine immunization programme
   - mobilization of financial and human resources
   - response assessment
   - documentation of lessons learnt.

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Strategy 3.2

Ensuring preparedness for and response to a safety event related to vaccines or immunization programmes

3.2.1 Context

- Vaccines used in NIPs are considered safe and effective when used correctly. However, like other pharmaceutical products, vaccines are not completely risk free and adverse events will occasionally result from vaccination. Although most adverse events are minor (e.g. redness at injection site, fever), more serious reactions (e.g. seizures, anaphylaxis) can occur, albeit at a very low frequency.
- The general public has low tolerance to any AEFI because vaccines are given to healthy people to prevent disease. For this reason, a higher standard of safety is expected of immunizations compared with medications that are used to treat people who are sick (e.g. antibiotics, insulin). This lower tolerance for risks from vaccines translates into a greater need to detect and investigate any AEFI than is generally expected for other pharmaceutical products.
- Public health emergency caused by a safety event related to vaccines or immunization programmes includes an event related to AEFIs and vaccine quality defects.
- An AEFI is defined as any untoward medical occurrence that follows immunization and that does not necessarily have a causal relationship with the usage of the vaccine. If not rapidly and effectively dealt with, they can undermine confidence in a vaccine and ultimately have dramatic consequences for immunization coverage and disease incidence. AEFIs are categorized into five types by cause: (i) vaccine product-related reaction; (ii) vaccine quality defect-related reaction; (iii) immunization error-related reaction (or programme error); (iv) immunization anxiety-related reaction; and (v) coincidental event.
- A vaccine event related to a quality defect involves the use and/or sale of substandard, falsified or unregistered vaccines.
- The immunization programme should lead the primary responses to AEFIs, while the national NRA or equivalent (e.g. Food and Drug Administration) should lead the primary response to vaccine quality defect-related events. The NIP and NRA should coordinate the response to both events.

3.2.2 Strategic Directions

Preparedness

(1) Establish and sustain a functional immunization safety surveillance system for: (i) prompt detection and reporting of AEFIs; (ii) thorough investigation; (iii) analysis; (iv) assessment of causality; and (v) corrective actions and feedback.
(2) Establish and sustain a functional national immunization safety expert committee as part of the immunization safety surveillance system for establishing the causality of serious AEFIs.
(3) Ensure all necessary functions of the NRA are in place to prevent and be prepared for vaccine quality defect-related events, and monitor pharmaceutical outlets to prevent the use of substandard, falsified or unregistered vaccines by immunization service providers.
(4) Have plans, guidelines and SOPs by both the NIP and NRA for properly responding on time to AEFIs and vaccine quality defect-related events.
(5) Ensure trained human resources to implement immunization safety surveillance.

Countries producing vaccines need to exercise six critical regulatory functions, including: (i) a published set of requirements for licensing; (ii) surveillance of vaccine field performance; (iii) a system for lot releases; (iv) use of laboratories when needed; (v) regular inspections for good manufacturing practices; and (vi) evaluation of clinical performance.
(6) Ensure sufficient funds are available to release in an emergency response to serious AEFIs and vaccine quality defect-related events.

(7) Prepare in advance awareness and advocacy materials to use in the emergency response.

(8) Periodically and proactively communicate and advocate the benefits and risks of vaccines and immunization to increase public awareness and stakeholder support to avoid negative responses in a safety event caused by vaccine or immunization.

Response

(1) Carry out a joint NRA–NIP response, which includes:

- verification and confirmation of a reported AEFI
- search for additional AEFI cases
- timely and comprehensive investigation
- causality assessment by a national immunization safety expert committee
- epidemiological analysis of AEFI data by NIP and/or NRA to determine vaccine reaction rates.

(2) Implement follow-up actions based on established causality and the established vaccine reaction rates:

- with an AEFI caused by vaccine product-related reaction (more than expected vaccine reaction rates or newly identified vaccine reaction signal) or vaccine quality defect-related reaction, the NRA should take the necessary regulatory actions (e.g. changing lot/batch, shifting to another supplier or product, etc.);
- with an AEFI caused by immunization error-related reaction, the NIP should inform parents and the public of the service gaps and state that corrective actions will be taken to ensure immunization safety, rectify immunization service gaps (e.g. vaccine storage issues, vaccine preparation, administration errors, etc.) and retrain immunization staff; and
- with an AEFI caused by either anxiety-related reaction or coincidental event, the NIP should inform the parent and public of causes of AEFIs and avoid or minimize public concerns and panic.

(3) Immediately quarantine substandard, falsified or unregistered vaccines, alert the public about these vaccines and recall substandard, falsified or unregistered vaccines based on thorough investigations.

(4) Monitor media (printed, electronic and social) reports and provide alerts within the ministry of health and stakeholders to increase vigilance and appropriate responses.

(5) Carry out an awareness and advocacy campaign for maintaining public confidence, acceptance and demand for vaccination.

(6) Resume the vaccination programme as early as possible, if vaccination programme has been suspended, to avoid the accumulation of susceptible children triggering VPD outbreaks (e.g. measles).
Strategy 3.3

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 programmes, but may require an immunization response

3.3.1 Context

- Some epidemic-prone pathogens can be prevented through vaccines, but they have not been targeted for accelerated control, elimination or eradication and are not routinely included in national immunization schedules. Risk of these “non-targeted VPDs” may vary widely between and within countries. These include cholera, typhoid, imported Ebola virus disease, imported yellow fever and others. Many of these diseases may occur in a disaster or post-disaster setting. Among other primary interventions, mass vaccination may play a role in the response to emergencies caused by these diseases.

- **Cholera**: OCV can be used in humanitarian crises to prevent cholera, even before any suspected cases are reported, and for outbreak responses to prevent further spread of cholera. In endemic settings, OCV is used as part of a longer-term cholera control plan, including reinforcement of surveillance and laboratory diagnostic capacity and improving water, sanitation and hygiene conditions. OCV is used to provide mid-term protection to the population while longer-term WASH solutions are being implemented.

- **Typhoid**: Access to safe water and adequate sanitation, health education, appropriate hygiene among food handlers and typhoid vaccination are all effective strategies for the prevention and control of typhoid fever. Currently, there are three WHO-recommended vaccines to be used to control typhoid in endemic and epidemic settings. All typhoid vaccination programmes should be implemented in the context of other efforts to control the disease, including health education, WASH, and training of health professionals in diagnosis and treatment.

- **Ebola virus disease**: An effective vaccine against the Ebola virus has been licensed for use during the response to outbreaks of Ebola. If Ebola virus is introduced into a population, the prevention of its spread is predominantly through behavioural interventions, including safe burial practices to avoid infection of mourners through unsafe contact with infected bodies, as well as appropriate infection prevention and control measures to prevent hospital-associated transmission.

- **Yellow fever**: Vaccination is the single most important measure for preventing yellow fever. Yellow fever routine childhood immunization combined with preventive mass vaccination campaigns to other age groups can accelerate the building of population immunity through what is called the yellow fever “combined vaccination strategy”.

3.3.2 Strategic Directions

- Immunization systems and programmes including VPD surveillance systems, laboratories and laboratory networks should play active roles in preparedness for and response to outbreaks of cholera, typhoid, imported Ebola virus disease, imported yellow fever and others that may require an immunization response.

- Core principles of VPD outbreak preparedness and response, described in Strategy 3.1, should form a foundation of cross-cutting outbreak response capacity, especially through strengthening policies and structures for overall strategic leadership and response coordination.
**Preparedness**

(1) Proactively identify the priority non-targeted VPDs at high risk of outbreak in the national context.

(2) Prepare specific SOPs for the vaccination response to these priority VPDs to be included in the overall SOPs for outbreak response coordination described in **Strategy 3.1**.

(3) Develop and strengthen laboratory capacity, or mechanisms to leverage laboratory networks, to detect non-targeted but epidemic-prone VPDs not included in routine VPD surveillance systems.

(4) Ensure that access to adequate vaccine supplies for a mass vaccination response for priority non-targeted VPDs are included in the overall planning for VPD outbreak response contingency resources.

**Response**

(1) Overall outbreak response strategies for non-targeted VPDs should follow the principles described in **Strategy 3.1**.
Strategy 3.4
Ensuring preparedness for and response to public health emergencies affecting immunization systems and programmes and/or interrupting deliveries of immunization services

3.4.1 Context

- The Western Pacific Region is the world’s disaster epicentre. According to the 2014 *World Risk Report*, six of the top 10 countries most exposed to natural hazards such as earthquakes, floods, tsunamis and typhoons are in the Western Pacific Region.

- Humanitarian emergencies, such as disasters due to natural hazards, have common risk factors for communicable diseases. These include mass population movement, absence of shelter and resettlement in temporary locations, overcrowding, poor sanitation and waste management, scarcity of safe water, poor nutritional status as a result of food shortages, economic and environmental degradation, impoverishment, and limited access to health care. These risk factors contribute greatly to excess risk of morbidity and mortality due to communicable diseases, including several VPDs (e.g. measles, cholera, etc.), during emergencies.

- In 2014, the WHO Regional Committee for the Western Pacific endorsed in resolution WPR/RC65.R6 the *Western Pacific Regional Framework for Action for Disaster Risk Management for Health* and urged Member States to develop, update and implement country priority actions for disaster risk management for health, in line with the Framework which stresses the importance of the readiness of health services during disasters and requires the planning and implementation of specific sets of public health activities at the national and subnational levels.

- Some public health emergencies such as humanitarian emergencies and disease pandemics (e.g. COVID-19) cause the temporary interruption of essential health service delivery, including routine immunization programmes, which leads to secondary health crises from VPD outbreaks such as measles outbreaks during or after the recovery phase, amplifying the economic damage of the epidemic and creating further morbidity and mortality. These consequences predominantly affect vulnerable groups, and they can worsen gender inequity by further slowing the return to economic participation by mothers whose children are suffering from VPDs.

- During the COVID-19 pandemic, several countries of the Region reported temporal disruptions of routine immunization sessions, suspension of some or all outreach services, postponement of immunization campaigns, reduced vaccination coverage and declined VPD surveillance performance. The response to the COVID-19 pandemic also required national and provincial immunization staff to be repurposed for the COVID-19 response, resulting in insufficient human resources for maintaining the performance of regular work. It caused the prolonged transportation and shipment of test specimens, a reduction in national and subnational vaccines stocks, and increased the hesitancy for parents to visit health facilities in some countries in the Region.

70 Western Pacific regional framework for action for disaster risk management for health. Manila: WHO Regional Office for the Western Pacific; 2015 [https://iris.wpro.who.int/bitstream/handle/10665.1/109279/9789291617082_eng.pdf, accessed 22 March 2022].

• It is critical to ensure the resilience of immunization systems and programmes, including VPD surveillance systems, laboratories and laboratory networks against public health emergencies, including humanitarian emergencies and disease pandemics, in order to minimize the prolonged disruption of immunization service deliveries, sustain immunization programmes and limit the accumulation of susceptible individuals that may lead to secondary outbreaks of VPDs during or following emergencies.

3.4.2 Strategic Directions

Preparedness

(1) Regularly conduct risk assessments at the national and subnational levels to identify population subgroups or geographic areas at higher risk of morbidity and mortality during emergencies.

(2) Include an emergency immunization activity plan into existing national health service packages for disaster response.

(3) Develop strategies for the continuity of immunization service delivery and mechanisms for response and recovery operations as part of national health sector preparedness plans.

Response

(1) Rapidly develop and implement plans for sustaining the delivery of routine immunization services in an effort to minimize the accumulation of unvaccinated individuals, without compromising the health and safety of health-care workers, caregivers and patients during emergencies by:
   › prioritizing vaccinations for epidemic-prone diseases (i.e. polio, measles and rubella, diphtheria and pertussis) while vaccination of other antigens may be delayed;
   › prioritizing immunization activities for vulnerable populations at higher risk of morbidity and mortality from VPDs;
   › ensuring that the NITAG or equivalent expert body is included in decision-making around modifications in immunization policies or practices during emergencies; and
   › ensuring that parents are notified of any temporary changes in immunization practices during emergencies.

(2) Ensure that VPD surveillance, including robust laboratory support, is maintained, reinforced and intensified as much as is feasible to enable early detection of and response to VPD outbreaks.

(3) Maintain vaccine supply and vaccination logistics by:
   › evaluating damage to the cold chain and the loss of biologicals, syringes and supplies;
   › immediately restocking vaccines utilized routinely by NIPs as soon as possible; and
   › initiating recovery of the cold chain (purchase of refrigerators, thermoses, thermometers, etc.).

(4) Ensure confined groups that result from mass population movements or confinement, such as in quarantine facilities, are protected against epidemic-prone VPDs (e.g. polio, measles and rubella, diphtheria, pertussis, etc.) through documentation of their vaccination status followed by catch-up vaccinations as soon as feasible.

(5) If VPD outbreaks occur during public health emergencies, adjust response activities to ensure the health and safety of health-care workers, caregivers, patients and the general public during emergencies. The target population for mass vaccination activities may need to be limited to maximize the protection of the most vulnerable or most accessible, as allowed by the circumstances.
(6) Ensure that immunization services are restarted at full capacity as soon as possible to limit the accumulation of susceptible unvaccinated individuals by:

› identifying individuals who missed vaccinations during the emergency;
› identifying and describing new or worsening immunity gaps;
› re-establishing community demand and providing catch-up vaccinations;
› restarting activities to strengthen childhood routine immunization programmes; and
› planning and conducting, if feasible and appropriate, catch-up vaccinations and SIAs in target high-risk areas.
Strategy 3.5

Ensuring preparedness for and response to events or outbreaks of novel diseases requiring an immunization response

3.5.1 Context

- Emergence of a novel infectious pathogen with outbreak potential presents a number of special challenges arising from complete susceptibility of the population, lack of an effective vaccine and lack of diagnostics in the initial phases. Due to extreme global connectivity and population movement and dense urbanization, a moderately infectious novel pathogen has a high risk of pandemic spread.
- Public health interventions for novel infectious diseases must initially rely primarily on physical distancing measures to reduce human-to-human transmission, and on controlling the source of infection (for instance by culling of infected animals/elimination of the infection reservoir). To prevent large-scale outbreaks, these interventions must be implemented before extensive human-to-human transmission occurs.
- In April 2009, WHO reported outbreaks of a previously undetected influenza A(H1N1) virus in Mexico and the United States of America. Vaccines were not used in any prior pandemics, except the 1976 swine flu outbreak in the United States of America, and the 2009 influenza A(H1N1) pandemic was the first time that most countries globally used pandemic vaccines. In the Western Pacific Region, 16 countries that received WHO-donated vaccines developed national pandemic vaccine deployment and vaccination plans, while the vaccine was under development. Between 7 January 2010 and 23 June 2010, all countries accepting WHO donations received their shipments. Some 8.7 million doses were distributed to 16 countries. Vaccine deployment and vaccinations played an important role in the 2009 influenza A(H1N1) pandemic.
- COVID-19, caused by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), was first identified in December 2019 in Wuhan, China, and has since spread globally, resulting in an ongoing pandemic. As of 27 May 2020, more than 6.05 million cases have been reported across 188 countries and areas, resulting in more than 368 000 deaths. More than 120 vaccine candidates for COVID-19 are in the pipeline for development (see Supplement to Strategy 3.5).
- Through strengthening preparedness for outbreaks of epidemic-prone VPDs (e.g. measles, vaccine-derived polio and diphtheria), countries may also build capacity for effective responses to outbreaks of novel and emerging pathogens for which an immunization response is required. Preparedness for and response to outbreaks of novel pathogens must include the ability to rapidly adapt and implement existing outbreak response plans and resources, in close coordination with WHO and the international community.

3.5.2 Strategic Directions

- Immunization systems and programmes including VPD surveillance systems, laboratories and laboratory networks should play active roles in preparedness for and response to events or outbreaks of novel diseases requiring an immunization response once safe and effective vaccines become available.
- Core principles of VPD outbreak preparedness and response, described in Strategy 3.1, should form a foundation of cross-cutting outbreak response capacity, especially through strengthening policies and structures for overall strategic leadership and response coordination.
**Preparedness**

(1) Ensure that VPD outbreak response policies, plans, protocols, skills and contingency resources are flexible and adaptable for the response to novel infectious disease emergencies.

(2) Continue strengthening systems for both disease-specific VPD surveillance with laboratory confirmation and early-warning syndromic infectious disease surveillance.

(3) Continue improving routine diagnostic capabilities for common microbial pathogens.

(4) In addition to simulating known VPD outbreaks, conduct VPD outbreak simulation exercises of hypothetical scenarios that include the emergence of novel pathogens with a variety of epidemiological characteristics.

(5) Proactively develop a national plan for vaccine development and immunization response based on an epidemiological analysis of the highest risk groups for infection, disease and transmission in anticipation of when a vaccine is developed and made available for mass administration.

(6) Regularly update the national plan for vaccine development and immunization response as new information is learned about clinical and epidemiological characteristics of the disease.

(7) Prepare for vaccine deployment (see Supplement to Strategy 3.5).

**Response**

(1) Prepare and implement the national plan for vaccine development and immunization response.

(2) Implement response activities (1) to (6) described in Section 3.4.2 Strategic Directions.
Supplement to Strategy 3.5

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

- **COVID-19 candidate vaccines have different platforms:**\(^{72,73}\) Live attenuated, inactivated, DNA, RNA, recombinant protein, virus-like particles, peptide based, replicating viral vector and non-replicating viral vector.

- **Vaccine safety:**\(^{74}\) Future COVID-19 vaccines will have different platforms, different excipients (e.g. adjuvants, stabilizers) and limited pre-licensure safety data. Therefore, related signals and possible adverse events of special interest (AESIs), including vaccine-enhanced disease, need to be quickly detected and scientifically evaluated post-vaccine introduction.

- **Vaccine efficacy:**\(^{75}\) Evaluations of clinical and immunological end points (correlation and duration of protection) to determine efficacy are continuing, and details will be available from the completion of Phase IIb and III clinical trials. The number of doses (vaccination schedule) and duration of protection will depend on the types of COVID-19 vaccine and possibly on virus variants.

- **Vaccine regulation:**\(^{76}\) While WHO emergency use listing (EUL) will provide the initial regulatory assessment, new COVID-19 vaccines need to be evaluated for safety and efficacy by NRAs. The capacities of NRAs in LMICs in the Western Pacific Region and Pacific island countries and areas are limited. Thus, a regional mechanism to support NRAs for accelerating registration and/or emergency use authorization (EUA) of COVID-19 vaccines is necessary.

- **Vaccine production capacity:** The expectation and demand that governments and the public have for a COVID-19 vaccine is very high. However, it is unlikely that large-scale vaccine production to meet global demand will be possible within a short period once vaccines are ready for production following clinical trials and regulatory clearance. Therefore, identifying and preparing to expand vaccine production capacity is critically important in planning for COVID-19 vaccine introduction. The Access to COVID-19 Tools (ACT) Accelerator\(^{77,78}\) that can support vaccine developers and regional manufacturers\(^{79}\) and the involvement of regional partners (e.g. the Japan International Cooperation Agency, the Korea International Cooperation Agency, Australian Aid, etc.) is helpful to accelerate vaccine production capacity.

- **Access to vaccine:** COVID-19 vaccines should be a global public good and available for all countries. Other than the availability, affordability is extremely important. It would be expected that the price may not be affordable to some countries. The COVAX facility, led by Gavi, in partnership with WHO under the ACT Accelerator, will support countries in access to COVID-19 vaccines. Pacific island countries and areas and middle-income countries of the Western Pacific Region will benefit from this initiative. However, the government commitments for vaccine financing and other logistics are essential.

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\(^{72}\) COVID-19 vaccine tracker and landscape. Geneva: World Health Organization; 2022

\(^{73}\) Rochfeld F. The race for the holy grail: is a swift COVID-19 vaccine within reach? In: Swiss Re Institute [website]. 30 July 2020


\(^{76}\) Regulation and prequalification. In: World Health Organization [website]

\(^{77}\) COVAX Facility. In: Gavi the Vaccine Alliance [website]. 2022


\(^{79}\) Regional Alliance for National Regulatory Authorities for Vaccines in the Western Pacific; second edition. Manila: WHO Regional Office for the Western Pacific; 2014.
• **COVID-19 surveillance:** Laboratory-supported COVID-19 surveillance is important: (i) to monitor disease epidemiology; (ii) to identify high-risk geographic areas and groups; (iii) to detect COVID-19 vaccine-related AESIs such as acute cardiac/liver/kidney injuries and multiple-system inflammatory syndrome in children, which will generate background rates of AESIs and will be useful for AEFI causality assessments; and (iv) to gauge the effectiveness of vaccination, with particular consideration on new virus variants. Real-time surveillance data linking to a national or centralized database will be an essential key component of COVID-19 prevention and control in every country.

• **Priority groups for vaccination:** Priority groups for COVID-19 vaccination will include: health-care workers; elderly; high-risk people with pre-existing conditions; pregnant women; specific occupational groups, including the travel and food industry; and schoolchildren. Some countries may also give priority to armed forces, police and other essential workers.

• **Vaccine storage:** With the high demand for large volume of vaccines and different cold-chain requirements for vaccines with different product profiles, countries need additional cold-chain capacity for COVID-19 vaccine storage.

• **Vaccination strategy (see Strategy 1.3):** Countries may adopt different strategies for the introduction of the COVID-19 vaccine, depending on the disease epidemiology, target population and affordability/accessibility to the COVID-19 vaccines. Mass vaccination activities and individual vaccination are possible options. However, due to limited supplies and considering programme delivery constraints, COVID-19 vaccine introduction is likely to be rolled out in a phased manner from highest priority groups to less vulnerable population groups. Countries where private providers are actively involved in immunization service delivery should be involved in COVID-19 vaccine deployment.

• **Advocacy and communication:** Advocacy and communication with specific information targeting political leadership, other stakeholders and the public are necessary and important in vaccine acceptance and uptake. Providing correct information on the advantages and limitations of COVID-19 vaccines is necessary, while emphasizing the continuity of all other preventive practices against COVID-19. Countries need to prepare effective communication tools and rumour monitoring to support the COVID-19 vaccination programme.

• **Vaccine safety surveillance:** Countries need to prepare enhanced surveillance for early detection and reporting of AEFIs of COVID-19 vaccines and a proper causality assessment. Since COVID-19 vaccines will have limited clinical trial safety data, particularly on very rare but serious AEFIs and AESIs, the inability to quickly and properly detect, evaluate and respond to AEFIs and AESIs during the vaccination programme could jeopardize COVID-19 vaccine implementation. Considering the use of new COVID-19 vaccines across the Western Pacific Region and globally, timely sharing of safety data with all stakeholders at national, regional and global levels is essential to ensure an effective response to safety events, particularly for AESIs, and evidence-based policy decisions.

• **Documentation:** Proper recording of all people vaccinated and having a national database are essential for monitoring, evaluation and other follow-up action in the post-introductory phase. The introduction of vaccination certificates or cards is necessary as a record, follow-up and day-to-day requirement (e.g. verify vaccination status during travel).

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C. Synergies with other health programmes and interventions

Immunization programmes should be an integral part of national health systems, and they are often a critical component of and platform for primary health care. Achieving immunization coverage targets, with resultant reductions in morbidity and mortality due to VPDs, contributes to UHC. Immunization programmes provide a strong population-based service to prevent and control infectious diseases and can reduce both the burden and impact of noncommunicable diseases (NCDs). Hepatitis B immunization and HPV immunization prevent liver cancer and cervical cancer. A life-course approach, which immunization programmes should strive to achieve, is also a key for the prevention and control of NCDs.

Immunization programmes should also be considered an indispensable and critical component of national health security systems. Efforts to control and eliminate VPDs and efforts to address health security threats have significant potential to generate synergistic benefits in various ways. For example, systems built for the immunization programme play important roles in preparedness for and response to VPD outbreaks and other public health emergencies. Capacities built to manage health security threats also strengthen preparedness for and response to VPD outbreaks. Vaccines and immunization programmes contribute to preventing and reducing antimicrobial resistance (AMR) through reducing use of antibiotics by preventing bacterial infections, such as *S. pneumoniae*, *Haemophilus influenzae* type b (Hib), *Neisseria meningitidis*, *Bordetella pertussis* and *Salmonella Typhi*.

This section describes how immunization programmes and VPD control and elimination efforts can – and should – be synergized with other health programmes. Eighteen strategies proposed to achieve the three Strategic Objectives of Section B (Figure 6) will strengthen synergies with: (i) health system strengthening and UHC; (ii) the prevention of NCDs and the life-course approach to health; and (iii) health security and emergencies, including AMR (Figure 7).
Figure 6. Three Strategic Objectives and 18 Strategies

Strategic Objective 1
Strengthening & Expanding Immunization Systems & Programmes
1.1. Leaving no one behind in childhood immunization
1.2. Immunization services along the life course
1.3. Tailor-made immunization strategies
1.4. Vaccine security
1.5. New and underutilized vaccines and biologicals
1.6. Vaccine safety and safe immunization
1.7. Vaccine confidence, acceptance and demand
1.8. Sustainable domestic financing for immunization
1.9. Governance and programme management

Strategic Objective 2
Managing Health Intelligence on Vaccine-Preventable Diseases & Immunization
2.1. Strategic use of epidemiologic intelligence through VPD surveillance systems
2.2. Prompt detection, confirmation & characterization of pathogens through VPD laboratory capacity and networks
2.3. Generating quality data for ensuring continuous improvement of immunization programme and strengthening overall health system
2.4. Evidence-based decision-making and action

Strategic Objective 3
Preparing for & Responding to Public Health Emergency
3.1. Outbreaks or resurgences of VPDs
3.2. Vaccine & immunization safety events
3.3. Outbreaks requiring immunization responses (e.g. cholera outbreak)
3.4. Emergency affecting immunization systems & programmes
3.5. Others (e.g. pandemic influenza)

Synergistic Area 1. Health System Strengthening & UHC
Synergistic Area 2. Prevention of NCDs & Life-course Approach
Synergistic Area 3. Health Security & Emergencies

Figure 7. 18 Strategies to contribute to three Synergistic Areas

1.1. Leaving no one behind in childhood immunization
1.2. Immunization services along the life course
1.3. Tailor-made immunization strategies
1.4. Vaccine security
1.5. New and underutilized vaccines and biologicals
1.6. Vaccine safety and safe immunization
1.7. Vaccine confidence, acceptance and demand
1.8. Sustainable domestic financing for immunization
1.9. Governance and programme management

2.1. Strategic use of epidemiologic intelligence through VPD surveillance systems
2.2. Prompt detection, confirmation & characterization of pathogens through VPD laboratory capacity and networks
2.3. Generating quality data for ensuring continuous improvement of immunization programme and strengthening overall health system
2.4. Evidence-based decision-making and action

Synergistic Area 1. Health System Strengthening & UHC
Synergistic Area 2. Prevention of NCDs & Life-course Approach
Synergistic Area 3. Health Security & Emergencies

For the Future: Towards the Healthiest and Safest Region
A vision for WHO work with Member States and partners in the Western Pacific

Research & Innovation
Partnership & Coordination
1. Universal health coverage based on health system strengthening

1.1 Overview of universal health coverage

- WHO defines universal health coverage (UHC) to mean that all individuals and communities receive the full spectrum of essential, quality health services they need without suffering financial hardship.\(^{81}\) It includes the full range of essential health services from health promotion to prevention, treatment, rehabilitation and palliative care. UHC is a journey rather than an end goal. Given the diversity of country contexts and capacities, there is no single approach to UHC that can work for all countries.

- Based on *Universal Health Coverage: Moving Towards Better Health – Action Framework for the Western Pacific*,\(^{82}\) high-performance health systems are characterized by five attributes: quality, efficiency, equity, accountability, and sustainability and resilience.

- WHO and its Member States identify achieving UHC as a strategic priority. UHC is one of the targets under Goal 3 of the Sustainable Development Goals (SDG 3.8). Also, UHC has been identified as one of the goals of GPW13, which is that “one billion more people benefit from universal health coverage”. It is also indicated as an operational shift in the *For the Future: Towards the Healthiest and Safest Region*,\(^{83}\) WHO’s vision for work with Member States over the next several years.

1.1.2 Strengthening health systems towards UHC

- Achieving UHC requires strong and resilient national health systems with strong primary health care. Good health systems are rooted in the communities they serve and focus not only on preventing and treating disease, but also on helping to improve well-being and the quality of life of individuals and communities. The health system has often been described through building blocks\(^{84}\) that are interlinked, and these are the basis of the priority strategies to strengthen systems towards UHC.

- The overall aim of the health system is to provide effective, safe, high-quality personal and population-based health services to those who need them, when they need them. This requires appropriate governance mechanisms through strategic policy frameworks, effective oversight mechanisms, regulation, collaboration with stakeholders, including the private sector and other sectors, and accountability for results and resources. It also requires a workforce, both professional and lay cadres, that is available, competent, responsive and productive.

- Delivery of health services requires appropriate financing that involves raising adequate funds for health, using these resources in more efficient ways to maximize health benefits and establishing mechanisms to protect vulnerable populations from impoverishment associated with having to pay for health care. Finally, the health system also needs a functional health information system that provides high-quality evidence to drive decision-making for health, as well as mechanisms to ensure the availability of high-quality, effective, and safe medicines and health products.

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1.2 Immunization and health system strengthening for UHC

- Immunization programmes are an integral part of national health systems. They are often a critical component of and platform for PHC. Achieving immunization coverage targets with a resultant reduction in morbidity and mortality due to VPDs contributes to UHC. However, there are still efficiencies to be gained in how immunization services are planned, organized and delivered within the context of the overall health system.
- The *Regional Framework for Action on Transitioning to Integrated Financing of Priority Public Health Services in the Western Pacific* outlines the key action areas to identify and secure essential public health functions across different disease programmes, including immunization, and integration with the rest of the health system to ensure sustainability of priority health outcomes following the transition from external funding. However, the actions are also useful for countries not using donor funding in securing public health priorities.
- Immunization services should be provided as part of a comprehensive PHC package in line with the principles of integrated people-centred health care. Immunization services have typically driven outreach and community-based service delivery; however, moving forward, these community-based approaches can be a strong platform for delivering a broader set of essential health services to communities (see Strategies 1.1, 1.2, 1.3). Lessons from the immunization programme can be useful in adapting service delivery models to reach people through various platforms, such as fixed health facilities and community- or home-based services. In addition, lessons from the immunization programme can contribute to broader efforts to strengthen community engagement and address demand-side barriers to health service access.
- A significant number of countries in the Western Pacific Region use external funding to pay for routine immunization and some essential public health functions. However, immunization is a public good with externalities and, as such, should be prioritized for domestic funding. Strategies to ensure sustainable financing for immunization will be more effective as part of efforts to secure national essential public health functions overall, rather than as a parallel mechanism. This requires continued engagement to include immunization services in the design of health insurance or tax-funded benefits packages, or other purchasing mechanisms for health (see Strategy 1.8).
- The Framework also highlights the importance of integrating other efforts to strengthen the immunization programme and other public health programmes into the national health system and progressively preserving essential public health functions through domestic financing. These include ensuring that coordination and governance mechanisms are aligned with health sector leadership platforms, and addressing the challenges of the health workforce as a shared resource with other programmes, from the planning to production and management of health workers, including provider incentives.
- It is also essential for countries to integrate immunization data and surveillance systems as part of national health surveillance and health management information systems, where it is not already (see Strategies 2.1, 2.2, 2.3, 2.4), to progressively use national procurement and supply systems for vaccines and related commodities (see Strategy 1.4), and to build national regulatory capacity to ensure the quality of vaccines and related commodities (see Strategy 1.6). Building and strengthening capacity for decision support and priority setting through health technology assessments are especially critical for countries that will be transitioning out of external aid but are still reliant on donor-funded technical assistance for decisions on new vaccine support.

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85 Regional framework for action on transitioning to integrated financing of priority public health services in the Western Pacific. Manila: WHO Regional Office for the Western Pacific; 2018 [https://iris.wpro.who.int/bitstream/handle/10665.1/14223/9789290618577-eng.pdf, accessed 22 March 2022].
Synergistic Area 2

Prevention of noncommunicable diseases and the life-course approach to health

2.1 Prevention of NCDs and immunization

- The Global Action Plan for the Prevention and Control of Noncommunicable Diseases 2013–2020 recognizes that strong population-based services to control infectious diseases through prevention such as immunization (e.g. vaccines against HBV, HPV, measles, rubella, influenza, pertussis and poliomyelitis) will reduce both the burden and the impact of NCDs. The Western Pacific Regional Action Plan for the Prevention and Control of Noncommunicable Diseases (2014–2020) also highlights the prevention of liver cancer and cervical cancer through hepatitis B immunization and HPV immunization, respectively.

2.1.1 Liver cancer

- Liver cancer is the fifth most common cancer in the Western Pacific Region. In 2018, approximately one half million liver cancer cases were newly diagnosed in the Western Pacific Region (total 507 501 cases: 373 794 male; 133 707 female) and 468 065 deaths due to liver cancer were reported. More than half of these deaths (60%) were caused by the long-term consequences of chronic hepatitis B and C infection: 43% were attributable to chronic hepatitis B infection and 17% to chronic hepatitis C infection. Liver cancer is the third most common cause of cancer deaths in the Western Pacific Region, and approximately 78% of liver cancer cases are a result of chronic viral hepatitis B or C.

- An effective response requires timely prevention and early detection, diagnosis and treatment of chronic hepatitis B and C infections. The response must reach all populations that are vulnerable and affected. Hepatitis B vaccination is highly effective in preventing hepatitis B epidemics (see A.5: Hepatitis B and Strategies 1.1, 1.2) while harm reduction services can reduce the risks of hepatitis B and C infection among people who use drugs.

2.1.2 Cervical cancer

- Cervical cancer is the fourth most frequent cancer in women in the Western Pacific Region. In 2018, a total 142 251 cases were diagnosed, and 63 703 people died due to cervical cancer in the Region.

- WHO recommends a comprehensive approach to cervical cancer prevention and control that includes multidisciplinary interventions across the life course. Community education, social mobilization, vaccination, screening, treatment and palliative care are needed to improve cervical cancer control. Almost all cervical cancer deaths could be avoided if known effective interventions were available to all women and implemented, including immunizing adolescent girls against HPV and cervical screening and treatment of precancerous lesions.

- Effective primary (HPV vaccination) and secondary prevention (screening for and treating precancerous lesions) approaches will prevent most cervical cancer cases. HPV vaccination can prevent cancers of the vulva, vagina, penis, oral cavity, oropharynx, anus and larynx, although the population-attributable fraction is varying for these cancer sites (90% for anus; 40% for vulva, vagina and penis; 12% for oropharynx; and 3% for oral cancer). It is suggested that high HPV vaccination coverage of girls can lead to cervical cancer elimination.
in most LMICs by the end of the century. Screening with high uptake will expedite reductions and will be necessary to eliminate cervical cancer in countries with the highest burden\textsuperscript{88} (see A.9: Human papillomavirus and Strategies 1.2, 1.5).

- At the 146th WHO Executive Board meeting in February 2020, one of the resolutions recommended to the Seventy-third World Health Assembly was welcoming the prioritization of vaccination against HPV in girls as the most effective long-term intervention for reducing the risk of developing cervical cancer, and recognizing the critical importance of strengthening vaccine supply and access, including by improving affordability and reducing prices to facilitate its inclusion into national immunization programmes.\textsuperscript{89}

2.2 Life-course approach to health (see Strategy 1.2)

2.2.1 Life-course approach to health and NCDs

- One of the overarching principles of the Global Action Plan for the Prevention and Control of Noncommunicable Diseases 2013–2020, as well as the Western Pacific Regional Action Plan for the Prevention and Control of Noncommunicable Diseases (2014–2020), is a life-course approach.\textsuperscript{90} A life-course approach is key to the prevention and control of NCDs. The process starts with maternal health, including preconception, antenatal and postnatal care, and maternal nutrition. In addition, proper infant feeding practices, including the promotion of breastfeeding and the health promotion of children, adolescents and youth, followed by promotion of a healthy working life, healthy ageing and the care of NCDs for people in later life, are integral components of a life-course approach.

- The WHO Package of Essential Noncommunicable Disease Interventions for Primary Health Care in Low-Resource Settings offers a set of interventions that can be adapted and scaled up in PHC as part of the overall initiative to promote health throughout the life course.\textsuperscript{91}

2.2.2 Strategies promoting the life-course approach to health and NCDs

- For women’s and children’s health, NCDs can have an intergenerational effect as NCDs prior to and during pregnancy can result in suboptimal newborn health, including prematurity and low birthweight. In the long run, these are associated with increased NCDs. In particular, strengthening the implementation of the International Code of Marketing of Breast-milk Substitutes and the WHO Global Strategy for Infant and Young Child Feeding are important to promote, protect and support breastfeeding, including exclusive breastfeeding for six months, continued breastfeeding until 2 years of age and above, and complementary feeding from 6 months of age onwards. Breastfeeding not only reduces susceptibility to infections and the risk of undernutrition, but also reduces the risk of obesity and NCDs across the life course.

- For healthy ageing, the ageing and health agenda in the Western Pacific Region encompasses a range of actions, including promoting healthy ageing across the life course, developing age-friendly health systems to address the health needs of older people, strengthening the evidence base, and promoting the right of older people to good health.

- As a policy option for Member States, it is proposed that they use participatory community-based approaches in designing, implementing, monitoring and evaluating inclusive NCD programmes across the life course and the continuum of care to enhance and promote response effectiveness and equity.


Synergistic Area 3

Health security and emergencies, including antimicrobial resistance

3.1 Health security and emergencies in the Western Pacific Region

- The Western Pacific Region continuously faces health security threats caused by disease outbreaks, natural disasters, food safety events, AMR and other public health emergencies. Those threats are inevitable, and no country is immune from health security threats, regardless of its size or level of development. In addition, the nature, context and consequences of health emergencies that we have to cope with have become more complex in recent years.
- Health emergencies often lead to enormous health, social and economic consequences, as were seen with the severe acute respiratory syndrome (SARS) in 2003, pandemic influenza in 2009, Typhoon Haiyan in the Philippines in 2013, measles outbreaks in the Pacific in 2019 and the COVID-19 pandemic in 2020.
- Health security is a priority for Member States and WHO. One of the three goals of GPW13 is to “better protect one billion additional people from health emergencies”. Health security, including AMR, is also one of the four new thematic priorities, as detailed in For the Future, for the Western Pacific Region.

3.2 Asia Pacific Strategy for Emerging Diseases and Public Health Emergencies for advancing the International Health Regulations (2005)

- The purpose and scope of IHR (2005) are “to prevent, protect against, control and provide a public health response to the international spread of disease in ways that are commensurate with and restricted to public health risks, and which avoid unnecessary interference with international traffic and trade”. To this end, IHR (2005) requires its State Parties to develop core capacities for surveillance and response.
- In Asia and the Pacific, WHO has worked with Member States and partners to develop the Asia Pacific Strategy for Emerging Diseases and Public Health Emergencies (APSED III). For more than a decade, APSED III and its earlier iterations have driven joint efforts to advance IHR (2005) core capacities, aiming towards a “region able to prevent, detect and respond to public health emergencies through collective responsibility for public health security”.
- Long-term system development, guided by the three iterations of APSED (2005, 2010 and 2016), have helped countries prioritize their efforts and investments in building core health security systems, strengthening implementation of IHR (2005).
- APSED III sets a vision and goals, and includes six objectives and the eight focus areas: (i) public health emergency preparedness; (ii) surveillance, risk assessment and response; (iii) laboratories; (iv) zoonoses; (v) prevention through health care; (vi) risk communication; (vii) regional preparedness, alert and response; and (viii) monitoring and evaluation.

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3.3 Synergies between efforts to strengthen health security systems and immunization programmes

3.3.1 Efforts to strengthen health security systems and immunization programmes

- As discussed under Strategic Objective 3, immunization programmes should be considered as an indispensable and critical component of national health security systems.
- Efforts to control and eliminate VPDs and efforts to address health security threats have significant potential to generate synergistic benefits in various ways:
  - improved coverage with vaccinations will reduce the risks of VPD outbreaks, as health security threats, and related morbidity and mortality;
  - systems built for the immunization programme play important roles in preparedness and response for VPD outbreaks and other public health emergencies; and
  - capacities built to manage health security threats strengthen preparedness for and response to VPD outbreaks.

3.3.2 Synergistic benefits of APSED III and the Regional Strategic Framework for Vaccine-Preventable Diseases and Immunization in the Western Pacific 2021–2030

- APSED III recommends continued investment in core public health systems prioritizing the eight focus areas.
- Focus Area 1 – Public health emergency preparedness
  - APSED III has promoted the use of emergency operations centres (EOCs) and operational management using incident management system (IMS) principles, which have contributed in a coordinated response for VPD outbreaks with the immunization programme playing a leading role (e.g. the response to cVDPV in Papua New Guinea in 2018–2019).
  - As part of pandemic preparedness, the development of national deployment and vaccination plans have been promoted for timely access to pandemic influenza vaccines, for which the immunization programme will play a central role.
  - The IHR (2005) mechanism enables international communication and alerts for VPD events. Close communication between the immunization programme and the National IHR Focal Point is crucial.
- Focus Area 2 – Surveillance, risk assessment and response
  - APSED III promotes the use of multiple sources of information for risk assessment to guide response decision-making. The immunization programme contributes through integrated VPD surveillance for monitoring trends and spread (Strategy 2.1) and timely analysis of data and production and sharing of reports (Strategy 2.3).
  - VPD surveillance contributes in the timely detection of an alert signal (Strategy 2.1), together with other information sources. Event-based surveillance and rapid response teams help with the rapid capture and verification of informal information.
- Focus Area 3 – Laboratory
  - Integrated VPD laboratory and regional networks contribute in strengthening and maintaining the fundamental laboratory functions, ensuring systems and guidelines for specimen collection, shipping and referral are in place, and providing a regional and global external quality assessment programme (Strategy 2.2).
- Focus Area 4 – Zoonoses
  - APSED III calls for collaboration of the animal and human health sectors to address zoonoses. Immunization programmes may have a role to play for risk reduction of certain zoonotic diseases, such as post-exposure prophylaxis for rabies.
Focus Area 5 – Prevention through health care
- Health-care settings play critical roles for the prevention, treatment and responses to mitigate the impact of outbreaks, including those caused by VPDs. Improvements in infection prevention and control, clinical management and health-care facility preparedness reduce morbidity and mortality due to infectious hazards, including those of VPDs.

Focus Area 6 – Risk communication
- APSED III aims to strengthen the capacity to manage the risk communication processes across all phases of health emergencies. Timely public communications will play a crucial role in responding to and managing VPD outbreaks, as well as in addressing vaccine hesitancy and in promoting vaccine uptake (Strategy 1.7).

Focus Area 7 – Regional preparedness, alert and response
- APSED III calls for improved regional systems and functions for information exchange, risk assessments, operational hubs for preparedness and response, rapid deployment of personnel and a learning hub. The immunization programme benefits from and contributes to such regional mechanisms and collaboration. Creating regional stockpiles for VPD commodities (e.g. diphtheria antitoxin) contribute to improved regional preparedness for VPD outbreak response.

Focus Area 8 – Monitoring and evaluation
- The immunization programme contributes through various means of monitoring and evaluation, such as after-action reviews and simulation exercises of VPD outbreaks and IHR (2005) joint external evaluations.

3.4 AMR in the Western Pacific Region
3.4.1 AMR as a major health security threat
- AMR is a natural process accelerated by human activity and practices, such as the overuse and misuse of antimicrobials in the human, animal and livestock sector, the spread and transmission of resistance and infections, and the contamination of the environment.
- Unless necessary actions are taken, AMR will cause an estimated 10 million deaths per year by 2050, of which 4.5 million will occur in the Asia Pacific region. AMR may also lead to economic losses of up to 3.8% of the global gross domestic product per year by 2050.

3.4.2 Regional action frameworks to address AMR
- In 2014, the WHO Regional Committee for the Western Pacific endorsed the Action Agenda for Antimicrobial Resistance in the Western Pacific Region, focusing on the development of national action plans, increasing awareness in other sectors, and strengthening health systems and surveillance.
- In 2019, the Regional Committee endorsed the Framework for Accelerating Action to Fight Antimicrobial Resistance in the Western Pacific Region, which proposes new ways of working in the Region to slow the spread of AMR and avert its impact. The Framework aims to guide countries to implement sustained and future-oriented solutions through specific actions.

3.5 Synergies between efforts to address AMR and immunization programmes

3.5.1 Vaccines and immunization programmes for prevention and reduction of AMR

- The Framework for Accelerating Action to Fight Antimicrobial Resistance in the Western Pacific Region calls for strengthening routine immunization programmes and ensuring high immunization coverage for VPDs (Strategies 1.1, 1.2, 1.3) as one of priority actions to address AMR.
- There are various mechanisms by which vaccines and immunization programmes contribute to preventing and reducing AMR through reducing:
  - The use of antibiotics for directly preventing bacterial infections (such as *S. pneumoniae*, Hib, *N. meningitidis*, Bordetella pertussis and *Salmonella Typhi*).
  - The use of antibiotics for preventing viral (e.g. influenza and varicella) and bacterial (e.g. *H. influenzae* and *S. pneumoniae*) diseases for which bacterial secondary infections are common. Vaccines have the potential to reduce the need for antibiotics to treat bacterial co-infections.
  - The misuse of antimicrobials for preventing viral diseases for which antimicrobials are inappropriately prescribed. Antimicrobials are often inappropriately prescribed for influenza or other upper respiratory tract viral infections. Studies have shown that antimicrobial use for influenza-related illnesses declines after influenza vaccination is introduced.101,102,103
  - The risks of health care-associated infection of antimicrobial-resistant pathogens. Wider implementation of DTaP boosters in older adults could reduce hospitalization among older people and limit exposure to AMR pathogens in health-care facilities.104 In infants and young children, RV vaccination substantially reduces hospitalizations due to acute gastroenteritis and also reduces the rate of hospital-acquired infections.105
- For immunization to contribute to a reduction in AMR, countries may need to consider improving vaccination coverage in all age groups through a life-course approach (Strategy 1.2) and integrate immunization planning into national plans to prevent and control AMR (Strategy 1.9). Childhood vaccination programmes have been successful in many countries, but much more could be done to immunize adults and older adults.
- It is important to develop and introduce vaccines that are effective against AMR pathogens (Strategy 1.5). Additional measures may be needed to facilitate new vaccine development against AMR pathogens, including through private–public partnerships and multi-stakeholder collaborations. In fact, vaccines, unlike antibiotics, are in a phase of major technological advances, which may offer improved options against diseases not currently vaccine preventable.106

3.5.2 Campaigns for behaviour change

- The *Framework for Accelerating Action to Fight Antimicrobial Resistance in the Western Pacific Region* advances a long-term approach and sustained campaign and advocacy for behaviour change. The aim is to recast AMR as a political and social issue and ingrain collective behaviour change through incremental, yet sustained, awareness-raising and the adoption of best practices.

- The campaign for behaviour change to fight AMR can serve as a platform for heightened advocacy to increase immunization coverage as one of the cornerstones in the fight against AMR.
D. Key areas supporting achievement of strategic objectives

This section describes two key areas critical for supporting implementation of the 18 Strategies and achievement of the three Strategic Objectives proposed in Section B.

Research and innovation are driving forces of progress in preventing, controlling and eliminating communicable diseases, and they have resulted in scientific advances that have provided unprecedented opportunities to develop effective and affordable tools in efforts for VPD control and elimination. Continuous progress in developing new and better vaccines, innovative vaccine delivery systems, and better ways to monitor and evaluate vaccine safety, as well as the use of new technologies, have made a significant impact on delivering better health service for all. Improvements mean that vaccines are and will become better, safer and more affordable; new vaccines will be developed to protect against new emerging diseases; immunization schedules can be adjusted to permit fewer visits; vaccinations can be less painful; and new options (technologies) will be available to reach remote areas to deliver life-saving vaccines. Research and innovation provide a strong foundation for the 18 Strategies proposed to achieve the three Strategic Objectives of Section B.

Partnership and collaboration will become more important and will need to be expanded along with other health programmes and interventions, and other entities, in the coming decade. While immunization programmes and VPD control and elimination initiatives have been one of the most successful public health endeavours in the Western Pacific Region over the last three decades with traditional partners such as UNICEF, Gavi, the Vaccine Alliance and the United States Centers for Disease Control and Prevention, collaboration and coordination with new partners will be indispensable: to expand and strengthen the immunization service-delivery platform throughout the life course; to advocate more broadly the benefits of vaccines and immunization among the general public; to identify and close immunity gaps among adolescents and adults; to protect more people, particularly older age groups and high-risk groups with underlying conditions; and to ensure vaccine security both nationally and regionally.

This section begins by describing the value of research and innovation in five relevant areas to be strengthened in the Western Pacific Region over the next decade, which include: (i) novel vaccines; (ii) vaccine delivery technologies; (iii) vaccine logistics; (iv) point-of-care testing; and (v) research on signal detection for vaccine safety. Secondly, the section describes partnership and collaboration that should be more actively enhanced or newly created in the next decade with other health programmes and interventions outside of immunization programmes and other entities beyond general health programmes.
Key Area 1
Research and innovation for VPDs and immunization in the Western Pacific Region 2021–2030

1.1 Novel vaccines

1.1.1 Sabin-derived inactivated polio vaccine (sIPV)
- WHO has been recommending the development of an affordable next-generation inactivated poliovirus vaccine (IPV) using sIPV.
- The first sIPV licensed in the world was produced in Japan and introduced in routine immunization in November 2012.\(^{107}\) China has two sIPV strains available for the national immunization programme.
- The Republic of Korea and Viet Nam are developing national manufacturing capacity for sIPV production through technology transfers supported by WHO and its partners. The transfer of the technology of sIPV is a significant milestone in preparations for the polio post-eradication era when the use of oral polio vaccine (OPV) will cease and the use of safe, low-cost and effective sIPV will be much needed.\(^{108}\)

1.1.2 Novel oral polio vaccine type 2 (nOPV2)
- Novel oral polio vaccine type 2 (nOPV2) is a modified version of the existing type 2 monovalent OPV. nOPV2 is more genetically stable and less likely to revert into a form that can cause paralysis in low-immunity settings and thus reduce the risk of seed ing new circulating vaccine-derived poliovirus type 2 (cVDPV2) outbreaks.\(^{109}\)
- The WHO Executive Board in February 2020 noted both the evolving public health emergency associated with cVDPV2 and the new strategies of the Global Polio Eradication Initiative (GPEI) to control these outbreaks, and made a decision that urges Member States to accelerate processes to enable the importation and use of nOPV2, on the basis of its emergency use listing.\(^{110}\)

1.1.3 New vaccines design (RNA vaccine, DNA vaccine, etc.)
- RNA-based technologies have shown good progress in the development of prophylactic and therapeutic vaccines. Clinical trials have shown that mRNA vaccines provide a safe and long-lasting immune response in animal models and humans.\(^{111}\) The potential of RNA vaccines to perform in such a setting was demonstrated in 2013 during an outbreak of a deadly strain of (H7N9) influenza in China, and several commercial RNA vaccine programmes are already moving forward for infectious diseases such as rabies, Zika, Chikungunya, HIV and several types of cancer vaccines (melanoma, prostate cancer, etc.).\(^{112}\)
- Continuous research is needed for a better understanding of the mechanism of action of new vaccines (DNA, mRNA vaccines), the identification and development of a new delivery system, and improvement of new vaccine design.

1.1.4 Combination vaccines
- The benefits of using combination vaccines include: fewer missed opportunities to vaccinate (fewer visits to the doctor’s office), storage of fewer vials, decreased risk of needle sticks,


potentially improved record-keeping and tracking, fewer injections needed, and a simplified immunization schedule. The main challenge in their development is the risk that the efficacy or safety of the combination would be less than that seen with the administration of the vaccines separately, as well as with uncommon transport and storage conditions and complicated bedside mixing.\(^{113}\)

- While combination vaccines have been used in the majority of countries in the Western Pacific Region (Australia, China, Japan, Malaysia, New Zealand, the Philippines, the Republic of Korea, Singapore, Viet Nam and others), not all countries have included these vaccines in their routine immunization programmes.

- Recognizing issues with the number of injections, as well as the differing schedules for each vaccine, that can potentially interfere with the adherence to the recommended vaccination programmes, it is expected that there will be an increasing number of countries moving towards recommending combination vaccines in their NIPs. The shift in the WHO recommendation from OPV to IPV in national programmes further supports the introduction of multivalent vaccines, including IPV.

### 1.1.5 Vaccines in pipelines

- WHO published a list of candidate vaccines for seven pathogen areas: HIV, malaria, tuberculosis, respiratory syncytial virus, enterotoxigenic *Escherichia coli*, shigella and norovirus.\(^{114}\)

- Clinical trials are ongoing for an inactivated hand-foot-and-mouth disease vaccine in China and Singapore.\(^{115}\)

- Due to the current pandemic, the most anticipated vaccine being developed is to combat COVID-19 and, as of July 2020, 205 vaccine candidates were in development, including vaccine manufacturers and research institutes in Australia, China and Japan.

### 1.2 Vaccine delivery technologies

- Recent work has been focused on vaccine delivery systems as an alternative to injectable vaccines. In particular, novel strategies based on needle-free injection systems, oral and nasal delivery systems, microneedle patches, micro-injectors, and edible or intradermal vaccine formulations have been demonstrated to trigger both a systemic and mucosal immune response. These novel vaccination delivery systems offer several advantages over the injectable preparations, including self-administration, reduced cost, stability and elimination of a cold chain – all with a great potential to transform the way that vaccines are delivered within immunization programmes in LMICs where vaccine delivery faces several challenges.\(^{116,117}\)

- Although offering evident advantages, there are potential barriers to the widespread uptake of these approaches – higher costs involved and the complexities of some of the technology required. Further research should be implemented in multiple fields, such as vaccinology, immunology and materials science, to improve this delivery platform.\(^{118}\)

- The use of alternative delivery methods for vaccines has already been explored in research institutions in Japan and the Republic of Korea.\(^{119}\)

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1.3 Vaccination logistics

- As unmanned aerial vehicle (UAV) technology has progressed in recent years, potential use cases for UAVs have proliferated due to their ability to traverse difficult terrains, reduce labour and replace fleets of vehicles that require costly maintenance.\(^{120}\)
- The first-ever use of drone delivery for vaccines was in 2018 in Vanuatu, where almost 20% of children do not have complete basic vaccines in an area of mountainous terrain covering 1344 km\(^2\) that is otherwise unreachable by road.\(^{121}\) Drones also are currently being tested for medical supply deliveries in Papua New Guinea.\(^{122}\)
- International immunization partners should consider supporting countries or areas in the Region that face critical issues for vaccine supply chains by traditional land transport by testing the feasibility of UAVs to transport vaccines needed for remote communities. UAVs can be also utilized to transport laboratory samples from a remote village affected by a disease outbreak to a diagnostic laboratory.

1.4 Point-of-care testing (POCT)

1.4.1 Measles

- In recent years, POCT for measles has been developed and piloted in several countries with good accuracy, ease of use and simple storage conditions.
- The introduction of similar POCT pilot studies in target communities in the Western Pacific Region (such as Pacific island countries and areas) will be an important first step and bring immediate improvements in the management of this disease towards its elimination. Currently, in Malaysia, the feasibility and potential impact of introducing measles POCT into ongoing case-based measles surveillance with laboratory confirmation is concluding.\(^{123}\)

1.4.2 Primary immunodeficiency (PID)

- People with PIDs affecting B-cells or combined PIDs, in rare circumstances, may excrete polioviruses for prolonged periods (six months to five years) or chronically excrete (more than five years), thus presenting a high risk of spreading poliovirus within a community.\(^{124}\)
- Diagnosing PID is complex and a simple rapid test such as a POCT format is ideally suitable for this role. Development of such a POCT may play an important part in the management of polio as well as the diagnosis and management of PID patients.

1.4.3 Other POCT

- Currently, rapid lateral flow diagnostic tests using novel molecular methods are being developed for the diagnosis of COVID-19 using advanced technology called CRISPR-Cas12 that allows for the detection of very low numbers of the SARS-CoV-2 virus using basic, robust equipment, a variation of polymerase chain reaction method.\(^{125}\) These can be easily identified by eye using the lateral flow test and would produce a result in much shorter time.


• More than 1 million POCTs are used every year in various health facilities in malaria-endemic areas with a reduction in overprescribing and the indiscriminate use of antimalarials.  

• Interested parties such as academic institutions, reference laboratories and commercial companies should be encouraged to develop specific POCT products and commercialize these products. International immunization partners should continue supporting countries and areas of the Region where POCT may be introduced to expand the diagnostic capacity of the countries.

1.5 Research on signal detection for vaccine safety

• Concerns surrounding AEFIs are a key challenge for public confidence in vaccination. Robust post-licensure vaccine safety monitoring remains critical to detect adverse events, including signals (those not identified in pre-licensure studies) and to ensure public safety and public confidence in vaccination.

• Routinely collected real-time electronic information can be used to detect AEFI signals in a timely manner, an essential element to minimize harmful effects receiving unsafe vaccines. Methods like the proportional reporting ratio and data mining can detect known signal events. This provides a model for prospective routine signal detection and improving vaccine safety surveillance.  

• An evaluation of the risk of immune thrombocytic purpura (ITP) and aseptic meningitis following the administration of the first dose of measles- and mumps-containing vaccines was carried out by WHO in 26 sentinel sites in 16 countries across the six WHO regions.  

From the Western Pacific Region, Australia, China and Singapore participated in the study. Significantly elevated ITP risk and aseptic meningitis risk were identified with specific strains of the measles and mumps vaccines, respectively.

• Support should be considered from international immunization partners to introduce pre-implementation research and pilot programmes to countries and areas in the Region to improve the data collection and analysis. Bottlenecks around the introduction of these methods need to be identified and the practical solutions to overcome them should be developed.


Key Area 2

Partnership and collaboration for VPDs and immunization in the Western Pacific Region 2021–2030

2.1 Coordination and collaboration with other health programmes and interventions

2.1.1 School health

- School-based immunization is a strategy for reaching older children and adolescents with vaccination services. With the availability of newer vaccines (e.g. HPV vaccines) and greater attention to providing booster doses of routine vaccines to older children (e.g. DTP), there is a growing interest in using schools as a platform for immunization. With increases in school enrolment rates, particularly in low-income countries, the school immunization strategy has become even more promising.

- School health settings provide good opportunities to integrate vaccine delivery with other health interventions aimed at reducing VPDs and improving population health. For example, HPV vaccination can be linked with health information and warnings against tobacco use, as an intervention aimed at primary prevention of cervical cancer. In addition, linking HPV vaccine delivery with other health interventions for school-age children, such as deworming, can increase coverage of these interventions and reduce the cost of delivery.

2.1.2 Occupational health

- To ensure vaccination through the life course, demand for vaccination among the general population should be enhanced, delivery points of contact should be integrated between immunization and other essential health interventions for various target age groups, and vaccine delivery should be enhanced beyond the health sector through developing and implementing context-specific immunization programmes, such as in high-risk occupational groups (e.g. health-care workers, military, travel industry), business settings (e.g. factories) and nursing care homes, as well as preschools, schools and universities.

- To address epidemiologic shift and prevent VPD outbreaks among older age groups (e.g. measles and rubella outbreaks in adult populations), targeted immunization initiatives, which may include occupationally based or travel-related immunization as well as school- and university-based immunization, need to be developed and implemented to address immunity gaps among adolescents and adults living in congregate housing, such as military barracks, dormitories and other settings.

- To prevent health care–associated transmission and amplification of measles, national policies and procedures for hospital infection control needed to be developed and thoroughly implemented, referring to the 2015 WHO guidelines, Infection Prevention and Control of Epidemic- and Pandemic-prone Acute Respiratory Infections in Health Care. Hepatitis B vaccination is recommended for all health-care workers with occupational exposure who have not received a complete primary series.

2.1.3 Water, sanitation and hygiene (WASH)

- WASH interventions include improvements of: (i) a safe water supply – for consumption, to reduce contact with surface water, and to enable hygiene practices, treatment, care and rehabilitation; (ii) sanitation – to reduce contamination of the environment and prevent vector breeding; and (iii) hygiene practices – to prevent primary and secondary infections and reduce transmission. For several VPDs, transmission is due to a lack of safe water.
proper sanitation and/or hygiene in affected families and communities. While vaccination can exert an immediate impact by reducing the prevalence of infection and the morbidity burden, WASH interventions are required to sustain such impacts and further reduce and ultimately eliminate transmission.

- **Hepatitis A** virus is primarily spread when an uninfected (and unvaccinated) person ingests food or water that is contaminated with the faeces of an infected person. The disease is closely associated with unsafe water or food, inadequate sanitation, poor personal hygiene and oral–anal sex. The spread of hepatitis A can be reduced by: (i) adequate supplies of safe drinking water; (ii) proper disposal of sewage within communities; and (iii) personal hygiene practices. Vaccination against hepatitis A should be part of a comprehensive plan for the prevention and control of viral hepatitis.131

- **Typhoid fever** is usually spread through contaminated food or water. Typhoid risk is higher in populations that lack access to safe water and adequate sanitation. Urbanization and climate change have the potential to increase the global burden of typhoid. In addition, increasing resistance to antibiotic treatment is making it easier for typhoid to spread through overcrowded populations in cities and via inadequate and/or flooded water and sanitation systems. Access to safe water and adequate sanitation, hygiene among food handlers, and typhoid vaccination are all effective in preventing typhoid fever.132

- **Cholera** transmission is closely linked to inadequate access to clean water and sanitation facilities. Typical at-risk areas include peri-urban slums, and camps for internally displaced people or refugees, where minimum requirements of clean water and sanitation are not met. A multifaceted approach, i.e. a combination of surveillance, WASH, social mobilization, treatment and oral cholera vaccines, is key to control cholera and to reduce deaths. The vaccines should always be used in conjunction with other cholera prevention and control strategies. Vaccination should not disrupt the provision of other high-priority health interventions to control or prevent cholera outbreaks.133

- **Polio**134,135 virus is transmitted by person-to-person spread mainly through the faecal–oral route or, less frequently, by a common vehicle (e.g. contaminated water or food) and multiplies in the intestine. OPV contains an attenuated vaccine virus, activating an immune response in the body. In areas of inadequate sanitation, this excreted vaccine virus can spread in the immediate community before eventually dying out. If a population with a lack of safe water, proper sanitation and/or hygiene is seriously under-immunized, an excreted vaccine virus can continue to circulate for an extended period of time. The longer it is allowed to survive, the more genetic changes it undergoes. In rare instances, the vaccine virus can genetically change into a form that can paralyse – known as a cVDPV. cVDPVs occur when routine or supplementary immunization activities are poorly conducted and a population is left susceptible to poliovirus, whether from vaccine-derived or wild poliovirus.

### 2.2 Partnership and collaboration with other entities

#### 2.2.1 Private sector

- The private sector actors, which may be any entity outside the government engaged in the provision of vaccinations and other health services, include: full- or part-time private practitioners (e.g. physicians, nurses, pharmacists); private for-profit and not-for-profit primary care organizations and hospitals; civil society, nongovernmental, faith-based and

community-based organizations; and private companies such as mining or other large industries that provide internal medical services for their employees and their families.\textsuperscript{136} Two thirds of Member States in the Western Pacific Region have engaged the private sector in their immunization programmes, but in most countries private providers’ contributions are limited to less than 10% of the total target population.\textsuperscript{137}

Engagement of the private sector should be accelerated in various aspects of immunization programmes, including: (i) provision of vaccination service according to the routine immunization schedule and along the life course; (ii) education and training on VPDs, vaccines and immunizations; (iii) promotion of vaccine confidence, acceptance and demand; (iv) storage of vaccines and other vaccination supplies; (v) notification of VPDs and immunization safety events; (vi) prevention of nosocomial transmission of VPDs; (vii) mobilization of communities and resources for closing immunity gaps through tailor-made immunization strategies; and (viii) response to emergencies (e.g. VPD outbreaks, immunization safety events, etc.).

\textbf{2.2.2 Academic institutions and professional societies}

- Undergraduate and postgraduate programmes for medical, nursing and paramedical students need to include the subjects of VPDs, vaccines and immunization. NIPs and immunization partners can and should actively support such programmes (e.g. giving lectures on vaccine and immunization programmes at undergraduate schools).
- Academic institutions and medical professionals can provide analysis, technical opinions and a scientific approach for addressing vaccine hesitancy. NIPs and immunization partners need to actively coordinate and collaborate with academic institutions for determining causes for vaccine hesitancy and promoting vaccine confidence, acceptance and demand based on evidence.
- NIPs and immunization partners need to more actively coordinate and collaborate with national and international academic societies on relevant areas (e.g. immunology, paediatrics, infectious diseases, public health, vaccinology, immunization programme and service delivery, etc.) in identifying a regional research agenda and appropriate areas for epidemiologic and implementation research in the fields of VPDs and immunization programmes, and they should advocate for the regional goals and targets for VPD control and elimination, as well as immunization programmes.

\textbf{2.2.3 Vaccine producers and suppliers}

- The governments of countries with vaccine production capacity should actively communicate and coordinate with vaccine manufacturers and suppliers to ensure an uninterrupted supply of affordable vaccines of assured quality.
- Public–private partnerships and international collaboration aiming to increase production capacity for vaccines of assured quality in the Western Pacific Region should be promoted to ensure a timely, sufficient and uninterrupted supply of essential vaccines at affordable price throughout the Region.
- To increase public trust in vaccines and immunization, NIPs and other stakeholders should actively coordinate with vaccine manufacturers in sharing vaccine-related data and information.
