Introduction

Although the Asia Pacific Region is undergoing a major economic transition, much morbidity and mortality is still due to infections that are considered to be diseases of poverty. Large high-risk populations and high population densities contribute to their spread, abetted by urbanization, deforestation, climate change, increased trade, international air travel, civil turmoil and disasters. Infectious diseases have a major impact on the public health and economic development of the 3.4 billion people in the Region. Many infections such as tuberculosis, helminths and diarrhoea are associated with poor sanitation, contaminated food, inadequate personal hygiene and lack of basic health services, conditions common in rural and agricultural areas of many countries. As a result of high-risk behaviours, some infections are present in pockets of very high prevalence, often among marginalized population groups.

The emergence of new diseases such as the severe acute respiratory syndrome (SARS), and the appearance of drug-resistant tuberculosis and malaria, counterfeit drugs, and insecticide-resistant vectors prove that the struggle against communicable disease will continue. This chapter provides detailed information about the most prevalent and serious infectious diseases in the Region and the resulting medical and social problems they cause, as well as the successful steps now being taken to combat them. Technical and organizational improvements have brought better diagnosis and treatment. Campaigns can effectively target the focus of infection, as with deworming in schools, immunization, and identification of animal and other vector reservoirs and hosts. Programmatic strategies include securing political commitment and resources, creating a stratified approach based on endemicity and transmission, mobilizing communities, and improving monitoring and evaluation. In several countries, the private sector has been brought into the effort to combat infectious diseases such as tuberculosis, and global cooperation and partnerships with national programmes have contributed to the success of disease control efforts, such as with lymphatic filariasis.
Communicable diseases can rapidly become a global problem and pose threats to national stability, and may require enormous human and economic resources to combat. It costs very little to protect an individual because of the cost-effectiveness and simplicity of many control measures, but most developing countries require external financial support for mass control programmes. Control strategies for many communicable diseases have key elements in common, including early diagnosis and case management, vector surveillance, and effective disease surveillance. Integrating and operationalizing these elements is a key primary health-care function, but many primary health-care systems are hampered by insufficient resources and organizational problems. Resources are still the main obstacle to scaling up control programmes, especially the more costly ones requiring a mass supply of medicines. The Global Fund to Fight AIDS, Tuberculosis and Malaria and other partnerships have made significant funding available for these programmes.

The challenges associated with emerging infectious diseases highlights the need for effective implementation of the International Health Regulations (2005), which provides a public health response to the international spread of disease. A common framework for strengthening national core capacities for the effective prevention and control of public health threats in the Region is now being used to plan capacity and implement sustainable, evidence-based measures to help countries cope with epidemics and emerging diseases.

### 7.1 Emerging infectious diseases: avian influenza, SARS and other diseases

In the 1960s it was commonly believed that the battle against infectious diseases had been won, but the emergence of new diseases such as the SARS reminds us that the struggle between microbes and mankind is far from over. Infectious diseases account for 26% of annual deaths worldwide and, according to *The world health report 2004* (WHO), 29.9% of 1.49 billion disability-adjusted life years (DALYs) lost every year. These estimates do not include morbidity and mortality that occur as a consequence of past infections, including various cancers, liver diseases, acute rheumatic fever, gastric ulcers, and possibly cardiovascular diseases and diabetes mellitus. The greatest impact of infectious diseases is felt in the developing countries of Africa, the Eastern Mediterranean and the Asia Pacific Region. The potential for an infectious disease to develop into a widespread outbreak, with significant consequences in many developing countries, is ever present. With over half the world’s population, the Asia Pacific Region has the highest burden of infectious diseases, which have a major impact on the public health and economic development of 3.4 billion people. Infectious diseases account for 21.4% of 26.6 million deaths in the Region with most deaths caused by respiratory infections (34.6%), tuberculosis (16.9%), acute diarrhoeal diseases (13.3%), HIV/AIDS (8.7%), vaccine-preventable childhood diseases (7.6%), and malaria (1.3%). Other infectious diseases account for the remaining 17.5% of deaths. Infectious diseases cause 22.3% of 691 million DALYs in the Asia Pacific Region. The number of deaths and corresponding DALYs due to infectious diseases are shown in Figures 7.1 and 7.2.

In the last three decades, over 30 new infectious agents have been detected, of which 75% have originated in animals. New pathogens, particularly viruses, remain unpredictable and continue to emerge and spread across countries. The advent of SARS and avian influenza underscores the importance of emerging diseases and their impact on health, economic and social development. The Asia Pacific Region is the epicentre for such emerging diseases. Dengue fever, Japanese encephalitis, leptospirosis,
Nipah virus, drug-resistant malaria and cholera are some of the diseases that have caused epidemics within the Region.

Several factors contribute to the emergence or re-emergence of infectious diseases. A worldwide increase in poverty and rapid urbanization are forcing millions of people to live in overcrowded and unhygienic conditions where lack of clean water and adequate sanitation provide breeding grounds for infectious diseases. High-density populations raise the risk of respiratory infections and those transmitted through contact with pathogens in food and water. In addition, almost one third of children today are undernourished and half the world’s people lack regular access to essential drugs. Human
encroachment on tropical forests and rapid deforestation has brought people with little or no immunity into close proximity with insects that carry malaria and yellow fever and other infectious diseases. Wars, civil turmoil and natural disasters are causing the migration and mass movement of millions of refugees or displaced persons from one country to another. This, coupled with increased international air travel, trade, commerce and tourism, provides fertile breeding grounds for infectious diseases. Deadly as well as commonplace disease-producing organisms are now being transported rapidly from one continent to another. The deliberate release of microbes to cause intentional harm adds a grim dimension to the growing problem.

Other changes, such as the globalization of the food trade, create new opportunities for infections to flourish, including the shipment of livestock; food production, storage and marketing; and altered eating habits. Changes in human behaviour and lifestyles expose certain age groups to higher risk from infectious diseases—for example, the clustering of young children in day-care centres, and the growing numbers of older person in nursing homes.

Due to the presence of most of these factors, many countries in the Asia Pacific Region are especially vulnerable to emerging diseases, making the Region the centre of many epidemics. Examples of important pathogens which emerged recently in the Asia Pacific Region include Nipah virus, SARS coronavirus and avian influenza virus A (H5N1).

The outbreaks of emerging infectious diseases like SARS and avian influenza, as well as the resurgence of known epidemic threats such as meningococcal diseases, cholera, typhoid fever and Japanese encephalitis, throughout the Region continue to threaten national, regional and international health security. Over the past years, the Region has experienced unprecedented multicountry outbreaks of newly emerging diseases, including SARS in 2003 and highly pathogenic avian influenza in poultry and humans since 2003. These emerging and re-emerging disease outbreaks not only have a profound impact on public health but also affect the economies and social stability of countries in the Region.

**Avian influenza A (H5N1)**

Influenza pandemics have occurred regularly throughout human history. Of the three occurring in the 20th century, the so-called Spanish flu pandemic of 1918 was the deadliest, with an estimated 20 to 40 million deaths. These pandemics were all caused by viral strains of influenza A related to avian influenza viruses, the reason the current outbreak of avian influenza A (H5N1) is believed to represent a high threat level.

The first documented occurrence of H5N1 infection in humans occurred in Hong Kong (China) in 1997 with 18 cases, six of which were fatal. The cases coincided with outbreaks of highly pathogenic avian influenza A (H5N1) infection in poultry on farms and in livestock markets. Within three days, Hong Kong (China) culled its entire poultry population of 1.5 million birds in an effort to avert a pandemic threat by removing further human exposure. This strategy was subsequently vindicated by evidence that the virus had begun to mutate in a dangerous way.

From December 2003 to November 2007, the regional outbreak of avian influenza A (H5N1) has resulted in the destruction of more than 150 million poultry and infection of at least 272 people in Cambodia, China, Indonesia, the Lao People’s Democratic Republic, Thailand and Viet Nam, with 179 deaths (Table 7.1). The majority of human infections have occurred sporadically, but clusters have been seen in most of these countries. Human infections are largely related to contact with infected
Table 7.1  Confirmed cases of human (A) H5N1 in the Asia Pacific Region, December 2003 to 12 November 2007

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poultry, but isolated instances of inefficient person-to-person transmission cannot be completely excluded. The disease has spread among poultry and wild birds to a number of countries in Europe, Africa and West Asia. In early 2006 Turkey reported its first human A (H5N1) cases. However, it is clear that the epicentre of the outbreak remains in the Asia Pacific Region where the disease appears to have become endemic in poultry.

Affected countries have responded vigorously to the emergence of human A (H5N1), but as long as outbreaks in poultry persist the threat of human infections and a possible influenza pandemic remains. Such an influenza pandemic would leave no country unaffected, but the precise impact is difficult to predict. Even a mild pandemic is expected to cause widespread absenteeism from workplaces and significantly increase demand on health services. A severe pandemic is likely to cause large-scale socioeconomic disruption, but advance planning can reduce this and help maintain essential services. In recent years, WHO and its Member States have worked to promote prevention efforts and develop pandemic preparedness plans.

Responding to the avian influenza outbreak has been challenging and has required a vigorous response from both WHO and its Member States. A situation analysis is instructive and can be summarized as follows.

- Since December 2003 poultry outbreaks have occurred in 13 countries in the Asia Pacific Region: Bangladesh, Cambodia, China, India, Indonesia, Japan, the Republic of Korea, the Lao People’s Democratic Republic, Malaysia, Mongolia, Myanmar, Thailand and Viet Nam. Some countries experiencing outbreaks have succeeded in controlling the disease but in others this has proved impossible. As a result, the virus is now entrenched over a large geographical area. The total number of human cases reported continues to rise in the
Asia Pacific Region. Cambodia and Indonesia reported their first human cases in 2005, and the Lao People’s Democratic Republic in 2007.

- The natural reservoir for the majority of avian influenza viruses, including A (H5N1), is in migratory waterfowl, which normally do not exhibit any signs of illness. In addition, there is now good evidence that domestic duck species can also be infected (and excrete significant amounts of virus) without exhibiting any outward signs. Taken together, these create a situation where a considerable potential reservoir of infection exists in domestic and wild bird populations, making both surveillance and disease control problematic.

- The virus responsible for the outbreak has not only proved to be resilient but also extremely versatile in its ability to infect a wide range of animal species, including pigs, cats and tigers, as well as domestic poultry and wild birds.

- The majority of human infections have occurred in people living in ordinary domestic settings who keep poultry in so-called backyard farms. Widespread poultry outbreaks in backyard farms create considerable logistical problems for detection and control by animal health authorities with limited resources. The preponderance of human infections in these settings also makes it difficult to define risk groups as anything less than virtually the entire population of some countries. The relationship between animal and human infections highlights the need for intersectoral collaboration at all levels between human health, agriculture, animal health and food safety sectors.

- Avian influenza has had a significant economic impact on the Asia Pacific Region and much of this impact has been felt by small-scale farmers who rely on poultry as their sole or major source of income. An important issue has been that of providing compensation for farmers for poultry that have been culled. In some instances the provision of inadequate compensation has proved to be an important disincentive in reporting outbreaks, resulting in problems with disease control.

- The affected countries, together with the international community, have actively responded to the outbreaks since 2003. The control of diseases such as avian influenza requires high-level government commitment, international collaboration and a strong public health infrastructure. However, in some countries public health has not traditionally been given a high priority and, therefore, infrastructure for surveillance and response activities need to be greatly enhanced. At a technical level, reliable laboratory diagnosis for this new disease has proved difficult and support from external technical partners has played a vital role. Despite this, a greater emphasis needs to be placed on capacity-building within affected countries. In addition to infrastructure and human resources enhancement, there is an urgent need to bring public health into the national political and decision-making arena.

- The rapid sharing of data and other information enables the development of evidence-based control strategies in affected countries, assists preparedness in vulnerable ones and is crucial in assessing pandemic risk. Barriers to rapid sharing of such data (and the conduct of formal research) need to be identified and overcome.

- Considerable efforts are currently being made at a global level towards the production of influenza A (H5N1) vaccines to protect individuals during a possible pandemic. However, significant pandemic influenza vaccine production may not occur until at least six months after the start of a pandemic. It is necessary for viral specimens to be sent to external reference laboratories for a number of reasons, including confirmation of diagnostic testing and genetic analysis as well as for the development of vaccines.
Several antiviral drugs are available for the prevention and treatment of seasonal influenza. Although none of the antiviral drugs have been shown to prevent avian influenza, studies conducted through the WHO Global Influenza Surveillance Network have shown that the antiviral drug oseltamivir may be the most useful for treatment. However, it is expensive and currently in great demand. In addition, its manufacturing process is complex and lengthy. The use of alternative antiviral drugs should be considered where appropriate.

In the early stages of the emergence of a potential pandemic, it may be possible in some situations, to stop or delay the virus spread by implementing a rapid response and containment strategy. The rapid containment of pandemic influenza requires extraordinary measures, including quarantine, social distancing (such as closing of schools) and mass administration of antiviral drugs.

Severe acute respiratory syndrome (SARS)

SARS was the first newly emerging and readily transmissible disease of the 21st century. In late February 2003, an atypical pneumonia outbreak of unknown cause with a total number of 305 cases (including five deaths) in Guangdong province of China was reported by health authorities. The outbreak was caused by a new, emerging disease later named SARS. Retrospective investigation indicated that the initial SARS case might have occurred in mid-November 2002 in Guangdong.

By March 2003, SARS had spread to other countries and areas rapidly due to international travel. According to final data compiled by WHO, 8096 probable SARS cases occurred in 29 countries and areas with 774 fatalities. Although the outbreak affected individuals in many countries, the greatest impact by far was felt in the Asia Pacific Region which had more than 95% of cases.

The epidemic began attracting international attention in February 2003, when an American businessman travelling from Hong Kong (China) became afflicted with fever and respiratory symptoms after arriving in Hanoi. Several of the medical staff who treated him soon developed the same disease, despite basic hospital procedures. The severity of the symptoms and the infection of hospital staff alarmed global health authorities. Fearful of another emergent global epidemic, WHO issued a global alert on 12 March 2003, followed by a health alert from the United States Centers for Disease Control and Prevention.

On 15 March 2003 WHO issued an emergency travel advisory and provided a case definition and a name for the new disease, severe acute respiratory syndrome (SARS). SARS is a respiratory disease in humans caused by the SARS coronavirus. Initial symptoms are flu-like and may include fever, malaise, myalgia, lethargy, gastrointestinal symptoms, cough, sore throat and other non-specific symptoms. A symptom that appears to be common to all patients is a fever above 38 °C. Shortness of breath may occur later. Symptoms usually appear 2–10 days following exposure, but a period of up to 13 days has been reported. In most cases symptoms appear within 2–3 days.

The principal mode of transmission at the SARS outbreak sites is exposure to infected respiratory droplets during close person-to-person contact. Droplet spread occurs when droplets from the cough or sneeze of an infected person are propelled a short distance through the air and deposited on the mucous membranes of the mouth, nose or eyes of persons who are nearby. The virus can also spread when a person touches a surface or object contaminated with infectious droplets and then touches the mouth, nose or eyes. The SARS virus could also spread more broadly through other means not yet known.
WHO, affected countries and other partners instituted general infectious disease control measures such as quarantine, isolation and strict hygiene measures in hospitals. Thousands were put under voluntary or supervised quarantine in Canada, China, including Hong Kong (China), Singapore, Taiwan (China) and the United States of America. In Beijing, Hong Kong (China), Singapore, and Toronto, Canada, schools were closed for a number of days to contain the spread of SARS.\textsuperscript{13,14,15}

Medical officers, epidemiologists and other specialists were deployed to assist with on-site investigations around the world. On 27 March 2003, WHO recommended the screening of airline passengers for symptoms of SARS. Finally, on 5 July 2003, WHO declared that the last chain of transmission of the global SARS epidemic had been broken and that the outbreak could be declared over.

However, since the 2002–2003 outbreak, four cases of SARS have been reported in Guangzhou, Guangdong province, in China from December 2003 to January 2004.\textsuperscript{16} In addition, SARS cases acquired in a laboratory setting have been reported in Beijing, Singapore and Taipei (China). The incident in Beijing was also associated with transmission beyond the index case, with three “generations” of infection resulting in a further nine cases.\textsuperscript{17} These cases have raised the profile of laboratory biosafety as a regional issue that should be addressed.

The source of SARS is believed to be in animals endemic to southern China. Although the definitive natural hosts remain uncertain, much research has suggested that a number of animals, including bats, may be implicated.

SARS caused considerable economic impact in many countries in the Asia Pacific Region and around the world. Losses based largely on cancelled travel and decreased investment in service industries in the Asia Pacific Region range from US$ 30 billion to US$ 140 billion.\textsuperscript{18} The extent of economic impact from outbreaks largely depends on how swiftly governments implement effective public health policies.

**Nipah virus**

Another important infectious disease in the Asia Pacific Region is Nipah virus, capable of causing illness and death in domestic animals and humans. Nipah virus is naturally harboured by certain species of fruit bats which are distributed across an area encompassing northern, eastern and south-eastern areas of Australia, Bangladesh, India, Indonesia, Malaysia, the Philippines, Thailand, some of the Pacific islands and Madagascar in Africa.\textsuperscript{19} The bats are not susceptible to infection and do not themselves become ill. Nipah virus was discovered in 1999 and is named after the location where it was first detected in Malaysia. Nipah virus is closely related to the Hendra virus, named after the town where it first appeared in Australia in 1994. Both Nipah and Hendra are members of the virus family Paramyxoviridae and are grouped together in the genus Henipavirus.\textsuperscript{20}

A major outbreak of Nipah virus in pigs and humans in Malaysia from September 1998 to April 1999 resulted in 265 infected persons, 105 of whom died, and the eventual destruction of about 1.1 million pigs.\textsuperscript{21} Of those people infected, 93% had exposure to pigs. The disease in pigs was highly contagious and symptoms included acute fever, respiratory problems and neurological signs in infected pigs. An associated outbreak in March 1999 among abattoir workers in Singapore who handled pigs imported from outbreak areas in Malaysia led to 11 cases, with one death. Between December 2003 and April 2004, 56 people in Bangladesh became infected with Nipah virus in two outbreaks, with 44 fatalities (78.5% mortality rate).\textsuperscript{22}
The mode of transmission from animal to animal, and from animal to human, is uncertain, but appears to require close contact with contaminated tissue or body fluids from infected animals. *Nipah* virus was detected in pigs during the Malaysian outbreak, but other sources such as dogs and cats could not be ruled out. The role of species of animals other than pigs in transmitting infection to humans has not yet been determined, although the disease predominantly affects the nervous system. The typical course of the illness begins with onset of fever followed by headache, dizziness and varying degrees of diminishing consciousness. Patients suffering from a reduced level of consciousness experienced prominent signs of brain-stem dysfunction. Some patients experienced respiratory illness during the early part of their infections.

No drug therapies have yet been proven to be effective in treating *Nipah* virus infection. Treatment relies on providing intensive, supportive care. There is some evidence that early treatment with the antiviral drug ribavirin can reduce both the duration of feverish illness and the severity of disease. However, the efficacy of this treatment in curing the disease or improving survival is still uncertain.

It is widely understood that there is risk of transmission of *Nipah* virus from sick animals such as pigs to humans, but transmission from person to person has not yet been documented even in the context of a large outbreak. Therefore, the risk of transmission of *Nipah* virus to health-care workers is thought to be low. However, transmission without percutaneous exposure (through a break in the skin barrier) is theoretically possible as respiratory secretions contain the virus. This is why it has been categorized as a biohazardous agent that should be managed in a high-level biosecurity laboratory. It is therefore recommended that close contact with body fluids and infected tissues be avoided if *Nipah* infection is suspected.

**Meningococcal diseases**

Meningococcal disease is a severe bacterial infection of the bloodstream or meninges (a thin lining covering the brain and spinal cord). Symptoms are high fever, headache, vomiting, stiff neck and a rash, which may appear 2–10 days after exposure but usually within 3–5 days. Among people who develop meningococcal meningitis, 5%–10% die in spite of treatment with antibiotics. Of those who live, permanent brain damage, hearing loss, kidney failure, loss of arms or legs, or chronic nervous system problems can occur. The meningococcus bacterium is spread by direct, close contact with nose or throat discharges of an infected person, thus it has potential to cause epidemics.

In the Philippines, meningococcal diseases have been reported since 2000. In September 2004, the Cordillera Administrative Region in the country’s main island of Luzon experienced an unusual outbreak of serogroup A meningococcal disease with a high case fatality rate. Between 1 October 2004 and 28 January 2005 a total of 98 cases of meningococcal disease and 32 deaths were reported, 11 laboratory confirmed for *N. meningitides*.

**Hand, foot and mouth disease**

Hand, foot and mouth disease (HFMD) is a common, acute viral illness in infants and children usually characterized by fever, sores in the mouth, and a rash with blisters. It occurs mainly in children under the age of 10, but may occur in adults too. Individual cases and outbreaks of HFMD occur more frequently in summer and early autumn.
Caused by Coxsackievirus A16 infection, HFMD is a mild disease and nearly all patients recover without medical treatment in 7 to 10 days. On the other hand, another cause of HFMD, enterovirus 71 or EV71, has the potential to cause viral meningitis and, rarely, more serious conditions such as encephalitis or a poliomyelitis-like paralysis. EV71 encephalitis may be fatal. Cases of fatal encephalitis occurred during outbreaks of HFMD in Sarawak, Malaysia, in 1997 and in Taiwan (China) in 1998.

### Chikungunya

Chikungunya fever is caused by alphavirus and spreads through the bite of the infected *Aedes aegypti* mosquito. The disease resembles dengue fever, and is characterized by severe, sometimes persistent, joint pain (arthritis) as well as fever and rash. Although widespread occurrence of the disease causes substantial morbidity and economic loss, it is generally not fatal. Major epidemics appear and disappear cyclically, usually with an inter-epidemic period of 7–8 years and sometimes as long as 20 years. After a long period of absence, outbreaks of chikungunya fever appeared in Indonesia in 1982 and 1999, and in Africa and other parts of Asia between 1960 and 1982. Virus strains had also been isolated in Bangkok, Thailand, in the 1960s, in various parts of India and in Sri Lanka in 1969, and in Vietnam and Myanmar in 1975.

After an interval of a few years, chikungunya fever has been reported from several countries including India and various Indian Ocean islands including the Comoros, Mauritius, Réunion and Seychelles. The most recent outbreaks were reported in more than 150 districts in India in 2006. As of October 2006, more than 1.25 million cases have been reported in India, with 752,245 cases from Karnataka state and 258,998 from Maharashtra state. In some areas attack rates reached as high as 45%.

### Other emerging infectious diseases

In August 2005 the Ministry of Health of China reported 215 cases of human disease associated with an outbreak of *Streptococcus suis* in pigs in Sichuan province with 39 fatalities. Symptoms reported by local clinicians included high fever, malaise, nausea and vomiting, followed by meningitis, subcutaneous haemorrhage, toxic shock, and coma in severe cases. The incubation period was short and disease progression rapid.

Japanese encephalitis is a disease spread to humans by infected mosquitoes in temperate regions of Bangladesh, China, India, Japan, Nepal and the Republic of Korea. It is one of a group of mosquito-borne virus diseases that can affect the central nervous system and cause severe complications and even death. The disease is the leading cause of viral encephalitis in Asia with cases between 30,000 and 50,000 reported annually and case-fatality rates ranging from 0.3% to 60%. An outbreak in India, which started in July 2005, resulted in a total of 4,255 suspected cases reported from the state of Uttar Pradesh with 914 deaths (a case fatality rate of 22%). Of this total, 280 cases and 68 deaths were from the adjoining state of Bihar. A total of 1,802 suspected Japanese encephalitis cases were reported, with 283 fatalities, in these two states till 21 September 2005.

Other new infectious agents that have emerged in recent years in the Asia Pacific Region include *Barmah Forest* virus, *Hendra* virus and *Chandipura* virus.

One feature common to many of these diseases (including avian influenza and SARS) is the increased risk of acquiring them from individuals either working or living in close association with animals, for
example, poultry in the case of avian influenza. This has led to the realization that human and animal health sectors should strengthen their collaboration in order to tackle such diseases “at source”. This will likely require a thorough review of animal husbandry practices.

The above-mentioned emerging diseases have been included as examples to highlight the Asia Pacific Region’s vulnerability to outbreaks of severe and potentially fatal diseases from unexpected organisms and to demonstrate that almost all such diseases are controllable by conventional public health and disease control measures. The capacity of the Region to detect potential outbreaks swiftly and mount a strong public health response needs to be strengthened.

7.2 HIV and sexually transmitted infections

Human immunodeficiency virus (HIV) first reached the Asia Pacific Region in the 1980s and by 2007 4.7 million people were living with HIV/AIDS (PLHA), just over 14% of the total global HIV/AIDS case-load. In 2007 alone, there were an estimated 420,000 new infections and 293,000 deaths from HIV/AIDS. The estimated number of people living with HIV/AIDS for the different WHO Regions is shown in Figure 7.4. Economic losses from HIV/AIDS in 2001 were calculated at US$ 7.3 billion.

![Fig. 7.4 Estimated number of people living with HIV/AIDS by WHO Region, 2007](image)

AFR = African Region; AMR = Americas Region; EMR = Eastern Mediterranean Region; EUR = European Region; SEAR = South-East Asia Region; WPR = Western Pacific Region


Worldwide, close to one million people a day acquire a curable sexually transmitted infection (STI) and approximately half of these cases occur in the Asia Pacific Region. Sexually transmitted infections are among the top 10 reasons for seeking health care in most developing countries in the Region. The socioeconomic costs of STIs and their complications are substantial. Untreated common STI can result in infertility, ectopic pregnancy, infant death, congenital abnormalities and cervical cancer. As STIs are known to facilitate both the acquisition and spread of HIV, there is an added urgency to coordinate national and regional HIV/AIDS and STI programmes.
Together with industry, international and nongovernmental organizations, community and faith-based organizations, national governments in the Region are increasingly committed to responding to the challenges of HIV/AIDS and STI. Special efforts are being made to prevent new infections among vulnerable populations, provide necessary care and treatment to those in need, mitigate the impact of HIV/AIDS on families and communities, and strengthen national health systems capacity and multisectoral responses towards reaching Millennium Development Goal 6 of having halted and begun to reverse the spread of HIV/AIDS by 2015. This goal will continue to guide countries and partners in the Region as they confront the HIV/AIDS pandemic.

The burden of HIV/AIDS and sexually transmitted infections in the Region

The Asia Pacific Region comprises over 14% of the globe’s landmass and is home to almost 3.4 billion people, over 53% of the world’s population. Among the most relevant features of HIV/AIDS and STI in the Region is the very large numbers of people at risk of infection. Even small changes in the incidence and prevalence of these diseases translate into very large numbers. Additionally, the HIV epidemic in the Region is best understood as a patchwork of epidemics, varying between and within areas of individual countries with regard to incidence and prevalence, and predominant risk factors for infection and trends. A snapshot of this evolving epidemiological situation in selected countries in the Region is provided in Table 7.2.

Diversity of the HIV epidemic in the Asia Pacific Region

With an estimated 4.7 million (range 3.9–6.0 million) PLHA in the Region, the overall adult (>15 years) prevalence of HIV infection is about 0.3% in the WHO South-East Asia Region and 0.1% in the Western Pacific Region, a toll that is below the estimated 5.9% prevalence seen in hard-hit sub-Saharan Africa. Four countries in the Region have adult HIV prevalence rates (frequently determined by prevalence among female antenatal clinic attendees for methodological reasons) in excess of or nearing 1%: Cambodia (0.9%), Myanmar (0.7%), Papua New Guinea (1.3%) and Thailand (1.4%). In the remainder of the Region’s countries, the national burden of HIV infection is concentrated in selected high-risk populations. However, the level of the HIV epidemic varies not only geographically but also between and within countries. Large areas across southern Indian states, for example, are experiencing HIV prevalence rates markedly higher than in the northern states.

While the Democratic People’s Republic of Korea has no reported cases of HIV infection, Cambodia, China, India, Myanmar, Thailand and Viet Nam account for the majority of the Region’s HIV case-load. India, the second most populated country in the Region, is estimated to be home to approximately 2.5 million adult PLHA. In terms of prevalence, however, India reports an adult prevalence of just 0.36%, compared to South Africa where one in five is infected.

Cambodia, Myanmar and Thailand have seen steady declines in HIV prevalence in adults aged 15–49. In more severely affected southern states of India, studies show a decrease in HIV infections among women attending antenatal clinics (Figure 7.5).

With few exceptions, the HIV/AIDS pandemic has grown significantly in the Region. Recent increases in reported HIV cases in Papua New Guinea and AIDS cases in Indonesia show the potential for HIV to reach epidemic proportions even in countries with generally low HIV prevalence rates (Figure 7.6).
Table 7.2  HIV burden for selected countries in the Asia Pacific Region

<table>
<thead>
<tr>
<th>Country</th>
<th>Estimated total population (2005)</th>
<th>Estimated number of PLHA</th>
<th>HIV prevalence in adults</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Number</td>
<td>Year</td>
<td>%</td>
</tr>
<tr>
<td>Australia</td>
<td>20 310 000</td>
<td>16 000</td>
<td>(2005)</td>
</tr>
<tr>
<td>Bangladesh</td>
<td>153 281 000</td>
<td>11 000</td>
<td>(2005)</td>
</tr>
<tr>
<td>Bhutan</td>
<td>637 000</td>
<td>&lt;500</td>
<td>(2005)</td>
</tr>
<tr>
<td>Brunei Darussalam</td>
<td>374 000</td>
<td>&lt;100</td>
<td>(2005)</td>
</tr>
<tr>
<td>Cambodia</td>
<td>13 956 000</td>
<td>65 000 *</td>
<td>(2006)*</td>
</tr>
<tr>
<td>China</td>
<td>1 312 979 000</td>
<td>700 000 *</td>
<td>(2007)*</td>
</tr>
<tr>
<td>Democratic People's Republic of Korea</td>
<td>23 616 000</td>
<td>...</td>
<td>...</td>
</tr>
<tr>
<td>Fiji</td>
<td>828 000</td>
<td>&lt;500 *</td>
<td>(2007)*</td>
</tr>
<tr>
<td>India</td>
<td>1 134 403 000</td>
<td>2 500 000 **</td>
<td>(2006)**</td>
</tr>
<tr>
<td>Indonesia</td>
<td>226 063 000</td>
<td>170 000</td>
<td>(2005)</td>
</tr>
<tr>
<td>Japan</td>
<td>127 897 000</td>
<td>17 000</td>
<td>(2005)</td>
</tr>
<tr>
<td>Lao People’s Democratic Republic</td>
<td>5 664 000</td>
<td>3 700</td>
<td>(2005)</td>
</tr>
<tr>
<td>Malaysia</td>
<td>25 653 000</td>
<td>69 000</td>
<td>(2A005)</td>
</tr>
<tr>
<td>Maldives</td>
<td>295 000</td>
<td>...</td>
<td>...</td>
</tr>
<tr>
<td>Mongolia</td>
<td>2 581 000</td>
<td>&lt;500</td>
<td>(2005)</td>
</tr>
<tr>
<td>Myanmar</td>
<td>47 967 000</td>
<td>360 000</td>
<td>(2005)</td>
</tr>
<tr>
<td>Nepal</td>
<td>27 094 000</td>
<td>75 000</td>
<td>(2005)</td>
</tr>
<tr>
<td>New Zealand</td>
<td>4 097 000</td>
<td>1 400</td>
<td>(2005)</td>
</tr>
<tr>
<td>Papua New Guinea</td>
<td>6 070 000</td>
<td>46 300 *</td>
<td>(2006)*</td>
</tr>
<tr>
<td>Philippines</td>
<td>84 566 000</td>
<td>7 500 *</td>
<td>(2007)*</td>
</tr>
<tr>
<td>Republic of Korea</td>
<td>47 870 000</td>
<td>13 000</td>
<td>(2005)</td>
</tr>
<tr>
<td>Singapore</td>
<td>4 327 000</td>
<td>5 500</td>
<td>(2005)</td>
</tr>
<tr>
<td>Sri Lanka</td>
<td>19 121 000</td>
<td>4 000 ***</td>
<td>(2005)</td>
</tr>
<tr>
<td>Thailand</td>
<td>63 003 000</td>
<td>580 000</td>
<td>(2005)</td>
</tr>
<tr>
<td>Timor-Leste</td>
<td>1 067 000</td>
<td>...</td>
<td>...</td>
</tr>
<tr>
<td>Viet Nam</td>
<td>85 029 000</td>
<td>260 000</td>
<td>(2005)</td>
</tr>
</tbody>
</table>

* HIV estimates are based on 2007 national consensus meetings.


Fig. 7.5 HIV prevalence among antenatal attendees in selected Asia Pacific countries, 1991–2006

HIV prevalence is decreasing in some countries


Fig. 7.6 Reported HIV or AIDS cases in selected Asia Pacific countries, 1995–2006


Surveillance data indicate that in some countries HIV is spreading from high-risk populations to the general population. In some areas of Yunnan, Henan, Xinjiang and other provinces in China, HIV prevalence is already ≥1% among pregnant women attending antenatal care, as is the case in the states of Andhra Pradesh, Karnataka, Maharashtra, Manipur and Nagaland in India.

**HIV/AIDS and sexually transmitted infections in select vulnerable populations**

Although there is diversity within countries and across the Region, virtually all countries have the same risk behaviours and vulnerabilities that promote, facilitate and fuel HIV and STI transmission. Widespread or defined pockets of such factors as sex work, low condom use, a high prevalence of STI, injecting drug use combined with sharing of injecting paraphernalia, poverty, illiteracy, limited access to health information and services, gender inequalities, taboos and “conservative cultures” that avoid open and frank discussions about sexual matters, urbanization, and migrant or mobile labour forces all contribute to the vulnerability of epidemic HIV within individual countries and regions.

Females are more vulnerable to acquiring HIV and STI, and although women currently comprise just over 29% of adults aged 15–49 years who are infected with HIV in the Region, their infection rates have been increasing steadily in most countries. Groups especially vulnerable to HIV/AIDS infections and at high risk of acquiring and spreading HIV have special relevance to the Asian HIV epidemic, and are found in all countries. Populations such as sex workers, injecting drug users (IDUs) and men who have sex with men and transgender populations are frequently at high risk of acquiring infection and transmitting HIV to other people through unsafe sexual or needle-sharing behaviours. Through such practices infection can spread widely in a community, either directly or through “bridging populations” such as clients and partners of sex workers. Because many of these populations are also widely stigmatized and socially marginalized, they can present special challenges for public health programmes seeking to reach them with prevention interventions and services for care, support and treatment.

The importance and diversity of high-risk behaviours associated with HIV transmission is similarly evident in the entire Asia Pacific Region, where almost 50% of HIV is associated with sex workers and their clients and 22% of infections are related to unsafe injecting drug use. In China, HIV outbreaks among IDUs have been seen in nine provinces as well as in Beijing, while HIV is being spread heterosexually in Guangdong, Guangxi and Yunnan provinces.

**Sex workers**

National surveillance data show that HIV prevalence among female sex workers has consistently and significantly exceeded that of the general population (i.e. all women attending antenatal clinics). For example, HIV prevalence among selected female sex workers is 50% in Mumbai, India (2005), over 30% in Kathmandu, Nepal, and Myanmar (2005), and 13% in Cambodia (2006). Documented HIV infections among female sex workers has been increasing markedly in several Indonesian cities, from approximately 1% in 2001 to almost 4% in 2003 in Jakarta, and from around 3% in 2000 to nearly 20% five years later in Sorong. In India, HIV surveillance among sex workers was conducted at 83 sites in 2005. Six states had HIV prevalences above 10% and one site in Maharashtra had a prevalence above 20%. In Cambodia, HIV surveillance showed a high rate of 17% among sex workers in 2003.
Men who have sex with men and transgender populations

Men who have sex with men (MSM) and transgender populations are also at high risk of acquiring and spreading HIV and have drawn the attention of regional and country health authorities. HIV outbreaks among MSM have occurred in Cambodia, China, India, Nepal and Viet Nam, and MSM are recognized as an especially important part of the HIV epidemic in Australia and New Zealand. Unsafe sex between men has been associated with more than two thirds of newly diagnosed infections in Australia since 2000. In New Zealand there has been an increase in HIV diagnosed among MSM, reaching over 50% of all new infections in 2005. Infection rates related to MSM have also been growing in many other urban centres across the Region. In Bangkok, Thailand, HIV prevalence among MSM increased from 17.3% in 2003 to 28.3% in 2005. Increasingly a cause for concern nationally, HIV prevalence among MSM has ranged from 1% to 40% across 18 targeted sites in India. Documented HIV among MSM in Villupuram district in Tamil Nadu, India, has doubled from 4% in 2002 to 8% in 2005.

Injecting drug users

High HIV infection rates have been found among IDUs in China, India, Malaysia, Myanmar, Thailand, Viet Nam and, most recently, in Nepal and Indonesia. Injecting drug users account for an estimated 45% of the HIV positives in China (2005), 76% of reported cases in Malaysia (2003), and 54% of reported HIV infections in Indonesia and Viet Nam (2005). India’s north-eastern states bordering Myanmar have documented HIV infections of up to 70% among IDUs, and infection rates in IDUs in New Delhi have increased from less than 2% to over 20% between 2001 and 2005. Especially noteworthy in the Region is a rapid increase in documented HIV in IDUs in Jakarta, Indonesia, from 16% in 1999 to almost 70% in 2003. Rapid increases in HIV infections among IDUs in Bangladesh provide evidence that the country is moving from a low-level to a concentrated epidemic.

Sexually transmitted infections and HIV

Sexually transmitted infections remain a serious and growing problem in many countries in the Region, both as consequential diseases in their own right and also in how they relate to HIV transmission. These infections are most frequently found among individuals who are exposed to high-risk, unprotected sexual practices that are similarly associated with HIV transmission. Thus, STIs can be sensitive markers for HIV transmission as the presence of STI in an individual or group suggests these individuals may also have been exposed to HIV. All STIs, not only ulcerative STI such as syphilis, chancroid and genital herpes, also facilitate HIV transmission to a third party through unprotected sex.

Surveys conducted during 2004–2005 in six sentinel countries of the Pacific (Fiji, Kiribati, Samoa, Solomon Islands, Tonga and Vanuatu) revealed that chlamydia was the most prevalent STI, at an overall 18% prevalence among pregnant women and up to a high of 29% in Fiji. In China, a surge in STI has been reported over the last two decades. The Ministry of Health reported around 5800 cases in 1985, but by 2005 this had risen to over 700 000. Of added relevance to this finding are estimates that reported cases in China represent only about 10% of the actual disease incidence. In Mongolia, National Health Indicators for 2006 reveal that the total number of cases of STI (gonorrhoea, syphilis and trichomoniasis) comprised 47.3% of all reported communicable diseases. Among pregnant women STI prevalence was found to be as high as 30.3% in a 2002 national survey among women attending antenatal clinics in Mongolia, where the number of syphilis cases among blood donors increased 12.3 times between 1992 and 2002.
The burden of STI among sex workers, MSM and transgender populations has been of special concern at the country level because of their relationship to the acquisition and spread of HIV. A survey in Ulaanbaatar, Mongolia, in 2001 revealed that 67% of sex workers had at least one STI. Across a selection of sites in Indonesia, surveys in 2005 revealed that the prevalence of STI among direct and indirect sex workers was uniformly high and even approached or exceeded 50% in some localities (Figure 7.7).^{46}

Patterns of STI vary greatly in Asia. Some countries have high rates of curable STI, while others have controlled these infections and see more incurable STI such as infection with herpes simplex virus type 2 (HSV-2). Syphilis prevalence among pregnant women is very low in Sri Lanka and Thailand, and is declining in Myanmar. Surveys in 2002–2003,^{47} for example, revealed HSV-2 prevalence rates ranging from 10% to 30% among women in antenatal clinics in Fujian, China, and among seafarers in Tarawa, Kiribati. In 2007 HSV-2 was documented as high as 70.8% among sex workers in Yunnan, China.^{48} Overall, however, data on STI are incomplete. STI surveillance remains inadequate to inform STI control and HIV prevention programmes in much of the Region.

Because of the high-risk sexual behaviours of some MSM, including recreational drug use during sex, elevated and increasing STI prevalence rates are also found among this vulnerable group. Studies in Sydney, Australia, for example, have documented a tenfold increase in syphilis cases between 1999 and 2003, and a sharp increase in unprotected sex between men since 2000.^{49}
**Tuberculosis and HIV**

Tuberculosis (TB) is the most common opportunistic coinfection among immunologically compromised individuals infected with HIV, and is the leading cause of death among persons with AIDS. With the likelihood of finding a higher prevalence of HIV among people infected with TB, and because of the need to coordinate treatment for HIV and TB in coinfected individuals, special attention has been directed to voluntary counselling and HIV testing among TB patients.

The Asia Pacific Region carries the highest tuberculosis burden in the world. It has been roughly estimated that among the 9.7 million cases of active TB in the Region, 227 000 were coinfected with HIV as of 2006.\(^5\)

HIV surveillance among TB patients in many countries of the Region has shown a moderate to high prevalence of HIV coinfection and incident cases (Table 7.3).

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**Table 7.3** Prevalence of HIV in new adult tuberculosis cases aged 15-49 in selected countries of the Asia Pacific Region

<table>
<thead>
<tr>
<th>Country</th>
<th>Percent prevalence of HIV in new adult TB cases</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thailand</td>
<td>11.0</td>
</tr>
<tr>
<td>Cambodia</td>
<td>10.0</td>
</tr>
<tr>
<td>Viet Nam</td>
<td>5.0</td>
</tr>
<tr>
<td>Myanmar</td>
<td>2.6</td>
</tr>
<tr>
<td>Nepal</td>
<td>1.4</td>
</tr>
<tr>
<td>India</td>
<td>1.2</td>
</tr>
<tr>
<td>Indonesia</td>
<td>0.6</td>
</tr>
<tr>
<td>China</td>
<td>0.3</td>
</tr>
</tbody>
</table>


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**Blood transfusion and HIV**

Intravenous exposure to HIV-infected blood or untreated blood products is the most efficient transmitter of HIV. Globally, 5%–10% of HIV transmission is estimated to be through transfusion of blood.\(^5\)

Fortunately, screening donated blood for HIV is now almost universal in the Region. Prevalence rates of HIV in screened blood across South-East Asia ranges from 0% to 0.9%. Notwithstanding this advance, transfusion related transmission has been documented in a few countries.
Extensive HIV transmission related to HIV-contaminated plasma collection equipment and procedures was recorded in central China up to the mid-1990s. While the burden of these early HIV infections and current AIDS disease is still an important feature of the epidemic in this area of China, other countries in the Region have not reported large transfusion-related outbreaks.

Response to the HIV pandemic

The global response to HIV/AIDS began with a primary emphasis on prevention between 1990 and 2002. The availability of antiretroviral therapy (ART) brought expanded treatment services, which were advanced through WHO’s 3 by 5 Initiative (2000–2005). Recently, the goal of achieving universal access has stressed the need for a comprehensive and coordinated approach to prevention, care and treatment in the response to HIV/AIDS and STI.

The Asian Development Bank and the United Nations Joint Programme on HIV/AIDS (UNAIDS) study series estimated that unless prevention, care and treatment programmes are significantly expanded, 10 million new HIV infections could occur in the Asia Pacific Region between 2004 and 2010, and the annual death toll will rise to 760,000 by 2010. However, it is also estimated that with an improved response to the regional pandemic, the number of newly infected persons can be contained to 4 million by 2010 and the number of deaths limited to approximately 660,000 per year.

The national and regional health sector response to the HIV pandemic has three principle tracks: improving strategic information systems for monitoring national epidemics, especially linked to identify needs and provide an evidence base for plans to strengthen health services; prevention of HIV spread, especially targeting the needs of vulnerable populations; and assuring the necessary medical treatment, care and support for HIV infected individuals, their families, friends and communities. There has been an important evolution in the global and regional strategic response to HIV/AIDS and STI in the last two decades.

In all these areas, there is a focus on activities that are: (1) appropriate to the national and local governmental, legal, religious and cultural imperatives; (2) sensitive to the stigma and discrimination experienced by vulnerable groups and people living with HIV; (3) able to mobilize and coordinate the resources of a full range of partners, including multiple sectors of national and local government, international and bilateral organizations, national and international NGOs, faith-based organizations and private sector business; and (4) designed to scale up comprehensive services that include and synergize prevention and treatment efforts in a coordinated manner.

Strategic information systems

National programmes need reliable information to guide the response to HIV/AIDS. Such information is especially important for policy and programme advocacy, resource mobilization, targeting resources to vulnerable population groups and highly impacted areas, measuring progress and impacts against planned programme objectives and accounting to governments, donors, policy-makers and the public. Key components of strategic information systems include second-generation HIV surveillance, monitoring and evaluation of essential interventions, such as ART, HIV testing and counselling, prevention of mother-to-child transmission of HIV, prevention in high-risk groups, care and treatment, and STI control and related operational research. New approaches recently introduced in some areas are HIV incidence surveillance and HIV drug resistance surveillance and monitoring.
Second-generation HIV surveillance systems have been established in most countries in the Region. HIV/AIDS case reporting and HIV sero-surveillance (HSS) have been widely implemented. Attention is being paid to improving STI surveillance across the Region. Repeated rounds of HSS and behavioural surveillance surveys (BSS) are organized at sentinel sites in selected vulnerable populations in Bangladesh, Cambodia, China, India, Indonesia, Mongolia, Myanmar, Nepal, the Philippines, Sri Lanka, Thailand and Viet Nam. Highly impacted countries, such as Cambodia, India, Myanmar, Papua New Guinea and Thailand, have also monitored HSS among more general population groups (women attending antenatal care, male military recruits and youth). Behavioural surveillance is being extended to the general population in Cambodia, India, Mongolia, Myanmar, Thailand and Viet Nam, and sentinel surveillance in countries in the Pacific such as Fiji, Kiribati, Samoa, Solomon Islands, Tonga and Vanuatu. HIV incidence surveillance has only been implemented in Thailand.

Programme monitoring and evaluation is increasingly applied across the Region for specific country programmes. HIV drug resistance surveillance has been the subject of targeted regional efforts to establish coordinating mechanisms, and to develop capacity, including laboratory capacity, in selected countries including Cambodia, China, India, Indonesia, Myanmar, Thailand and Viet Nam.

**Prevention**

The prevention of HIV and STI has long been a major challenge for governments and partners in the Region. Virtually all countries have instituted HIV awareness programmes to inform the public about the threat of HIV/AIDS and STI and to promote safer sex behaviours that prevent the acquisition and spread of infections. Because of the critical role that high-risk and “bridging groups” play in epidemics, special or “targeted” prevention programmes have been directed at these vulnerable groups.

**Sex work**

Where sex work plays an important role in national or local HIV/AIDS and STI transmission, targeted prevention programmes have been initiated that seek to promote safer sexual practices, condom use, and improved STI detection and treatment. The 100% Condom Use Programme (100% CUP), which was developed in Thailand, has been a successful approach in the Region and is being adapted and implemented in Cambodia, China, the Lao People’s Democratic Republic, Myanmar, Mongolia, the Philippines and Viet Nam. Implementation has usually begun with piloting the programme in a small number of localities and then progressively expanding it to other sites, often with good support from the international community. The programme has now been expanded virtually nationwide in Cambodia and Thailand. This programme strategy is particularly designed to empower sex workers to better negotiate condom use and to enlist the support of “gatekeepers” of establishment-based sex work (e.g. brothel owners, managers of entertainment establishments, police and local authorities) to enforce an area-wide policy of “No Condom No Sex”. The involvement of police in such programmes has been criticized by NGOs and community-based organizations as being counterproductive in the long run and an infringement on human rights. Subsequent experience, as in Mongolia, has shown that the 100% CUP strategy can be adapted to non-establishment-based or “freelance” sex work. Strengthening STI surveillance and treatment services has also been a significant feature in the 100% CUP in many countries. The 100% CUP has been credited with contributing to the reversal of the HIV epidemic in Cambodia and Thailand (Box 7.1).
Box 7.1: Lessons learnt from Thailand’s 100% Condom Use Programme

The 100% Condom Use Programme began in the central Thai province of Ratchaburi in 1989. Expanded to neighbouring provinces, it was successful in rapidly increasing condom use among sex workers and impacting STI in their clients. In 1991 the Thai National AIDS Committee, under the chairmanship of the Prime Minister, agreed to implement the programme nationwide. Condom use in sex work nationwide increased from 14% in 1989 to over 90% by mid-1991. The national incidence of STI dropped from 400 000 cases in 1998 to less than 15 000 cases per year since 2000. HIV prevalence among Thai sex workers and populations representative of the general public (e.g. military conscripts, women attending antenatal clinics, blood donors) also showed steep declines after the programme was launched. In his opening speech at the 15th International AIDS Conference in Bangkok 2004, the Thai Prime Minister reported that “the 100% Condom Use Programme has already prevented over 5 million HIV infections in Thailand”. Figure 7.8 shows the effect of 100% CUP on the incidence of STI and AIDS after its nationwide introduction in 1991.

![Fig. 7.8  Impact of implementation of 100% Condom Use Programme on the incidence of sexually transmitted infections and AIDS in Thailand, 1983–2003](http://www.searo.who.int/en/Section10/Section18/Section356_4609.htm)

As the programme has been introduced in other countries in the Region, it has had strong political support from the highest levels of government, and a multisectoral approach that involves the sex business (managers, workers), government sectors (police, business registration) health services (STI, family planning), NGO and community-based organizations (condom social marketing, sex worker self-help groups), the media and donors.

In other countries, and in response to patterns of sex work that are particular to their environment, other prevention strategies have been implemented on a smaller but no less important scale. Strategies concentrated on the involvement of NGOs, community-based and civil society organizations, and sex workers have been particularly successful in Bangladesh and India.
In Bangladesh, NGOs, with political support from the government, have spearheaded interventions among highly vulnerable groups such as sex workers that include outreach interventions, peer education, condoms and STI management. In 2005 these activities succeeded in keeping the epidemic’s burden in these groups to 1% or less. Estimates suggest that in the absence of these prevention measures, HIV prevalence would have been 10% among sex workers and 2% among their clients in 2005.53

Condoms are the essential component of prevention efforts for protection from sexually transmitted HIV. In the Region, condoms have been provided for free, through commercial means and also through social marketing. Most countries in the Region use social marketing programmes which have helped make condoms more accessible and affordable to various segments of society, including low-income and high-risk groups in many developing countries. An example of a social marketing company is Population Service International, actively working in Cambodia, the Lao People’s Democratic Republic, Myanmar and Nepal. Programmes are developed in collaboration with governments to complement existing services and distribution systems.

Other strategies have been used elsewhere to promote safer sex practices among sex workers and their clients. In Sonagachi, a large “red light” district in central Kolkata, India, an “empowerment model” has been employed in which HIV and STI services, including condom promotion, are but one part of a broad effort to organize and improve the conditions for sex workers. Sex workers participate actively in all aspects of community-led structural interventions, from savings and credit schemes to reduce dependency on sex work, to confronting trafficking and child prostitution. HIV prevalence remains low in Kolkata compared to other large Indian cities. This empowerment strategy has now been extended to over 60,000 sex workers in the state of West Bengal.

In India’s six high-prevalence states, the Avahan India AIDS Initiative targets both sex workers and their high-risk clients. With support from the Bill and Melinda Gates Foundation, Avahan works in highly-affected districts and along national highways, supporting community mobilization and STI clinics for sex workers and their clients, MSM and IDUs. This programme has expanded greatly since December 2004, reaching over 200,000 sex workers including female, male, transgenders and IDUs.54

**Injecting drug use**

China, Indonesia, Malaysia and Viet Nam have adopted an essential harm reduction package in addressing the prevention needs for IDUs (Box 7.2). The largest harm reduction programme in the Region is in China, with 307 methadone clinics in the country now covering two thirds of the nation’s 31 provinces, autonomous regions and municipalities.55 The Chinese Government also plans methadone maintenance treatment for 300,000 opioid dependent people and 1000 needle and syringe outlets by 2008.56

In Indonesia, the first two drug substitution clinics were established in Jakarta and Bali, with plans for expansion underway. Antiretroviral medication is available to IDUs, and Indonesia’s Ministry of Health has reported that at least half of the patients receiving ART therapy are drug users. In Viet Nam 20 provinces have established needle and syringe exchange programmes and advocacy for the expansion of drug dependence treatment services to include substitution treatment.

India, Malaysia, Myanmar and Nepal have started initiatives which include drug treatment, needle syringe programmes, oral substitution treatment, outreach, and HIV counselling and testing, care and
treatment. Services for drug users are established in Thailand and a variety of abstinence-oriented treatment models are offered. Methadone clinics have been in operation since 1989 but were mainly confined to the capital and, in general, offered methadone detoxification and not methadone maintenance. Some education and HIV prevention programmes targeting IDUs have been initiated in selected prisons in Indonesia and Thailand.

**Box 7.2: Essential Harm Reduction Package and HIV**

The Essential Harm Reduction Package is a regional strategy that embodies a comprehensive response to the individual and public health implications of drug use. It combines outreach, education, opioid substitution therapy, such as methadone or buprenorphine maintenance therapy for dependant IDUs, and needle supply or exchange programmes. Together, they form part of an integrated response to HIV/AIDS prevention and control in reducing exposure to contaminated injecting equipment, a major factor in HIV transmission. Additionally, the strategy provides access to IDUs for education and counselling about HIV/AIDS, including issues that may be associated with their treatment and care as well as their need to practice safe sex.

Despite the significant progress that has been achieved in HIV/AIDS and STI prevention programmes in the Region, greater efforts must be made if governments are to keep pace with the expanding epidemic. Overall, it has been estimated that HIV prevention programmes reach less than 2% of MSM in South-East Asia. It has been further estimated that access to prevention programmes has been limited to only 20% of sex workers and 3% of IDUs. In East Asia and Pacific Ocean countries these prevention programmes reach only 38% of sex workers and 8% of IDUs. Modelling analysis indicates that reversing epidemic trends in these most vulnerable groups means 60% of them must incorporate prevention strategies and adopt safer behaviours.

**Voluntary counselling and testing**

Despite global recommendations to expand services for voluntary counselling and testing (VCT), especially for all pregnant women attending antenatal care, STI clients and TB patients, such services are still underdeveloped across the Region, except for Cambodia where VCT has expanded rapidly (Figure 7.9).

By March 2006 India had expanded VCT to 935 centres covering all districts. From 2002 to 2005, 3.02 million people were counselled and tested in these centres with an average rate of post-test counselling increasing from 40.7% to 71.9%.

In Thailand, the first VCT service was established in 1991 in Chiang Mai province with the support of the Thai-Australia Northern AIDS Prevention and Care Program and Communicable Disease Control Region 10. It was followed by the opening of a clinic for anonymous testing by the Thai Red Cross in Bangkok. These VCT settings were designed to offer preventive measures to the general population. Subsequently, the Ministry of Public Health promoted the development of VCT clinics in public hospitals throughout the country. In 2007, a WHO report indicated that HIV/AIDS counselling and VCT are now available at approximately 1000 hospitals and clinics across the country. These services...
can be delivered in specific HIV counselling units, integrated in outpatient departments or general health counselling units. All antenatal care units also offer VCT. Tuberculosis patients are increasingly offered HIV testing and counselling as part of the National TB Programme policies.

Prevention of mother-to-child transmission

Pregnant women with HIV infection are at high risk of transmitting HIV to their infants, either during pregnancy, at birth, or through breastfeeding. Studies demonstrated that without intervention between 20%–45% of infants may become infected. The risk can be reduced to below 2% by a package of evidence-based interventions. Prevention of mother-to-child transmission is now a standard of care in many developed countries and has reduced transmission to almost zero. Despite the virtual elimination of paediatric HIV/AIDS in resource-rich countries, limited progress has been made in resource-limited settings to scale-up interventions for the prevention of mother-to-child transmission. The majority of infants and young children living with HIV have become infected through mother-to-child transmission and half of these children die before their second birthday.

Mother-to-child transmission prevention programmes are complex interventions, of which HIV testing and counselling, the provision of preventive ART regimen, and the avoidance of breastfeeding are some of the components. Reaching the ultimate goal of eliminating HIV infection in infants and young children requires a standard package of services that includes HIV primary prevention services, prevention of unintended pregnancies among HIV-infected women, antiretroviral drugs for mother-to-child transmission prevention or treatment, safer delivery practices, infant feeding counselling and support, and sexual and reproductive health services for HIV-infected women. This also includes linkages to ongoing care and support services and women’s empowerment.

Of an estimated 500 000 Cambodian women per year who become pregnant, only 48.6% ever attend an antenatal clinic at least once. Breastfeeding remains a major issue in the Region due to lack of access to clean water and formula milk.
In India, about 55,000–60,000 children are born to mothers who are infected with HIV every year.\textsuperscript{61} The national Prevention of Parent to Child Transmission Programme includes HIV testing and counselling, single-dose nevirapine given to mother and baby, safe delivery practices and infant feeding counselling and support.\textsuperscript{62} Only 3.94% of all pregnant women (27 million) had been counselled and tested for HIV and 2.35% of all HIV-infected women (189,000) had received ART prophylaxis by the end of 2004. Assessment of maternal eligibility for and functional links to ART and HIV care services are less than optimal. Cotrimoxazole prophylaxis for mothers and HIV exposed and infected children is not included in the national policy, and less than 1% of HIV-infected children receive ART.\textsuperscript{63} There are plans to adapt the prophylactic antiretroviral regimen to include multiple drugs.

In Myanmar, the nationally supported prevention of mother-to-child transmission programme includes HIV testing and counselling, single-dose nevirapine for mother and baby, safe delivery practices and infant feeding counselling. The health centre-based programme began in 2000 and hospital-based services were added in 2004. The programme has been expanding at the rate of about 5–10 townships per year and 79 townships, of which 17 include hospital-based services have been covered. The coverage of HIV-infected pregnant women was estimated in 2004 to be 4.8%. The estimated number of infections averted in 2005 was 60 (3.4% of perinatal infections).\textsuperscript{64}

Of 639,363 women who gave birth in Thailand in 2005, 98% attended an antenatal clinic, 99.7% were HIV tested, and 93.8% of those found to be positive received ART.\textsuperscript{65} The effective prevention of sexual transmission of HIV and a contraceptive prevalence of 79% (1997–2005)\textsuperscript{66} have also contributed to this success. As a consequence, the number of reported AIDS cases of children under-five declined significantly (Figure 7.10).

Other countries such as Bangladesh, Bhutan, Cambodia, Indonesia, Nepal and Sri Lanka have also started prevention of mother-to-child transmission (PMTCT) programmes on a small scale.

\begin{figure}[h]
\centering
\includegraphics[width=\textwidth]{fig7_10}
\caption{Number of AIDS cases among children (age 0-4 years) in Thailand, 1984–2004}
\end{figure}

**Blood transfusion services**

Blood safety has long been a priority area for WHO and national governments in the Region. Pursuing the WHO Global Strategy for Safe Blood, the focus of this effort has been on a nationally coordinated blood transfusion service with adequate government commitment and a national policy. The key elements of the WHO Global Strategy for Safe Blood include the establishment of nationally coordinated blood transfusion services, collection of blood only from voluntary blood donors, quality testing of blood to ensure its freedom from infectious markers and rational use of blood in clinical setting.

Despite efforts and achievements made, there is a need for further strengthening of national blood services in the Region. Approximately 61% of total blood collected in South-East Asian countries is from voluntary, non-remunerated blood donors. Paid or non-voluntary blood donations still continue in China, although this is down from 42% in 2000 to less than 10% in 2004. Such donations are as high as 75% in Cambodia. In India, where six million units of blood are collected annually, 50% are from voluntary donors, a figure that drops to less than 20% in Bangladesh where professional blood donors are still permitted.

**Treatment and care**

By 2003, approximately 7% of the people in need of ART in developing countries were receiving it. People living with HIV/AIDS and other sectors of civil society led a growing worldwide political movement advocating treatment as a fundamental right. Thailand was already implementing a national treatment programme since the early 1990s although covering only a few thousand people. Since then, tremendous progress has been made in the Region. The 3 by 5 Initiative stimulated a dramatic increase in access to ART. At the end of 2006 it was estimated that over two million people living with HIV/AIDS in low- and middle-income countries were receiving ART, representing 28% of the estimated 7.1 million people in need of such treatment. Within the Region, an estimated 280 000 were receiving ART by the end of 2006, 19% of those in need. Although far from desired rates of coverage, the number of people receiving ART in the Region had increased rapidly.

The 3 by 5 Initiative contributed to increased political commitment and partnerships in providing the care and treatment of PLHA, including capacity-building of health services, with training in and strengthening of infrastructure and logistics of the supply of drugs and diagnostics (Box 7.3). The momentum of the 3 by 5 Initiative in countries of the Region is seen in the scale-up of national ART programmes.

**Box 7.3: The 3 by 5 Initiative**

Access to ART and care has been accelerated through the 3 by 5 Initiative, which incorporated a global target to provide three million people with ART by 2005. This target was estimated to be half of the people in urgent need of treatment throughout the world in 2003. This initiative was launched in September 2003 by WHO/UNAIDS and partners, including the Global Fund to Fight AIDS, Tuberculosis and Malaria. This initiative took place seven years after combined ART first became available in developed countries (1996) and in view of the decreasing prices for first-line regimen from an estimated US$ 10 000 per patient per year to US$ 350 (minimal producer price).
The Government of India launched free ART in April 2004. By June 2006, ART delivery scaled up to 54 public sector facilities. In addition, free ART is available in 19 other collaborating centres. Health-care providers were trained in using the ART recording and reporting system. Standardized recording and reporting forms and definitions were used to collect longitudinal (cohort) data at 6 months, 12 months and 24 months after start of treatment on following treatment outcomes and on first-line treatment, i.e. patients currently on treatment. The analysis showed high rates of treatment continuation and survival. The lower proportion of women enrolled in ART may be related to the HIV/AIDS epidemic profile. As expected, deaths occurred mainly during the first six months and decreased thereafter. Survival rates of women on treatment were slightly better than that of men. Most patients remained on first-line regimen at 12 and 24 months. At the end of 12 months, 81% of patients were alive and on treatment and at the end of 24 months, 73% of patients were alive and on treatment, indicating high effectiveness of first-line antiretroviral drugs. The effectiveness and quality of the ART programme forms the basis for further expansion and decentralization of ART services in the country (Figure 7.11).

The Royal Thai Government reached the national treatment target of delivering ART to all those in need by the end of 2006 and many other countries in the Region have followed suit. Due to its substantial prevention efforts since the early 1990s, as of end 2006 Thailand has been able to offer treatment to all those in need. The rapid expansion of ART coverage was possibly through strong political commitment and harnessing the full potential of the strong public health system in Thailand. The rapid scale-up of ART is based on comprehensive systems for care, support and treatment and involving PLHA as well as the broader community in the planning and implementation of services. The ART delivery system was initiated at tertiary level hospitals, and at the same time at district-level health facilities (Figure 7.12).
Challenges and opportunities

A range of complex challenges still exist. Many of the laws, policies, and cultural and social norms that increase the vulnerability of particular groups to HIV infection remain. Although significant progress has been made in establishing an enabling environment for HIV prevention, treatment and care in many countries, there are still countries that have not found ways to begin this process. Even within countries with well-advanced HIV/AIDS strategies and policies, there are still groups and communities whose access to prevention, treatment and care is extremely limited.

In relation to prevention, a range of successful strategies exist for different populations and contexts of risk. These include comprehensive, targeted 100% condom use programmes, expanded access to STI services, and harm reduction for injecting drug users, in addition to general awareness and education programmes. However, these interventions have rarely been taken to scale or achieved the kind of coverage needed to bring about long-term individual and societal change. Reluctance to openly confront difficult issues, such as sex outside marriage, sex between men and drug use, have led to a proliferation of general HIV/AIDS awareness campaigns that have not had a long-term impact on risk behaviour. The coverage of prevention of mother-to-child transmission services remains extremely low and must be rapidly expanded. Significantly more attention needs to be paid to the prevention needs of people living with HIV/AIDS.

Most PLHA are still not aware that they are infected. There is a need to implement innovative strategies to significantly expand access to HIV testing and counselling. Several countries are showing the way to scale up HIV testing without jeopardizing human rights or increasing stigma and discrimination.
HIV/AIDS-related stigma and discrimination, particularly in health-care settings, remains a significant access barrier. However, it is particularly so for people from marginalized groups such as sex workers, drug users and men who have sex with men. The centralization of HIV prevention, treatment and care services in urban centres also acts as a persistent barrier for people from rural areas.

The price of first- and second-line therapies continues to present a challenge. Although the price of first-line treatment has dropped by between 37% and 53% in the last two years, large variations in price exist between regions and countries. First-line treatment prices remain particularly unstable in middle-income countries. Second-line treatment prices remain high and will present a significant challenge for universal access as people currently on first-line treatment progress to these treatments. The prices of laboratory diagnostics and supplies will also need to be reduced in order to lower the financial burden as more people access HIV/AIDS treatment and care.

Current financing to implement regional and national HIV/AIDS plans is inadequate and available funding is often unpredictable and of short duration. Sustainable financing strategies are essential to enable countries to develop and implement long-term responses.

Responses involving the NGO and private sectors in a structured manner remain inadequate. Although people living with HIV and affected communities have formed self-help groups, and networks and are increasingly involved in service provision, they should be fully involved in policy and programme planning with sufficient resources and capacity-building.

7.3 Tuberculosis

About 5 million cases of tuberculosis (TB) occur in the Asia Pacific Region every year, claiming the lives of about 800 000 people—more than all other infectious diseases combined. WHO estimates that almost 60% of these cases are detected and officially reported by countries and areas in the Region. The remaining 2 million go undetected and untreated. The Region accounts for approximately 60% of all TB cases detected globally.

Tuberculosis is a potentially fatal infectious disease caused by the bacillus *Mycobacterium tuberculosis* and is spread when a person with TB of the lungs expels airborne droplets carrying the bacteria, which are then inhaled by another person. The lungs are most commonly involved, but the disease can affect any organ. Although most infected people never develop active disease, approximately 5%–10% do so over their lifetime, half within the first two years following infection. As TB is the leading cause of death among people with HIV/AIDS, the increasing spread of this epidemic exacerbates the TB problem. Among people with HIV/AIDS, the risk of developing TB increases by 10%–15% per year.

In low-income countries and areas, diagnosis is typically made through microscopic examination of sputum samples for acid-fast bacilli in symptomatic persons reporting to the health system. Laboratory diagnosis can be confirmed by a culture of the bacilli, although this can take up to two months. Once diagnosed, TB patients are generally treated with a combination of four drugs for a period of at least six months. In several countries in the Region including China, India and the Philippines, TB control programmes face a rising number of patient who are infected with bacilli that have developed a resistance to the most commonly used anti-TB drugs.

More than a decade after it was declared a global emergency by WHO in 1993, TB remains one of the leading infectious causes of death among adults and continues to levy a heavy toll on social and
economic development in the Asia Pacific Region, where an estimated 900 million people live on less than US$ 1 a day. Tuberculosis thrives in poor populations, where people often reside in overcrowded areas with poor housing and sanitation and limited access to the health system. Apart from the poor, TB also affects vulnerable populations such as the homeless and injecting drug users, as well as remote and mountainous populations with little access to health services. A group that is particularly vulnerable are those living with HIV/AIDS.

**Prevalence and mortality**

In 2005 there were an estimated 8.4 million cases in the Region, of which almost 5 million cases were new. Six countries—Bangladesh, China, India, Indonesia, the Philippines and Viet Nam—account for about 90% of new cases. With 71% of the Region’s population, India and China are the two most populous countries and rank first and second in total number of cases, with 66% of all newly detected TB.

The global HIV/AIDS epidemic has had a profound effect on the TB situation in the Region. As it is the leading cause of death among AIDS patients, mortality from TB is increasing in countries where the HIV epidemic is spreading. The prevalence of HIV/AIDS in reported TB cases in 2005 was 9.7% in Papua New Guinea, 7.6% in Thailand, 7.1% in Myanmar, 6% in Cambodia, 5.2% in India and 3% in Viet Nam. More importantly, many people living with HIV eventually develop clinical TB.

Tuberculosis mortality is also affected by increasing resistance to the usual first-level anti-TB drugs. Varying levels of resistance to the most commonly used TB drugs were found in almost all settings surveyed in the Region. The prevalence of multidrug-resistant TB (MDR-TB)—defined as resistance to two of the most potent anti-TB drugs—among previously untreated TB cases varied widely across settings, ranging from less than 1% in Cambodia to approximately 10% in some provinces in China.

**Tuberculosis control strategy**

A total of 46 out of the 48 countries and areas in the Asia Pacific Region have adopted directly observed treatment, short-course (DOTS), the strategy recommended by WHO to fight TB. The DOTS strategy has several components, including diagnosis through sputum smear microscopy, an uninterrupted supply of quality anti-TB drugs, supervised administration of a standardized regimen of medicines, and a comprehensive monitoring system. These components, coupled with the political will to tackle the disease, form the foundation of modern TB control. Effective implementation of DOTS has lead countries and areas in the Asia Pacific Region towards the achievement of the three targets set for 2005 by WHO: access to DOTS services for 100% of the population; a case detection rate of at least 70%; and an 85% treatment success rate among new smear-positive TB cases. Reaching these targets is an important step towards meeting the global target of reducing by one half the burden and deaths due to tuberculosis by 2015, a goal set by WHO and its partners. The achievement of the global target in 2015 will be critical for reaching the United Nations Millennium Development Goal of halting and beginning to reverse the incidence of major communicable diseases, including TB, by 2015. Meeting these targets requires a coherent strategy which can sustain existing achievements and address remaining constraints and challenges more effectively. The Stop TB Strategy, which underpins the Global Plan to Stop TB (2006–2015), developed by the Stop TB Partnership envisions a world free of TB, and sets out the steps that national TB control programmes and their partners need to take, assisted actively by all stakeholders.
Progress

Over the past five years, remarkable progress has been made towards achieving the three targets established by the World Health Assembly in 2000. By the end of 2005, over 95% of the Region’s population was living in areas where DOTS services were available. Almost 90% of TB patients are being successfully treated, exceeding the target of 85%. The case-detection rate increased from 37% in 2002 to more than 65% in 2005, closing in on the target of 70%.

A major factor in improving case detection has been the inclusion of health-care providers—such as military and prison health services, as well as private providers, through an approach called Public-Private Mix DOTS. This approach consists of DOTS implementation in non-Ministry of Health services and in the private sector through, for example, the provision of free drugs, ensuring continuity of care and extending quality assurance to laboratories outside of the public health system. The scheme also includes improved referral mechanisms between the private and public sectors, and between different ministries within the public sector. With support from the Global Fund to Fight AIDS, Tuberculosis and Malaria and other partners, Public-Private Mix DOTS activities are rapidly expanding throughout the Asia Pacific Region, particularly in China, India, Myanmar and the Philippines. In areas where Public-Private Mix DOTS initiatives are under way, increments in case detection of up to 25% are being reported. In China, India and Indonesia, strengthening collaboration between large public hospitals and TB clinics has contributed to improved case-detection rates.

Quality control mechanisms have been introduced in TB laboratories in most of the countries and areas with a high burden of tuberculosis. The implementation of external quality assessments, one of the components of quality control for TB laboratories, has led to improvements in the quality of TB laboratory services across the Region. There is now a need to establish strong links between national reference laboratories and supra-national reference laboratories, a network of international laboratories that support TB laboratory services in the countries of the Region. The need for external quality assessment and drug resistance surveillance in the smaller Pacific island countries and areas has been addressed through the establishment of the Pacific TB Laboratory Initiative.

Recognizing the threat of TB–HIV coinfection, national HIV/AIDS and TB programmes in some of the most affected countries and areas in the Region have developed or are developing national frameworks for TB–HIV. Progress in pilot projects and the scaling up of collaborative activities in Cambodia and Thailand have been impressive. Other countries in the Region, including China, India, Indonesia, Myanmar and Viet Nam, have developed national strategies to address TB–HIV coinfection.

In several countries and areas in the Asia Pacific Region, surveys were conducted to assess the extent of anti-TB drug resistance among TB patients. In India, Mongolia, Nepal and the Philippines, projects to manage MDR-TB under programme conditions have been established in collaboration with the Green Light Committee and are being expanded. These projects aim to identify and treat increasing numbers of MDR-TB cases. In Bangladesh, Bhutan, Cambodia, China, Indonesia, Myanmar, Sri Lanka, Timor-Leste and Viet Nam, programmatic management of drug-resistant TB is being established.
Sustainability of TB control services

On account of the very large numbers of persons infected with TB, sustained financing is required to effectively address the issue in the Region. With up to 10% of those infected expected to develop active TB during their lifetime, TB control efforts need to be sustained for decades. Governments must increase domestic financing in addition to securing external resources to ensure adequate future funding for TB control services in their countries.

Funding for tuberculosis control greatly improved between 2000 and 2005 when many of the countries most affected increased their TB budgets substantially. In addition, bilateral and multilateral agreements with donor countries and various partners helped to increase spending on TB control in the Region. A further boost of funding for TB control in countries and areas with a high burden of TB was provided by the Global Fund to fight AIDS, Tuberculosis and Malaria. By the end of 2006, a total of 32 proposals with a value of US$ 538 million were approved by this fund in support of TB control programmes in the Region.

Partnerships

Stop TB Special Projects were established in WHO’s Western Pacific Region in 2000 and in the South-East Asia Region in 2001. The two WHO regions include the 48 countries and areas that make up the Asia Pacific Region. The Special Projects, based at WHO’s Regional Offices in Manila and New Delhi, help coordinate the efforts of governments and their national and international partners. Through this partnership, the Stop TB Special Projects were able to respond to regional challenges, mobilize financial resources, and keep TB control high on the agenda of countries and areas in the Region. Three key ingredients—leadership, sound technical advice and effective partnerships—have contributed to strong government commitment and increased funding in recent years, resulting in well-performing national TB control programmes and successful DOTS implementation. With the support from their partners, countries and areas in the Region are now better able to take on the challenges of TB control.

Much has been done to build capacity to fight TB in high-burden countries and areas in the Asia Pacific Region by deploying national and international experts and supporting field staff. India has successfully expanded the DOTS programme by contracting national consultants who assist the state-level national TB programme managers in implementing and monitoring the programme. Quarterly monitoring takes place to ensure the quality of DOTS implementation in the Region. In addition, in-country missions and support for improved surveillance efforts have helped sustain the quality of TB interventions and monitor their impact.

In the Asia Pacific Region partnerships with the private health sector, NGOs, business and industry, medical schools, the media, and communities and development partners are making a significant contribution to TB control. There are outstanding examples of successful collaboration between governments and NGOs at the grass-roots level in Bangladesh, Cambodia, India, Indonesia, Myanmar, Nepal and the Philippines, where NGOs provide DOTS at the community level. Public-Private Mix DOTS has gone from a pilot programme in a few countries and areas to being adopted as an integral part of national TB control programmes in many. China, India, Indonesia, and Myanmar have recently experienced a substantial increase in case detection rates as a result of a strong political commitment at all levels, together with countrywide implementation of a partnership linking private practitioners, large public and general hospitals, and TB dispensaries. Other countries are in the process of building and scaling up these very successful partnerships. Employees in the public and private sectors are
Chapter 7

Beginning to benefit from DOTS at their workplaces. In India, a business alliance against TB was launched in March 2004 in collaboration with WHO and the World Economic Forum. DOTS has also been included in teaching, practice and research agendas of medical schools in Bangladesh, India, Indonesia, Myanmar, Nepal, the Philippines, Sri Lanka and Thailand.  

**Challenges to tuberculosis control**

The Asia Pacific Region faces important challenges to TB control, including identifying and reaching out to those in need of care, especially poor and vulnerable populations. Increasing the case-detection rate to over 70%, while sustaining the good treatment success rates, would be required for TB programmes to have an epidemiological impact on the burden of TB.

The HIV-TB coinfection and MDR-TB pose challenges to hard-won gains in TB control in the Asia Pacific Region. Increased technical assistance is needed to expand drug resistance surveillance and establish and scale up projects to diagnose and treat TB patients with multidrug resistance. In most countries, establishing a laboratory network with culture and drug sensitivity testing to support the programmatic management of MDR-TB continues to be a challenging task.

Similarly, the increasing prevalence of the HIV–TB coinfection in countries and areas in the Region requires urgent and decisive action. National HIV/AIDS and TB programmes need to initiate and scale up TB–HIV collaborative activities, including surveillance of HIV among TB patients, intensified case detection and prevention, treatment and care. In order to ensure that HIV-positive TB patients requiring antiretroviral therapy have full access to treatment, and that all people living with HIV/AIDS are screened and those with active TB treated effectively, national HIV/AIDS and TB programmes will need to collaborate effectively.

Increasingly, there is also a need for greater coordination with providers of TB services that work in the private sector and in public health services operating outside the national TB programme. Their involvement should increase access to quality TB services and improve community awareness about TB, thus leading to better utilization of health-care facilities where TB services are available. In addition, effective use of health promotion, advocacy and communication tools should be promoted to enhance the reach of DOTS and address the stigma associated with TB.

Efforts to control TB should go hand-in-hand with efforts to strengthen health systems as a whole. Primary health-care systems in many countries and areas are stretched thin and suffer from inadequate infrastructure and a shortage of adequately skilled staff. The transition from centralized to decentralized health-care systems in many countries and areas poses a challenge to maintaining successful TB programmes because of the limited management capacity and insufficient human resources at provincial, district and peripheral levels. Ensuring sufficient human resources in health-care has been one of the persistent challenges in the Asia Pacific Region. China and Indonesia have given priority to human resources development, making a significant contribution to overcoming the difficulties arising from decentralization of the health-care system. Throughout the Asia Pacific Region, opportunities have been created by WHO and several partners, such as the International Union Against Tuberculosis and Lung Disease, to increase human resources capacity for TB control by establishing training courses and workshops on TB control.

Tuberculosis control programmes also need to address the needs of population groups at higher risk of contracting active TB. These risk groups include prison populations, refugees and other displaced
people, migratory workers, illegal immigrants, PLHA, and other marginalized groups. Special situations requiring extra attention include unexpected population movements occurring at times of political unrest, war or natural disaster.

Tuberculosis control means long-term commitment. While funding for TB control programmes is fairly secure with most short-term resource gaps filled, concerns remain regarding funding over the long term. The substantial progress in TB control achieved thus far needs to be sustained and further developed to enable individual countries and areas in the Region to achieve the targets set for TB control in the Millennium Development Goals. This concern led to the adoption of a resolution on sustainable financing for TB control at the World Health Assembly in 2005. Increased domestic funding by governments, in addition to enhanced support from donor agencies, will be required to ensure that global and regional TB targets are met. Countries in the Asia Pacific Region should make full use of the new resources that have and will become available from the Global Fund to Fight AIDS, Tuberculosis and Malaria, development banks and bilateral development agencies. However, increased domestic funding should remain a priority, particularly in countries with a positive economic development as this may eventually lead to withdrawal of bilateral support.

**Future plans**

Following the achievement of the TB control targets set by WHO for 2005, countries and areas in the Asia Pacific Region need to address remaining challenges to make further progress towards the global target of reducing the prevalence of and mortality due to TB by one half by 2015. In January 2006, the Global Plan to Stop TB 2006–2015 was launched by WHO and its partners. The Stop TB Strategy, which underpins the Global Plan, envisions a world free of TB and sets out the steps that national TB control programmes and their partners need to take. The new strategy is now reflected in the regional and national multi-year plans for TB control that will run up to 2015.

The rapid progress in TB control in the Asia Pacific Region has led WHO and its partners to move the regional target from 2015 to 2010 by which to reduce by half the burden and mortality due to TB. Data from China, Indonesia and a district in India, which have all shown a decline in TB prevalence, indicate that this regional target can be achieved.80,81,82

**Conclusion**

The first five years of the 21st century saw unprecedented progress in TB control in the Asia Pacific Region. The progress has, in large part, been due to the widespread implementation of the DOTS strategy. Sharp increases in case-detection and cure rates, as well as innovative strategies to address challenges in TB control, paved the way for a turnaround in the fight against TB. Moreover, health systems issues, such as human resources development and health financing, increasingly affect TB control and will need to be considered in planning and implementing TB control activities.

New strategies are being developed in the Region to sustain and further strengthen TB control, as well as address new challenges such as TB–HIV co-infection and multidrug-resistant TB. Strong partnerships have been developed across the Region involving a wide range of stakeholders in TB control. Stronger political commitment and improved financing have contributed to more effective and efficient TB control services. With sustained efforts from all stakeholders it will be possible to reduce the prevalence and mortality due to TB by one half by 2015 and take another significant step towards a future without TB.
7.4 Malaria

Malaria is a potentially fatal tropical disease caused by a parasite transmitted to humans by the bite of an infected female *Anopheles* mosquito. Intracellular protozoa members of the genus *Plasmodium*, four species of the parasite infect humans: *P. falciparum*, *P. vivax*, *P. malariae* and *P. ovale*. Several recent reports of human infections of the simian parasite *P. knowlesi* in Brunei Darussalam and Malaysia include at least two recorded deaths, suggesting that it may eventually become the fifth human species of malaria.

The parasitic infection and ensuing illness are characterized by paroxysms of fever, chills and headache. In a mild form, it may also manifest with other presentations of systemic disease. If untreated, *P. falciparum* infections can deteriorate into severe or fatal disease with multiple organ failure leading to cerebral malaria, anaemia, prostration, renal failure, pulmonary oedema and eventually circulatory collapse.\(^83,84\)

Disease burden and mortality

With about 3.2 billion people living in malaria endemic areas at risk, the disease afflicts almost 500 million people worldwide each year.\(^85\) This mosquito-borne disease is therefore a serious public health problem. Endemic in 20 countries in the Asia Pacific, the Region accounts for 7% of global cases and 6% of all deaths.\(^86,87\) The number of malaria cases in endemic countries in the Asia Pacific Region in 2005 is shown in Table 7.4.

WHO estimates that in 2002 about 3.2 million DALYs were lost to the disease in the Region.\(^88\) While *P. vivax* is more predominant in China, the Indian subcontinent, the Korean peninsula, and some Pacific island countries, in almost all other areas, *P. falciparum* is the major cause of malaria, with a very small number of cases due to *P. ovale* and *P. malariae*. Even though Bangladesh and India have seen a decline in malaria in recent years, there has been a surge in the proportion of *P. falciparum* cases, possibly due to the westward spread of drug-resistant falciparum malaria from the Mekong region.\(^89\) In countries where effective treatment and control measures for falciparum malaria are in place, the proportion of reported vivax cases is increasing. A re-emergence of vivax malaria in the Democratic People’s Republic of Korea and the Republic of Korea in the mid-1990s and outbreaks in five provinces of central China in 2003 have been effectively controlled. As it remains widespread, greater attention to the health impact of *P. vivax* must be paid in countries where it is most prevalent. Figure 7.13 presents the distribution of malaria cases by species for selected countries in the Asia Pacific Region in 2005.

Malaria affects mainly poor, underserved and marginalized populations in remote rural areas, which are characterized by inadequate control measures and limited access to health care. Several studies show higher malaria prevalence among ethnic minorities and tribal groups living in remote forested areas, as well as mobile and migrant populations.\(^90\) Underreporting of malaria cases and deaths remains a major challenge in these areas due to inadequate and limited access to health services and weak surveillance systems. Parasitic drug resistance, poor treatment-seeking behaviour and the presence of counterfeit antimalarial drugs, especially in Greater Mekong subregion countries, further hinders control efforts.\(^91,92\)
Table 7.4 Malaria situation in malaria-endemic countries of the Asia Pacific Region, 2005

<table>
<thead>
<tr>
<th>Country</th>
<th>Population* (thousands)</th>
<th>Confirmed malaria cases</th>
<th>No. of probable malaria cases</th>
<th>No. of P. falciparum cases</th>
<th>Confirmed malaria deaths</th>
<th>% P. falciparum cases</th>
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<tbody>
<tr>
<td>Bangladesh</td>
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<td>48 096</td>
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<td>37 754</td>
<td>501</td>
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<td>1 947</td>
<td>853</td>
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<td>...</td>
<td>40 432</td>
<td>296</td>
<td>81.8</td>
</tr>
<tr>
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<td>21 935</td>
<td>3 705 444</td>
<td>3 588</td>
<td>48</td>
<td>16.4</td>
</tr>
<tr>
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<td>11 507</td>
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<td>0</td>
<td>0.0</td>
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<tr>
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<td>3 343</td>
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<td>19 497</td>
<td>...</td>
<td>14 231</td>
<td>18</td>
<td>73.0</td>
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</table>

Remark: Maldives is a malaria-free country and is not included in the table
... Data not available
* : Incomplete information about malaria deaths
* : United Nations population (thousands)

Source: Unpublished data. Compiled from country reports of Asia Pacific countries and areas for 2005.

Fig. 7.13 Percentage distribution of malaria cases by species in selected countries in the Asia Pacific Region, 2005

Source: Unpublished data. Compiled from country reports of Asia Pacific countries and areas for 2005.
Drug resistance and national treatment policies

In the Asia Pacific Region, antimalarial drug-resistant strains have spread slowly but steadily. Chloroquine resistance was initially reported in 1962 on the Thai-Cambodian border, then in 1969 on the Thai-Myanmar border, two areas of the Greater Mekong subregion now identified as the primary foci for multidrug-resistant falciparum malaria. Presently, resistance to the 4-aminoquinolines and sulfadoxine-pyrimethamine monotherapy is widespread in almost all Asia Pacific countries, with varying levels of severity. Chloroquine has reduced susceptibility in Cambodia and Thailand where it was used as monotherapy from the mid-1980s to the early 1990s. Although quinine is still effective in the treatment of severe malaria, it is generally combined with tetracycline to improve efficacy. With progression from single drug to multidrug resistance, the problem is becoming acute, prompting most countries to shift to highly effective artemisinin-based combination therapy (ACT). During the last four years, however, data have started to show increasing treatment failures with the mefloquine and artesunate combination along the Thai-Cambodian border.

The Democratic People’s Republic of Korea and the Republic of Korea do not have falciparum malaria. Except for Malaysia, Nepal and Sri Lanka, the remaining 15 of 20 falciparum malaria-endemic countries in the Region have officially adopted artemisinin-based combination therapy within their respective treatment guidelines as a first- or second-line treatment for falciparum malaria. China and Viet Nam pioneered the use of artemisinin-derivatives as monotherapies in the late 1980s. Thailand started using artemisinin-based combination therapies in 1995, followed by Cambodia in 2000, and then other countries. These countries have shown a significant reduction in falciparum cases and malaria deaths over the last 15 years.

Chloroquine resistance in \( P. \) vivax was first reported in the Pacific island countries of Solomon Islands, Vanuatu and Papua New Guinea (1989), and recently in India, Indonesia, Myanmar, Timor-Leste and Viet Nam, while primaquine tolerance (e.g. of the Chesson strain) was already well documented in the 1950s and 1960s. The current treatment recommendations of 3-day chloroquine and 14-day primaquine against vivax malaria are inadequate in these areas, and a higher dose of primaquine is required to achieve a radical cure of infections. However, evidence on prevalence and distribution of glucose-6-phosphate dehydrogenase deficiency in most countries is not well established, which limits the use of primaquine. Likewise, very little is known about the characteristics of relapsing vivax strains circulating in the Region, which makes treatment and control of vivax malaria even more challenging. In November 2004, WHO’s Regional Offices for the South-East Asia and Western Pacific Regions began collaborating with countries and partners in operational research on \( P. \) vivax and its control through the newly founded Asian Vivax Network.

To meet the need for a continuous evaluation of the efficacy of antimalarial drugs, WHO established a systematic inventory of in vivo and in vitro drug efficacy studies from 1990 to the present, gathering data from malaria-endemic countries in the Region. A database was created to facilitate the analysis and tracking of drug efficacy studies. The inventory and database helped identify trends of \( P. \) falciparum and \( P. \) vivax drug resistance in 19 countries in the Region, including a review of how national treatment policy changes evolved and recommendations for future action.

The malaria situation in neighbouring countries can vary significantly. Most malaria-prone countries in the Asia Pacific Region have established drug-resistance sentinel sites in strategically located areas and have conducted therapeutic efficacy tests of a 28-day or 42-day duration. A network has been established that facilitates intercountry information exchange, as well as discussions on trends in the development of drug resistance and evidence-based antimalarial drug policy changes.
Malaria vectors

Malaria is a focal disease with wide variations and therefore requires stratified, area-specific strategies for effective, sustainable control.

There are several ecological zones where malaria flourishes: forests and forest fringes, irrigated agricultural areas, and coastal areas. The environment plays a substantial role in vector species prevalence, with geographical areas playing a major role in the predominance of a particular type of Anopheles mosquito. An farauti and An litoralis are brackish water-breeding species responsible for malaria transmission in coastal areas of the Pacific islands and the Philippines, respectively. On the Indian subcontinent, there are about 40 identified malaria vectors, but An stephensi (urban vector) and An culicifacies complex (rural vector) are the predominant species. An minimus and An dirus complex are effective vectors in the forest and forest fringes of the Greater Mekong subregion. An sinensis is common in China and on the Korean peninsula, and An sundaicus is prevalent in the estuaries of the Mekong delta. An kunmingensis has been recently described as an effective vector in Yunnan, China, and the border regions of the Lao People’s Democratic Republic, Myanmar and Viet Nam. The An sundaicus complex, An flavirostris, An balabacensis and An fluviatilis are effective vectors in the Malay-Indonesian subregion, breeding mainly in forested mountainous areas but also found in lowland rice paddies, irrigation canals and streams.

Ecological changes brought about by the agro-industrial exploitation of forest resources and forested lands, such as mining, large-scale farming, development projects with the construction of hydroelectric dams, roads and bridges, housing and urbanization, along with the appearance of insecticide-resistant mosquitoes, have all contributed to the increasing complexity of vector control.

Strategies adopted by country malaria control programmes

Faced with variability in topography, climate, population movement, intensity of transmission and vector diversity, a dynamic drug resistance situation, the varying efficacy of therapeutic and preventive measures, and vector control, many countries have an increasingly difficult task in adopting and sustaining effective antimalaria strategies.

Building on the Global Malaria Control Strategies from the 1992 Ministerial Conference on Malaria in Amsterdam, the Netherlands, most countries in the Asia Pacific Region adopted the Roll Back Malaria initiative in 1998 in an effort to significantly reduce the burden of the disease. Key strategies stress effective management through: (1) early diagnosis and effective treatment; (2) integrated multiple vector control measures, including epidemic management; and (3) strengthening partnerships with all stakeholders, especially communities at risk, public and private organizations, and local governments. Operational strategies include securing political commitment, mobilizing resources, creating a stratified approach based on endemicity and transmission, strengthening the health system, mobilizing communities, building partnerships with stakeholders, and intensifying monitoring and evaluation.96

The success of implementing these Global Strategies depends on budgetary allocations and the capacity of malaria control programmes. While some are operating as vertical programmes, other countries already have decentralized malaria control programmes and have integrated them into the local health infrastructure. In either setting, good programme management at the local and national level is essential. Indonesia, Papua New Guinea and the Philippines have decentralized programmes,
but continue to struggle with the acceptance of responsibilities, limited mid-level programme management capacities and the competing health priorities of local government officials. While these are tried and proven strategies, the capacity of many countries to implement them is inadequate.

**Early case detection and prompt treatment**

While a few countries have diagnostic services using malaria microscopy at hospitals and community clinics, diagnostic networks in the periphery are inadequate and need to be strengthened in most countries. Most countries have moved towards the use of malaria rapid diagnostic tests (RDT), with all Greater Mekong subregion countries, Pacific island countries and the Philippines now deploying RDT for field use in very remote areas. This change from exclusive use of microscopy is most important for Pacific island countries and remote border regions because it allows confirmed diagnosis prior to treatment in difficult-to-access areas. A programme is in place to conduct laboratory testing to ensure the quality of malaria rapid tests prior to deployment in the field. Cambodia, India, Indonesia, the Lao People’s Democratic Republic, Malaysia, Myanmar, Pacific island countries and the Philippines are part of a global programme to improve the quality of malaria microscopy diagnosis. Many countries in the Asia Pacific Region have recently changed their treatment guidelines and are now using highly efficacious ACT medicines, but the availability of these supplies for health workers and dispensing facilities in remote areas is not assured, which hampers prompt access to effective treatment.

**Vector control**

An effective, integrated vector management strategy is based on the selective application of various control measures determined by the ecology of the area and the local epidemiological patterns of the disease. While insecticide-treated bednets or long-lasting insecticidal bednets are distributed to households in non-mobile communities of endemic areas, insecticide-treated nets, including hammock nets, have been recommended for mobile groups, i.e. forest workers, soldiers and miners. Indoor residual spraying complements insecticide-treated nets in some areas where vectors usually feed indoors, and is also used to control focal epidemics. Biological and environmental modification control methods have been used in the Pacific, including Solomon Islands and Vanuatu, and considerable work has been done in this field in India. With the ongoing threat of cross-border malaria epidemics and the increasing likelihood of epidemics in areas where malaria has been greatly reduced, good surveillance, preparedness, logistics and intercountry coordination are key to epidemic recognition and management.

**Regional, country and community level partnerships**

In recent years, countries in the Asia Pacific Region have come to realize that national control programmes need to incorporate partnerships with all stakeholders at the regional, country and community level. Most countries have made efforts to increase intersectoral activity and promote community participation in malaria control. Promotion of community-based care and the creation of links between communities and health systems are crucial for effective control strategies. This is being achieved through community mobilization and communication for behaviour change in several countries in the Asia Pacific Region. The entry of the Global Fund to Fight AIDS, Tuberculosis and Malaria in recent years has promoted the active involvement of the private sector, especially villagers, private physicians and pharmacies, NGOs, the business and corporate sector, faith-based groups and multilateral and bilateral agencies in malaria.
control. In the Asia Pacific Region, 16 countries are currently recipients of funds for malaria control from the Global Fund to Fight AIDS, Tuberculosis and Malaria. Further regional partnerships in malaria control exist between the United States Agency for International Development (USAID) and the Greater Mekong subregion, and the Pacific Malaria Initiative by the Australian Agency of International Development (AusAID) to support Solomon Islands and Vanuatu, and in the future, Papua New Guinea.

Challenges to malaria control

It must be noted that countries most affected by malaria not only have the lowest gross domestic product (GDP) in the Region, but also large inequities in family income, education, work opportunities, access to health services, and environmental and housing quality. While no group is exempt, malaria is a disease of poverty. Indigenous or tribal minorities of these countries are most vulnerable and less protected against the disease, have the least access to health services, and are hampered by socioeconomic and cultural barriers. These minorities remain an important focus for national control programmes if the countries where they reside are to achieve a significant reduction of malaria. Mobile populations and migrants, often with a non-formal status, are other groups with similar limited access to health services, and are therefore highly vulnerable to malaria.

Like many other public health efforts, national malaria control programmes face several health system-related challenges. Primary health care systems often suffer from limited management capacity, inadequate infrastructure and logistic support, a lack of skilled human resources, weak surveillance, monitoring and reporting systems, and lack of health insurance. Low-income countries and those beset by civil unrest and political repression are particularly affected, while the situation in middle-income countries such as Malaysia, the Republic of Korea and Thailand is quite different. Some countries must overcome obstacles arising from decentralization, with significant investment required in human resources development and capacity strengthening. With the constant turnover of field managers, more training courses and workshops are needed, such as management of field operations, advocacy workshops and training on technology transfer, all specifically designed for malaria programme managers. The Asian Collaborative Training Network for Malaria (ACT Malaria), founded more than 10 years ago, currently has 11 country members and plays a very important role in human resource capacity-building in the Region.

All countries face the continuing threat of multidrug-resistant falciparum malaria and the emerging resistance of vivax malaria. There is an increasing and urgent need for the availability of affordable Good Manufacturing Practice-certified antimalarial medicines as well as alternative drugs should currently recommended drugs reach their efficacy limits. The presence of counterfeit and substandard antimalarial medicines, especially in the Greater Mekong subregion, continues to take a toll on unsuspecting patients. Even if countries have made efforts to warn the public of the danger of counterfeit drugs, stronger intercountry and interagency cooperation, drug regulation and policing are essential to curtail their circulation. The Region is spearheading efforts to cooperate with the International Criminal Police Organization (INTERPOL) to stop the production and interrupt the distribution of counterfeit antimalarial medicines.

Malaria impedes economic growth and human development, but it is preventable and curable, with good returns on investment. With support from external donors, successful large-scale malaria control was achieved in Viet Nam and several Indian states. At a cost to the Government of Viet Nam
of about US$ 11 in 1998 for a clinic visit plus medicines to treat one episode, direct savings amounted to over US$ 9.5 million, about twice the amount spent on malaria control annually. Added to this is approximately US$ 14 million in reduced out-of-pocket health-care costs to households. Eight states in northern India with the highest risk for malaria received financing for the Enhanced Malaria Control Project in 1997. After six years, there was a dramatic reduction in the malaria burden in Gujarat (58%), Rajasthan (79%) and Maharashtra. Significant investments were made in strengthening diagnosis and treatment, vector control and health systems, but the most important factor was commitment and leadership at all levels of the government. Notably, decentralization of programme implementation and financing boosted progress, but the cohesive and centralized malaria control programme conducted during the campaign was equally important.

### Outlook

Successful malaria control means long-term commitment and sustainability by national governments, communities and partners. While funding seems secure in the next few years with the infusion of money from the Global Fund to Fight AIDS, Tuberculosis and Malaria (and others) bridging identified resource gaps in most countries, stable future financing remains a major priority. This is a particular challenge in the light of quickly diminishing numbers of malaria cases.

In a number of countries, notably Malaysia and the Republic of Korea, malaria incidence rates have now dropped so low that they have embarked on malaria elimination. Other countries, for example, China and the Philippines, have changed their national goals from control to a gradual scaling up towards elimination by successively increasing the number of malaria-free provinces. The substantial progress achieved by most countries must be maintained by the Asia Pacific Region to make a lasting contribution to global malaria control and, eventually, elimination.

### 7.5 Vaccine-preventable diseases

Although immunizations today save more than three million lives worldwide annually, millions of children in the Asia Pacific Region remain unimmunized and continue to die from diseases that can be prevented with vaccines available in their own countries. A safe, proven strategy for reducing disease and death, vaccines are a highly effective public health intervention. Vital for social and economic development, immunization programmes are also one of the most cost-effective means of addressing economic disparity within health-care sectors. With a heavy disease burden from vaccine-preventable diseases in many countries in the Region, support for immunization efforts is a high priority.

Many countries in the Region maintain high routine immunization coverage with the six traditional antigens and have expanded immunization programmes by introducing new vaccines. However, challenges persist, such as increasing coverage and ensuring vaccine quality and safety, especially for underserved and hard-to-reach populations, enhancing disease surveillance and laboratory capacity, and improving vaccine security. Immunization programmes in many countries are highly donor-dependent, leaving them vulnerable to shifting donor priorities.
Poliomyelitis

Poliomyelitis is a highly infectious disease caused by the poliovirus. The virus enters the body through the mouth and multiplies in the intestine, from where it can invade the central nervous system causing paralysis. Among those paralysed, some will die when the muscles used for breathing become immobilized. Many infected with the virus show no symptoms but can infect others. Polio is incurable but the disease can be prevented through immunization.

In the Asia Pacific Region 37 countries and areas were officially certified as poliomyelitis-free in October 2000, with the last locally circulating poliovirus reported among them from Cambodia in March 1997. Of the remaining 11 countries in the Asia Pacific Region, seven have remained poliomyelitis-free after successful interruption of wild poliovirus transmission several years ago. India continues to be poliomyelitis-endemic, and Bangladesh, Indonesia and Nepal, after having been poliomyelitis-free for several years, have suffered recent importations of wild poliovirus. In India, the disease continues to occur in some states and despite immunization campaigns that reach 90% of the population, wild poliovirus has continued to circulate because of high population density, poor sanitation, malnutrition and large birth cohorts. In response, India implemented a range of intensified and specific initiatives since 2005 designed to interrupt the transmission of wild poliovirus, including intensifying advocacy efforts; utilizing monovalent oral poliomyelitis vaccine in high-risk areas; employing new strategies to reach underserved populations; and vaccinating at transit points such as railway and bus stations, ferries, markets and religious fairs, netting 3 million vaccination sites. Despite these initiatives, in 2006 there was a setback with India reporting 676 new cases of poliomyelitis.

However, there has been a dramatic decline in the number of cases of poliomyelitis due to subtype P1 from western Uttar Pradesh in the early part of 2007, and this is seen as a positive step towards finally ending wild poliomyelitis transmission in India.

After having been poliomyelitis-free for 10 years, Indonesia had an importation of wild poliovirus in March 2005. The index case, occurring in Sukubumi, West Java, was linked to wild poliovirus circulating in West Africa. The outbreak continued for several months, paralysing over 300 children and affecting several dozen districts on the islands of Java and Sumatra. The wide circulation of wild poliovirus required several rounds of nationwide immunization and intensive technical support in the high-risk provinces to support planning, implementation and monitoring of the vaccinations, as well as an improvement of poliomyelitis surveillance.

Imported wild poliovirus has the potential to spread widely since vaccination rates have dropped in many communities over the past few years. Low coverage led to 46 poliomyelitis cases due to vaccine-derived poliovirus on Madura Island in East Java, Indonesia, and one case in Myanmar in early 2006. The oral poliovirus vaccine has proven to be safe and effective in almost 50 years of widespread use. However, in certain circumstances, mainly where there is low immunization coverage, vaccine-related polioviruses are able to persist for extended periods through transmission in unprotected people.

For similar reasons as in Indonesia and Myanmar, vaccine-derived polioviruses also emerged in China in 2004 and in the Lao People’s Democratic Republic in 2004–2005 in communities with low vaccination rates and resulting immunity gaps. After certification of poliomyelitis-free status, supplementary immunization activities with poliomyelitis vaccine have been reduced in several countries in the Asia Pacific Region, mainly due to lack of funding. Although priorities are now focused on strengthening routine immunization systems, progress is often slow. Therefore, in areas of the
Region where wild poliovirus has been controlled, the emergence of vaccine-derived polioviruses remains a threat. High vaccination rates to prevent such occurrences also reduce the risk of imported wild poliovirus outbreaks.

Surveillance for poliomyelitis is based on the detection of children under the age of 15 years who get acute flaccid paralysis (AFP). Rapidly obtaining and testing the stool of cases of AFP for poliovirus enables accurate identification of poliomyelitis cases. Stool specimens have to be tested for poliovirus at a quality laboratory accredited under WHO standards. These AFP surveillance results are regularly reported to WHO and quality standards are applied to ensure that almost all cases are investigated and to be certain no poliomyelitis cases are missed. Countries in the Region rely upon quality indicators, based on regular data analysis, to strengthen their surveillance systems.

Positive highlights of the work regarding polio in the Asia Pacific Region include the ongoing implementation of the poliomyelitis laboratory network, which is composed of two global specialized laboratories, four regional reference laboratories, 23 national laboratories and 31 provincial laboratories. All countries have access to a WHO accredited laboratory, and all except two laboratories were fully accredited for 2005.106 Laboratory results are available in a timely fashion and reflect a high degree of accuracy. The network has provided an excellent basis for international collaboration in the surveillance of poliovirus.

For several years 47 out of the 48 countries and areas in the Asia Pacific Region remained poliomyelitis-free, making the maintenance of poliomyelitis-free status a top priority.107 Addressing the ongoing risk of wild poliovirus importation into poliomyelitis-free countries is crucial, and most countries have recently conducted risk assessments and have updated or enhanced their preparedness plans. Events in Bangladesh, Indonesia and Nepal emphasize the importance of interrupting the transmission of wild poliovirus as swiftly as possible, since no country is safe from wild poliovirus as long as any country is endemic.

Laboratory monitoring for poliomyelitis-free status, which includes accurate and updated national inventories of wild poliovirus infectious materials retained in laboratories to ensure that they are safely stored under required biosafety conditions, is another important priority.

Once wild poliovirus no longer circulates in human populations, its only source will be laboratories that retain materials infectious for polioviruses. Therefore, all countries should conduct a thorough review of all biomedical laboratories to establish a national inventory of wild polioviruses and implement required biosafety measures to ensure that these viruses will not be re-introduced to communities. Almost 30 000 laboratories in the Region have been surveyed, indicating that wild poliovirus infectious materials are currently being held in only 10 countries.108

Of notable achievement in the Region is the success of the poliomyelitis network in highly diverse countries under a range of differing conditions. Laboratories participate in regular data exchange and mutual technical support for immunization campaigns, surveillance reviews and alert systems. Indeed, the high-quality surveillance systems developed for poliomyelitis eradication, the demonstrated commitment to infrastructure and capacity-building, and the establishment of coordination mechanisms for external partner support can serve as a model for infectious disease control for other diseases such as influenza.

The Global Polio Eradication Initiative, spearheaded by national governments, Rotary International, the United States Centers for Disease Control and Prevention, UNICEF and WHO, is the world’s
largest public health initiative. Its demonstrable success is testimony to the commitment of the many participants in the fight against the disease. Perhaps no better example than poliomyelitis eradication is needed to underscore the value of collaboration, for no other solution would have permitted such achievements. Collaboration must continue as the basis of the ongoing commitment to eradicate this burdensome disease.

**Measles**

Measles is a highly contagious respiratory infection caused by a virus and is best known for the rash and fever it causes. Despite a substantial reduction in deaths in the Asia Pacific Region compared to the pre-vaccine era, measles continues to be a leading cause of vaccine-preventable morbidity and mortality in children. An estimated 183,000 deaths from measles occurred in 2006 in the Region, compared with 265,000 in 2000. However, children who survive measles may also endure lifelong disabilities, including brain damage and blindness. A disproportionate amount of measles-related death and disability affects the poorest and most disadvantaged children. The burden of the disease is greatest in countries still struggling with health systems development, difficult-to-reach populations, and populous areas and cities.

Many countries in the Region have set a goal of measles elimination by 2012. Other countries have not set a specific target date for elimination, but have adopted a policy of accelerated measles control to rapidly decrease measles mortality, disability and morbidity. Virtually all countries in the Region have developed multi-year national plans of action specifically addressing measles elimination or control using WHO-recommended strategies. These include: a high routine immunization coverage (≥95% for elimination) with a first and second dose of measles vaccine, or a second opportunity for a first dose, given either through routine services or supplementary immunization activities (SIA); sensitive and timely surveillance; and case management for children with measles, which includes providing vitamin A.

Based on population estimates by WHO-UNICEF and best estimates of vaccination coverage, routine immunization coverage for the first dose of measles vaccine was 73.1% in 2005. However, measles vaccination coverage varied widely between countries. Countries with the lowest coverage in 2005 included the Lao People’s Democratic Republic (41%) and Timor-Leste (48%). The next lowest were Kiribati (56%), Samoa (57%), India (58%) and Papua New Guinea (60%). In addition to India, WHO-UNICEF best estimates of routine first-dose measles vaccination coverage in other countries with very large populations include Indonesia (72%), Bangladesh (81%) and China (86%). Routine immunization in priority countries is being strengthened using GAVI Alliance (formerly known as the Global Alliance for Vaccines and Immunization) funds to implement the “Reaching Every District” approach. This approach emphasizes re-establishment of regular outreach services, supportive supervision with on-the-job training, community links with service delivery, monitoring and use of data for action, and microplanning for better management of human and financial resources and more effective service delivery. Additional initiatives in many countries in the Region have been taken to include national financing for all Expanded Programme on Immunization (EPI) vaccines, ensuring adequate salaries for immunization staff, introducing a routine second dose of measles vaccine, and requiring school entry checks of children’s immunization status throughout the country.

Many countries in the Region have conducted large-scale, age-range measles SIA to provide a second opportunity for measles vaccine. Countries having recently conducted successful large-scale measles SIA include Bangladesh, Cambodia, China (11 of 31 provinces), Indonesia,
the Lao People’s Democratic Republic, Mongolia, Myanmar, Nepal, Sri Lanka, the Philippines and Viet Nam. However, many susceptible children in China and India, the largest countries in the Region, have yet to receive this opportunity through SIA. Of 59 228 000 surviving infants in the Region in 2005, India and China covered 41% and 28% respectively. Most countries conducting SIA use the opportunity to include additional health and child survival interventions, including vitamin A supplements and deworming medications.

Measles surveillance is being strengthened throughout the Region and benefits from the high-quality surveillance infrastructure established for poliomyelitis eradication. In many countries, measles surveillance strengthening is conducted in a manner that strengthens surveillance for all vaccine-preventable diseases. Currently, all countries include measles as a reportable disease requiring investigation in their routine communicable disease surveillance systems. In countries targeting measles for elimination, case-based epidemiological surveillance systems are developed with specific indicators to monitor measles incidence and surveillance performance. In countries with measles control goals, the measles surveillance objective is usually to identify measles outbreaks quickly to enable a timely response. Laboratory networks have been established consisting of subnational and national measles laboratories, and regional reference laboratories. Regional reference laboratories, which are located in Australia, China, Hong Kong (China), Japan and Thailand, provide quality assurance to national laboratories and conduct virus isolation and sequencing of measles virus. These laboratories work in collaboration as part of a global measles laboratory network that allows for confirmation of suspected measles cases and identification of specific genotypes of measles virus to determine whether the measles virus is indigenous or imported.

National governments provide the lion’s share of financial support for measles elimination activities, with additional support provided by partners. A total of US$ 48.1 million was provided to countries in the Asia Pacific Region through the United Nations Foundation (UNF) in 2007–2008. These funds were used primarily to support procurement of measles vaccine and injection equipment and operational costs for SIA, and also for strengthening routine immunization and improving measles surveillance. Most of the UNF funds were obtained from the International Finance Facility for Immunization Company (IFFIm), a consortium of countries that have created an innovative mechanism for financing health priorities through issuance of long-term debt (bonds) to the public. Funds from IFFIm are channelled through the GAVI Alliance to the UNF. While many countries and development partners have contributed to measles elimination efforts, core members of the Measles Initiative include the American Red Cross, the United States Centers for Diseases Control and Prevention, UNF, UNICEF and WHO.111

The need for 95% population immunity and a second dose of measles vaccine beyond infancy requires measles elimination strategies to include strengthening immunization and health service systems. Success against measles in both Regions will require ongoing cooperation among a broad array of national and international partners as well as unprecedented levels of support from local stakeholders.

Hepatitis B

Worldwide, two billion people, or roughly one in three people, are infected with hepatitis B, with an estimated 350 million people being chronic carriers.112 An inflammatory liver disease caused by the hepatitis B virus (HBV), it is transmitted through percutaneous or mucous membrane contact with infected blood (e.g. through unsafe injection, blood transfusion) or other body fluids (e.g. serous exudates from a wound or cut, saliva, semen or vaginal fluids during unprotected sex). Infants infected
at birth become chronic carriers of the disease. Unlike other vaccine-preventable diseases, hepatitis B infection rarely causes disease in children. Instead, 90% of infants infected with hepatitis B will develop chronic infections leading to late-onset diseases such as liver cancer and cirrhosis. The risk of dying from HBV-related cirrhosis and hepatocellular carcinoma (HCC) in those chronically infected range from 15%-25%. 111,114 Hepatitis B is 100 times more infectious than the AIDS virus, killing about 500 000 people a year and inflicting an enormous strain on public sector health systems.

Most countries in the Asia Pacific Region are either endemic or hyperendemic for hepatitis B. With an estimated 258 million chronic carriers in the Region, hepatitis B is an important public health priority and regional plans have been developed for control through universal childhood immunization.115,116 Interrupting transmission of the disease at the earliest opportunity is the best strategy and vaccination remains the best means of doing so.

A common, long-term issue faced by countries in the Region is financial sustainability of hepatitis B vaccination programmes, as several countries have financed vaccine costs with support from the GAVI Alliance. In addition, many countries with weak immunization services face challenges in achieving sustained high coverage with three doses of hepatitis B vaccine.

All countries in the Region, except for Timor-Leste, have introduced hepatitis B vaccine into their national immunization programmes, though some countries have yet to introduce the vaccine nationwide. Maldives and Thailand, both non-GAVI Alliance eligible countries, introduced the vaccine even before the launch of the GAVI Alliance programme. India, with an annual birth cohort of more than 25 million infants, began introducing the vaccine in a phased manner, initially targeting 15 metropolitan cities and 33 districts.117 The next phase of expansion targeted at least 11 states in 2006–2007. The state of Andhra Pradesh in southern India introduced the hepatitis B vaccine several years before the country began its phased introduction for the entire country. Japan follows a nationwide high-risk approach with the screening of all pregnant women and provision of hepatitis B vaccination for infants born to hepatitis B-positive mothers and other high-risk groups.

It is estimated that 30%–50% of all chronic infections in the Region were acquired by transmission from infected mother to newborn child at the time of birth.118 Hence, timely delivery of the first dose of the vaccine is critical for reducing the spread of the disease. While increasing coverage with three doses of hepatitis B vaccine depends on strengthening routine systems, delivery of the first dose within 24 hours of birth to prevent transmission at the time of birth provides a special challenge in countries where a substantial proportion of births occur at home, unsupervised by any trained health worker. Despite this, the delivery of a birth-dose of hepatitis B vaccine is an opportunity to link maternal health care with immunization services, and may have positive effects on access to trained maternity care—an important Millennium Development Goal.

WHO has set a goal of reducing chronic hepatitis B infection rates in the Western Pacific Region to less than 2% by 2012. With sustained efforts, the entire Asia Pacific Region is well positioned to substantially reduce the hepatitis B disease burden.

**Japanese encephalitis**

Japanese encephalitis is caused by a virus spread by mosquitoes. While usually starting as a flu-like illness, encephalitis may develop when the virus invades the central nervous system, including the brain and spinal cord. Japanese encephalitis can be fatal in 30% of cases. It is a neglected disease in
the Asia Pacific Region, with more than 50 000 cases and 10 000 deaths occurring annually.\textsuperscript{119} Furthermore, outbreaks of Japanese encephalitis have occurred in areas previously non-endemic for the disease. In 2005, a suspected Japanese encephalitis outbreak in northern India and southern Nepal resulted in at least 8900 cases and 1700 deaths.\textsuperscript{120}

Vaccination and environmental control are necessary to combat the disease. However, vaccination of at-risk populations has been proven to be the most effective intervention. Current best practices for Japanese encephalitis control and prevention begin with campaigns focused on high-risk groups and geographical areas, followed by the progressive introduction of the vaccine into routine immunizations. While some countries, such as China, Japan, the Republic of Korea and Thailand, have used vaccinations effectively to control Japanese encephalitis, it has only recently been integrated with vaccination initiatives in other endemic countries such as several provinces in China and endemic states in India, Sri Lanka and Viet Nam. Many countries which have only recently begun using vaccinations as the major control strategy are faced with issues of high cost and limited supply of inactivated mouse-brain derived vaccine, lack of WHO prequalified manufacturers of the vaccine, and difficulty in choosing the type of vaccine. As a result, only a handful of countries have introduced Japanese encephalitis vaccines into their national immunization programmes.

More recently the live attenuated SA14-14-2 vaccine has become available in large quantities and at affordable prices. As a result, several countries including India, Nepal, and Sri Lanka have developed plans to introduce this vaccine into their national immunization programmes. India began its first phase of introduction in May 2006 by immunizing about seven million children aged 1 to 15 years in six districts of Uttar Pradesh, and in June an additional two million children in the same age group were immunized in Bardhaman district in West Bengal.\textsuperscript{121}

Several new vaccines against Japanese encephalitis that may be more effective are expected to be available in the next three to five years. Availability of these new, improved vaccines will greatly facilitate the prevention and control of Japanese encephalitis in endemic countries through routine immunization efforts.

Disease epidemiology, laboratory support and surveillance are sketchy, contributing to the low political commitment to control this disease. Efforts are being made to set up surveillance systems to generate data in countries where the disease is considered to be endemic, but at present no credible disease estimates are available in countries such as Cambodia, the Lao People’s Democratic Republic and the Philippines. However, there is an urgent need to standardize both the surveillance reporting and laboratory testing for Japanese encephalitis.

**Other new vaccines**

The stable picture of routine national immunization priorities is changing. Recent research progress in developing new vaccines for several infectious diseases of worldwide importance is resulting in an unprecedented number of new immunization options. How countries and national immunization programmes deal with these new prevention opportunities will be a critical issue in this decade and the next.

Two new vaccines in an advanced stage of development are the multivalent pneumococcal and rotavirus vaccines. These are expected to substantially reduce childhood mortality from pneumonia and diarrhoea.\textsuperscript{122} While vaccines for widespread use are not likely to be available for the next three
To five years, countries need to prepare by generating sufficient disease burden data to guide the policy on future vaccination. GAVI Alliance funding has been instrumental, through special accelerated development and introduction plans, in helping countries in the Region generate the necessary data through multicountry surveillance networks.

**Maternal and neonatal tetanus elimination**

Tetanus, also known as lockjaw, is a serious but preventable disease that affects the body’s muscles and nerves. It typically arises from a skin wound that becomes contaminated by a bacterium commonly found in soil. Neonatal tetanus is an often deadly form of tetanus in newborn infants who lack protective passive immunity because their mothers also lack immunity. It usually occurs through infection of the unhealed umbilical stump, particularly when the stump is cut with an unsterilized instrument. Neonatal tetanus is estimated to kill over 200,000 newborns each year and almost all of these deaths occur in rural areas of developing countries where births often occur in unsanitized conditions.\(^{123}\) Vaccination is the best protection against tetanus.

Reducing deaths from neonatal tetanus is one of the simplest and most cost-effective means by which to support the Millennium Development Goal of reducing neonatal mortality. Neonatal tetanus can be prevented by immunizing women of childbearing age, thereby permitting antibodies to be transferred to the baby; by promoting clean delivery and cord-care practices; and by strengthening disease surveillance and case investigation. Of further benefit, vaccination with tetanus toxoid will protect expectant mothers from maternal tetanus during pregnancy and delivery. Though the data are incomplete, it is estimated that maternal tetanus is responsible for 5% of maternal mortalities, almost exclusively among the poorest and most underserved populations.\(^{124}\)

Neonatal tetanus remains one of the most underreported diseases and is often called the “invisible killer”, as it tends to occur in areas with poor or no access to health care and remains unidentified within the community. WHO continues to work closely with UNICEF and the United Nations Population Fund to reach worldwide elimination of both neonatal tetanus and maternal tetanus. Elimination is defined as less than one case of neonatal tetanus per 1000 live births. Eradication is, of course, impossible as tetanus survives in the environment. This means that high levels of immunization must be maintained even after national goals have been reached.

All countries in the Asia Pacific Region have made progress towards neonatal tetanus elimination. Currently, 10 countries in the Asia Pacific Region continue to report neonatal tetanus cases above the elimination goal: Bangladesh, Cambodia, China, India, Indonesia, the Lao People’s Democratic Republic, Myanmar, Papua New Guinea, the Philippines and Timor-Leste.\(^ {125}\) In Viet Nam, maternal and neonatal tetanus elimination was formally validated in December 2005.\(^ {126}\) National elimination goals have been set in Cambodia and the Philippines for 2008, China for 2010 mainly through enhancement of clean and institutionalized deliveries, and the Lao People’s Democratic Republic for 2010. Maternal and neonatal tetanus is regarded as eliminated in Bhutan, the Democratic People’s Republic of Korea, Maldives, Nepal, Sri Lanka, Thailand and seven states in India.\(^ {127,128}\) Indonesia has completed nationwide supplementary immunization activities for women of childbearing age. Myanmar has provided supplementary immunization in most of its high-risk districts and plans to cover those remaining by 2006. Bangladesh began tetanus toxoid supplementary immunization activities in high-risk areas in 2005, with completion in 2006.
In September 2003, WHO passed a resolution on child health that strongly urged placing child health higher on political, economic and health agendas, targeting child survival interventions, and increasing allocation of financial resources to reduce child mortality and morbidity, especially in developing countries. In line with this resolution WHO and UNICEF initiated a joint Regional Child Survival Strategy, in which the essential package included tetanus toxoid immunization during antenatal care and skilled assistance during delivery and care of newborn children for the entire Asia Pacific Region.

Tetanus prevention is a tremendous opportunity for various public health programmes to collaborate and make an impact far beyond health alone. Every year, close to 600 000 women—more than one woman every minute—die globally from complications related to pregnancy and childbirth. In addition, these complications contribute to more than three million infant deaths within their first week of life. A maternal death has an impact on the family, the community and society. A significant proportion of these deaths can be prevented with safe, inexpensive vaccinations.

7.6 Dengue and dengue haemorrhagic fever

Dengue fever is an acute febrile viral disease characterized by the sudden onset of a fever lasting 3–5 days, intense headache, pain in the muscles, joints and behind the eyes, loss of appetite, gastrointestinal disturbances, and rash. Flaviviruses, which include four serotypes DEN 1, 2, 3 and 4, and dengue viruses cause the more acute dengue haemorrhagic fever (DHF), characterized by increased vascular permeability, a decrease in blood volume (hypovolaemia), and abnormal blood clotting. The disease is now endemic in most tropical and subtropical countries, and is transmitted to humans by the bite of infective mosquitoes, mainly Aedes aegypti. The incubation period is 3–14 days, but most commonly 4–7 days.

Dengue fever, with its severe manifestations of DHF and dengue shock syndrome (DSS), has emerged as a major public health problem of international concern. Geographical distribution of dengue fever has greatly expanded over the last 30 years, in lockstep with an increase in breeding grounds for the vector species. This is due to an explosive growth in population and urban areas, which strain public health services and potable water supply systems. This encourages rainwater harvesting in diverse types of containers, which offer perfect breeding conditions for dengue carrying mosquitoes.

Current estimates show at least 100 countries are endemic for DHF and about 40% of the world population (2.5 billion people) is at risk in tropical and subtropical regions. During 1998, over 1.2 million cases and 3442 deaths were reported to WHO by 56 countries. Over 50 million infections, with about 500 000 cases of DHF and at least 12 000 deaths, occur annually, with dengue being a leading cause of childhood mortality in several Asian countries.

In March 2006, WHO organized a Meeting of Partners on Dengue Prevention and Control in the Asia-Pacific in Chiang Mai, Thailand. Attended by representatives from Asia Pacific Region countries, the meeting highlighted the problems of dengue emergence in the Region, and the decision was made to form the Asia Pacific Dengue Partnership. Following the meeting, a core group was formed to prepare a partnership strategic framework and initiate effective advocacy for additional resources for dengue control.
Key strategies for dengue control in the Region

An intercountry consultation of programme managers was held in Batam, Indonesia, in July 2001, where a regional strategy for prevention and control of dengue was discussed and approved featuring the following key elements:

- Establishing an effective disease and vector surveillance system based on reliable laboratory and health information systems.
- Ensuring early recognition and effective case management of DHF/DSS to prevent case mortality.
- Undertaking disease prevention and control through integrated vector management with community and intersectoral participation.
- Undertaking activities to achieve sustainable behavioural changes and partnerships.
- Establishing emergency response capacity to control outbreaks with appropriate medical services, vector control, communications and logistics.
- Strengthening regional and national capacities to undertake prevention and control of dengue and research related to epidemiology, disease and vector management, and behavioural changes.

Integrated vector control with community and intersectoral participation has been successfully implemented in Indonesia through the 3M Strategy—covering water containers (menutrap), clearing and brushing water containers (mengguras), and burying water containers (mengubur). The success of this effort was due to the active participation of the Indonesian Women’s Organization. In Thailand the national dengue prevention and control plan, aiming to prevent morbidity and mortality, integrated DHF control with the primary health care programme. The case-fatality rate due to DHF/DSS dropped from 2.45% (1978) to 0.58% (1987) as a result of access to standard treatment. In Malaysia, the Communication for Behavioural Impact (COMBI) programme has been very successful in Johor Baru. The dengue control programme in Singapore was implemented by the National Environmental Agency through strong legislative measures and several effective strategies, including the use of ovitraps. In Viet Nam, copepods of genus *mesocyclops* are being used effectively for biological control of *Aedes aegypti* larvae, which is principal vector of dengue fever. In Cambodia, partnerships were developed with the private sector in the design and introduction of suitable water-storage covers to reduce vector breeding. There are many other success stories that have been implemented on a smaller scale.

The Asia Pacific Strategic Plan for Dengue (2007–2015) was developed in response to the increasing threat of dengue as an emerging high-burden disease, and for meeting the requirements of the International Health Regulations (2005). The goal of the strategy is to reverse the rising trend of dengue in affected countries in the Region. There are differences between countries in the Region in terms of preparedness, response capacity and the allocation of financial resources. The strategic plan provides generic recommendations to allow local adaptation in preparing national operational plans, identifying resource gaps, developing capacity, strengthening health systems, establishing networks and harmonizing partnerships for dealing with dengue.

As the disease does not respect international boundaries, effective dengue control is not possible if efforts are limited to one country or a few countries. Adoption of a regional approach is required, through collaboration between countries and sustained partnerships, to enable the implementation of evidence-based interventions using the best practices for expansion.
To achieve the goal of reducing the rising trend of dengue in the Region, it is proposed to strengthen the system for prediction, early detection, preparedness and early response to dengue outbreaks and epidemics; improve standard case management of dengue; support prevention of dengue through strengthening of integrated vector management and community mobilization; and refine strategic interventions through access to innovations in the prevention and control of dengue.

Currently, national programmes are expending only modest resources and a major part of what is being spent goes to insecticide sprays and chemical larviciding, which have little impact on the control of epidemics. In contrast, the evidence shows that vector control through larval monitoring, source reduction and personal protection, combined with adequate sanitation and improvements to the environment of households and communities, are proven options for the prevention of dengue. Good public health policies are an essential prevention and control measure in both urban and rural settings.

Community participation and social mobilization for behaviour impact have started to show good results in many different settings. Investments in this approach and in integrated vector management will produce the desired results.

The role of the health sector needs strengthening as does intersectoral and programme collaboration. Efforts to improve case management of DHF/DSS are already showing good results with reduced case fatality rates, and this initiative is to be scaled up.

For prevention of dengue outbreaks, monitoring the virus and vector is key, allowing timely prediction of dengue outbreaks and prompt investigation. Collaboration between disease surveillance programmes in various countries also helps reverse the rising trend of dengue. Such networking plays an important role in the success of programmes and will be included in future operational plans.

Dengue and DHF in countries of the Region

The Asia Pacific Region is home to 53% of the world’s population and only a few of the Region’s countries do not report dengue cases: the Democratic People’s Republic of Korea, Japan, the Republic of Korea, Mongolia and New Zealand (except for occasional imported cases). Bhutan and Timor-Leste first reported dengue fever outbreaks in 2004, followed by Nepal in 2006.

Dengue fever (DF) is a major public health issue in many Pacific island countries and areas. Although the disease has been reported in the Pacific for over 100 years, in the early 1970s Pacific island countries experienced a re-emergence of dengue after an absence of more than 25 years, with DHF occurring for the first time in 1975. Since then, several Pacific island countries have experienced significant outbreaks and epidemics, including cases of DHF and DSS. High morbidity during outbreaks is often observed, and in some countries more than 20% of the population has been affected during epidemics. However, dengue has never progressed to very dramatic epidemics with high case-fatality rates (CFR), as might be expected in isolated communities where the entire population is vulnerable.
Epidemics are difficult to predict, but historically they are cyclical, occurring roughly every three to four years. In the past decade, two major epidemics broke out, one in 1998 and another in 2001, each affecting an estimated 30,000 people.

Between 2000 and 2004, the seven most affected Pacific island countries and areas were French Polynesia (33,047 cases), New Caledonia (6616 cases), Wallis and Futuna (2488 cases), Cook Islands (2282 cases), Palau (2188 cases), Kiribati (2143 cases) and the Federated States of Micronesia (658 cases). During the same period, other countries had no cases or a low number of cases.

From 1991 to 2004, 72 deaths were reported. Most of these occurred in outbreaks in 1998 (14), 2001 (12) and 2003 (24) in Fiji, French Polynesia, New Caledonia, Palau, Solomon Islands and Tonga. All four serotypes of dengue have been reported in the Pacific, where *Aedes aegypti* is the principal vector, with *Aedes albopictus* and *Aedes polynesiensis* secondary vectors. All four serotypes have been detected circulating in all the countries, but the transmission potential is different both at the macro and micro levels.

The combined total reported dengue cases in the Asia Pacific Region ranged from 198,932 (1991) to 312,820 (2004). Case-fatality rates for DHF declined as a result of improved case management. Over the last seven years, the combined fatality rate was 0.5%–1%. While there is a declining trend in mortality, reported cases have consistently remained over 300,000 since 2001 (Figure 7.14).

The number of cases reported by 27 countries in the Region between 1991 and 2004 varied from a low of 2 to a high of 140,081 (Figure 7.15). Incidence rate per 100,000 in selected countries is shown in Figure 7.16. These rates are very high in countries reporting focal outbreaks for the first time, especially smaller countries with less population.
Fig. 7.15  Number of reported dengue cases by country and area in the Asia Pacific Region, 1991–2004

Source: Unpublished data. Compiled from country reports of Asia Pacific countries and areas.

Fig. 7.16  Dengue incidence rate per 100,000 in selected countries and areas in the Asia Pacific Region, 2004

Source: Unpublished data. Compiled from country reports of Asia Pacific countries and areas.
Review of select countries

*Bangladesh*

During the epidemics in 2000 and 2002 in Bangladesh, the number of reported cases was 5550 and 6000, respectively. Case-fatality rates varied from 1% to 2% and fell below that by 2004 (Figure 7.17).

**Fig. 7.17 Number of reported dengue cases and case-fatality rates in Bangladesh, 1999–2004**

Source: Unpublished data. Compiled from country reports of Bangladesh.

*Cambodia*

Following a decline in dengue cases in 1999 in Cambodia, there was an upward trend in 2004. The total number of reported cases between 1991 and 2001 was 93,852, with 2444 deaths or a CFR of 2.6%. In 2004 Cambodia had an incidence rate of 68 per 100,000 with a CFR of 0.9%, the first year since 1991 that the CFR was below 1% (Figure 7.18).

**Fig. 7.18 Number of reported dengue cases and case-fatality rates in Cambodia, 1991–2004**

Since the 1998 nationwide dengue epidemic Cambodia has intensified dengue surveillance activities, including hospital-based sentinel surveillance, which has meant an increase in the number of reported hospitalized cases. The National Malaria Centre has taken a number of steps to reduce vector breeding. In collaboration with NGOs and WHO, the Ministry of Health designed and distributed insecticide-impregnated jar covers on an experimental basis, which reduced or eliminated mosquito breeding in numerous water-storage jars that are common in nearly every rural Cambodian household. Mass campaigns have been conducted since early 2001 to distribute the mosquito larvicide temephos throughout the provinces, and a biodegradable insecticide for spraying used in ponds, stream margins, standing or polluted water, and other possible larvae breeding sites.

In addition, some other vector control trials have been conducted in Cambodia. In 2003 a novel, controlled-release formulation of pyriproxyfen, an insecticide that acts as an insect growth inhibitor, was tested under semi-field conditions in Phnom Penh, Cambodia, against a local strain of *Ae. aegypti*. With a view to creating a single application, the test formulation was designed to inhibit adult emergence for six months, the approximate duration of the main dengue transmission season in Cambodia and many other endemic countries. The application of *Mesocyclops* spp (Copepod), a predator of *Aedes aegypti* larvae, in combination with community participation has been piloted. However, the evaluation results did not show a significant reduction in vector density.

**India**

Serious outbreaks occurred in India in 1993 (11 125 cases), 1996 (16 517) and 2003 (12 754). From 1997 to 2002 cases were relatively lower, with an abrupt rise in 2003. Case-fatality rates were between 2% and 4% from 1996 to 1998, and have fluctuated between 1% and 2% since 1999 to fall below 1% in 2004. However, the reported data were from only a few states with most states not reporting (Figure 7.19).

![Number of reported dengue cases and case-fatality rates in India with available data, 1991–2004](image)

**Indonesia**

From 1991 to 1998 cases in Indonesia increased threefold and further increased to 79 462 in 2004. During inter-epidemic years, the incidence varied from 10 000 to 25 000 cases. The case-fatality rate was 2%–3% during the period 1991–1999 and dropped to less than 2% since 2000 (Figure 7.20).
**Malaysia**

Dengue fever has been increasing in Malaysia in recent years. In the early 1990s an average of 5000 cases were reported annually. However, between 2002 and 2004 there were more than 30 000 cases per year. The highest number of cases and deaths were reached in 2004, with 33 895 cases and 102 deaths (Figure 7.21).

In Malaysia, the Communication for Behaviour Impact programme has been very successful in reducing the incidence of dengue fever in Johor Baru.
**Myanmar**

Figure 7.22 shows that cases recorded in Myanmar during epidemics maintained a range between 5000 and 16,000, and in the inter-epidemic period the figure fluctuated between 1000 and 2000. The case-fatality rate remained high (>5%) until 1990. Thereafter, it fluctuated by 3% to 4% and dropped below 2% after 1995.

![Fig. 7.22 Number of reported dengue cases and case-fatality rates in Myanmar, 1991–2004](image)


**Philippines**

Dengue fever and DHF are endemic in all regions of the Philippines, with epidemics occurring every three to four years. The areas with the highest morbidity and mortality are urban centres such as Metro Manila, Cebu and Davao.

Dengue occurs throughout the year, with rates increasing one to two months after the onset of the rainy season in June. The main vector responsible for dengue transmission in the Philippines is *Ae. aegypti*, which is predominantly urban. *Ae. albopictus* may be a secondary rural vector.

The largest number of cases recorded in recent years was in 1998, when a nationwide dengue epidemic was declared, which totalled a reported 36,162 cases and 514 deaths. In 2001, another outbreak occurred with 25,216 cases and 177 deaths. Since 2001, the annual number of cases has remained high. These are shown in Figure 7.23.

All four dengue virus serotypes are present in the Philippines, although according to available data DEN 2 and DEN 3 were predominant during the period 1995–2004. Children under the age of 15 account for about 75% of all cases, and the majority of the fatalities occur among children below age 9 with males and females equally affected.
Singapore

In Singapore, larger outbreaks of dengue tend to occur every five to six years. Since the early 1990s, dengue incidence during major outbreaks has been rising steadily in the country (Figure 7.24). In 2004, 9459 cases and eight deaths were reported. This is the highest number of cases reported during the last 15 years, and is almost twice as many cases as that of the 1998 epidemic. This has occurred in spite of Singapore’s sophisticated control and monitoring system and strict legislation measures. Control of *Ae. aegypti* and *Ae. albopictus* is largely done through source reduction. Other strategies involve health education and the application of public health regulations and chemical control. The control programme is implemented by the National Environment Agency. The programme has been implemented through strong legislative measures and several strategies, including the use of ovitraps.

**Fig. 7.23 Number of reported dengue cases and case-fatality rates in the Philippines, 1991–2004**

![Graph showing dengue cases and CFR in the Philippines from 1991 to 2004.](source)

**Fig. 7.24 Number of reported dengue cases and case-fatality rates in Singapore, 1991–2004**

![Graph showing dengue cases and CFR in Singapore from 1991 to 2004.](source)
**Sri Lanka**

Outbreaks of DF and DHF are becoming a major public health problem in Sri Lanka. With the first 10 reported cases in 1988, incidence gradually increased to just fewer than 2000 cases in 1999. By 2004, however, 15,408 cases were reported. Case-fatality rates were high (4.2%) until 1996, and then dropped to under 2% from 1997 to 2001. Since 2002, fatalities have been less than 1% (Figure 7.25).

**Thailand**

Thailand is the epicentre of DHF in the Region. The number of reported cases was over 100,000 annually from 1987 to 2002 (Figure 7.26). During the inter-epidemic years, the incidence fluctuated from 18,000 to over 90,000 cases. Thailand achieved an early breakthrough in case management and brought down CFR to below 1% by 1985. It was further lowered to under 0.5% by 1990 and since then has remained below 0.2%.
**Viet Nam**

Dengue fever and DHF are leading causes of hospitalization and death in Viet Nam. Viet Nam had the highest reported dengue cases in the Region during the period 1991–2004 with a total of 1 000 866 cases and 2299 deaths.

In 1997 there were 108 000 cases with 245 deaths. During the 1998 dengue pandemic there were 234 866 cases and 383 deaths, the highest figure ever recorded in one year. Like other South-East Asian countries, the number of reported dengue cases has shown an increasing trend in 2004, after a decline in 1999. There were 78 669 reported dengue cases and 114 deaths in 2004, representing an incidence of 97.25 per 100 000. However, case-fatality rates remained below 1% and showed a decreasing trend over the period 1991–2004 (Figure 7.27). In Viet Nam, copepods of genus *mesocyclops* have been used effectively for dengue vector control.

![Graph showing number of reported dengue cases and case-fatality rates in Viet Nam, 1991–2004](image)

**Source:** Unpublished data. Compiled from country reports of Viet Nam.

The most intense transmission of dengue in Viet Nam is concentrated in the Mekong Delta region with a population of some 25 million people. There is a very high population density living in areas where the ground water is not potable due to its salt content, thus forcing people to collect and store rainwater in large jars or tanks that provide breeding places for *Aedes* mosquitoes. Although knowledge about dengue is widespread in the country, private and commercial establishments continue to construct buildings with open drinking-water reservoirs that are the source of a large number of vector mosquitoes. It is difficult to securely cover these large water tanks.

**Conclusion**

There is a need for more advocacy and the acceleration of specific public health interventions to contain dengue fever in countries of the Region. The Asia Pacific Dengue Partnership should be strengthened for the effective mobilization of resources and the implementation of prevention and control measures in accordance with the global strategy.
7.7 Leprosy

Leprosy is a chronic disease caused by a bacillus, *Mycobacterium leprae*, which multiplies very slowly and has an incubation period of about five years, although symptoms can take as long as 20 years to appear. Leprosy is not highly infectious and is transmitted via droplets from the nose and mouth during close and frequent contact with untreated cases.

Leprosy mainly affects the skin and nerves. If untreated, progressive and permanent damage to the skin, nerves, limbs and eyes can result. Due to this progressive and visible disability, leprosy-affected people are often stigmatized and discriminated against by their families and communities.\(^{144,145,146,147}\)

Today, leprosy is a curable disease and treatment provided in the early stages averts disability. After a short period of training, any health worker can easily diagnose leprosy on clinical signs alone. Only in rare instances is there a need to use laboratory or other investigations to confirm a diagnosis of leprosy. In an endemic country or area, an individual should be regarded as having leprosy if one of these cardinal signs is present: a skin lesion consistent with leprosy and accompanied by sensory loss, with or without thickened nerves; or a positive skin smear.\(^{148,149,150}\)

Leprosy can be classified on the basis of clinical manifestations and skin smear results and is grouped as paucibacillary leprosy (PB), with less than five skin lesions, or multibacillary leprosy (MB), with five or more skin lesions.\(^{151}\) In 1981, a WHO study group recommended multidrug therapy (MDT) consisting of dapsone, rifampicin and clofazimine. This drug combination kills the pathogen and cures the patient. Since 1995, WHO has been supplying MDT free of cost to leprosy patients in all endemic countries.\(^{152}\)

Once diagnosed, PB cases (adult and child) are treated with MDT and cured in six months; MB cases (adult and child) treated with MDT are cured in 12 months. Safe, effective and easily administered under field conditions, MDT is available to all patients in convenient monthly calendar blister packs. Patients are no longer infectious to others after the first dose of MDT, as transmission of leprosy is interrupted and there are virtually no relapses after treatment is completed.\(^{153,154}\) No resistance of the bacillus to MDT has been detected. WHO estimates that early detection and treatment with MDT has prevented disability in about four million people. The huge economic and social loss averted shows the great cost-effectiveness of MDT as a health intervention.\(^{155}\)

Current situation in the Asia Pacific Region

In the Asia Pacific Region there were 126 536 cases of leprosy on MDT treatment at the end of 2006, and a prevalence of 0.71 per 10 000 population. In the past, the Region accounted for the highest burden of leprosy in the world with India the most afflicted, but in 2006 nine of the 48 countries and areas in the Region reported zero prevalence and no new case detection. Another 17 countries reported less than 10 new cases and 14 reported less than 1000. However, five countries reported more than 1000 but less than 5000 cases, and three reported more than 5000 new cases. Table 7.5 shows the countries reporting more than 1000 new cases in 2006.\(^{156,157,158}\)
Leprosy elimination strategy and its impact

In 1991 the Forty-fourth World Health Assembly (resolution WHA44.9) called on WHO Member States to work towards elimination of leprosy as a public health problem, defined as less than one case per 10,000 population.\textsuperscript{159,160}

Through increased political commitment, enhanced resource allocation and intensified efforts in all endemic countries, by the end of 2006, 44 of the 48 countries in the Region had reached the leprosy elimination goal. India, the country with the highest burden of leprosy globally as well as in the Region, attained the elimination target in December 2005.

Those yet to achieve elimination are the Federated States of Micronesia, the Marshall Islands, Nepal and Timor-Leste. However, the absolute number of new cases in three of these countries is small: 151 in the Federated States of Micronesia, 42 in the Marshall Islands and 248 in Timor-Leste.\textsuperscript{161,162,163}

As shown in Figure 7.28, the prevalence of leprosy has steadily declined from a peak of 2.14 per 10,000 population in 1996 to 0.37 per 10,000 population in 2006. The annual new case detection has declined from a peak of 29.92 per 100,000 population in 1999 to 5.3 per 100,000 population in 2006. Thus, the burden of leprosy has dramatically declined in the Asia Pacific Region.\textsuperscript{164,165,166,167,168}

Between 1996 and 2006, the prevalence of leprosy declined by 66.8\% and new case detection fell by 31.3\%. These are significant achievements considering the huge population of the Region. This declining trend can be attributed to the wide coverage, efficacy and effective implementation of MDT.\textsuperscript{169,170,171}

Of more than 15 million cases cured globally with MDT, about 13 million were from the Asia Pacific Region, representing a significant contribution to reducing the global leprosy burden. More than 11.8 million cases were from India alone.\textsuperscript{172,173,174}

### Table 7.5 Countries in the Asia Pacific Region reporting more than 1000 new leprosy cases in 2006

<table>
<thead>
<tr>
<th>Country</th>
<th>Number of new cases detected in 2006</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Bangladesh</td>
<td>6,280</td>
</tr>
<tr>
<td>2 China</td>
<td>1,506</td>
</tr>
<tr>
<td>3 India</td>
<td>139,252</td>
</tr>
<tr>
<td>4 Indonesia</td>
<td>17,682</td>
</tr>
<tr>
<td>5 Myanmar</td>
<td>3,721</td>
</tr>
<tr>
<td>6 Nepal</td>
<td>4,253</td>
</tr>
<tr>
<td>7 Philippines</td>
<td>2,517</td>
</tr>
<tr>
<td>8 Sri Lanka</td>
<td>1,993</td>
</tr>
</tbody>
</table>

Source: Unpublished data. Compiled from country reports of Asia Pacific countries and areas for 2006.
Seven countries in the Region have achieved elimination at the subnational level—Bangladesh, Cambodia, China, the Lao People’s Democratic Republic, Myanmar, the Philippines and Viet Nam. These seven countries used to be known as “hyperendemic”. The deformity rate among new cases has also dramatically declined, from more than 10% in 1985 to 2% in 2006. Development of the Geographic Information System (GIS) among various large countries contributed to identifying leprosy-endemic pockets.\textsuperscript{175,176,177}

Increased community awareness has resulted in decreased stigma and discrimination, and greater integration and acceptance of leprosy-affected people in communities.

**Remaining challenges in the Asia Pacific Region**

Challenges in the Region include achieving the goal of elimination of leprosy in the remaining four countries (the Federated States of Micronesia, the Marshall Islands, Nepal and Timor-Leste); maintaining political commitment and ensuring adequate resources to sustain elimination at the national level; and making progress towards further reducing the burden of leprosy in all countries. It is crucial to provide resources for the prevention and care of disabilities caused by leprosy and to establish facilities for physiotherapy, reconstructive surgery and protective footwear for those affected. Increasing community awareness through advocacy and information, education, and communication activities promotes voluntary case detection and reduces stigma.\textsuperscript{178,179,180}

**Strategy to sustain leprosy services following elimination in the Asia Pacific Region**

WHO held a meeting in Manila, Philippines, in 2004 for 18 participants from 16 countries in the Region to develop a comprehensive post-elimination strategy.\textsuperscript{181} The strategy focuses on timely new case detection and treatment with MDT to further reduce cases of leprosy and sustain high-quality leprosy services, including rehabilitation. There are four key elements in the strategy. The first deals with the integration of leprosy services into general health services, with an emphasis on detection of
cases under low-endemic conditions; management of cases, including rehabilitation; referral services and capacity-building; as well as the logistics and supply of MDT. The second element deals with subnational approaches, as leprosy is not uniformly distributed in any given area and cases tend to cluster. The spatial distribution of cases at different administrative levels must, therefore, be studied to identify areas and groups where cases are more frequent. A GIS would be useful in identifying pockets of high endemicity and clustered cases and would aid in understanding their spatial distribution. The third element concentrates on monitoring, supervision, surveillance and evaluation; and focuses on the importance of the absolute number of new cases detected rather than the prevalence proportion under very low endemic conditions. The fourth deals with the importance of political commitment and partnerships to ensure an adequate flow of resources over a long period. To sustain gains made and progress towards a leprosy-free society, advocacy campaigns should be planned for key groups such as policy-makers, politicians, senior government officials, media, NGOs and local leaders. This element also outlines the future role of WHO in low-endemic situations.

**Partnerships**

The remarkable success of elimination efforts in recent years reflects the close working relationship between national programmes and partners. Two of the most notable partners having generously funded the supply and shipment of MDT drugs are the Nippon Foundation of Japan (1995–1999) and the Novartis Foundation (2000–2010). Most member organizations of the International Federation of Anti-Leprosy Associations work closely with various international and nongovernmental organizations. In implementing leprosy activities, the main operational partners within countries are the national programmes.182,183

**The future of leprosy services in the Asia Pacific Region 2007–2010**

Quality leprosy services within the general health system in the Region should be available and sustained in all countries. This includes improved quality of diagnosis and greater attention to prevention and care of disabilities and rehabilitation. Annual new case detection will be less than 10 per 100 000 population for the Asia Pacific Region, including among large countries with a population of more than 500 000. National-level elimination targets should be sustained to reduce the burden of leprosy.184,185

Even with sustained elimination at national levels, between 100 000 and 125 000 new cases are expected to be detected annually in the Region. In addition, a substantial number of cured people with disabilities will continue to need care and rehabilitative services. However, in view of the low endemic situation in most countries, there is a risk of declining political commitment, decreased resources and insufficient capacity for timely detection and treatment of cases, with the potential for marginalization of remaining older patients with deformities who continue to need care and support.

**Future plans**

Towards the achievements in elimination of leprosy as a public health problem, WHO continues to play an important role in sustaining effective leprosy services. Specific WHO inputs include assisting national governments and their partners in developing country-specific action plans and implementing
the regional strategy to sustain leprosy services within the general health system. WHO also provides technical support for implementing the elimination programme based on national operational guidelines, as well as support in convening intercountry, national and subnational periodic review meetings. WHO also supports advocacy to sustain political commitment and the mobilization of adequate resources.

**Conclusion**

The leprosy elimination programme, spearheaded by WHO, is a success story in the global health field. The WHO recommended MDT treatment, initiated in phases by the mid-1980s in most countries, has produced a dramatic decline in prevalence and new case detections worldwide, including the Asia Pacific Region.

However, the elimination of leprosy as a public health problem by reducing prevalence to below 1 case per 10,000 population is an intermediary goal. As new cases will continue to occur, albeit in smaller numbers, there is a need to sustain leprosy services.

The implementation and success of the post-elimination strategy is dependent on global and regional partnerships between all stakeholders, with national governments assuming a leadership role. With WHO providing the necessary technical inputs, it is expected that partnerships will sustain commitment for leprosy elimination at all levels, allocate the required additional resources, ensure free supply of MDT drugs and materials, and establish an effective monitoring and evaluation mechanism.

**7.8 Kala azar**

Kala azar (KA) or visceral leishmaniasis (VL) is a chronic and potentially fatal parasitic disease of the viscera (the internal organs, particularly the liver, spleen, bone marrow and lymph nodes) due to infection by *Leishmania donovani*, a parasite transmitted by sandfly bites. An estimated 200 million people are at risk for KA in Bangladesh, India and Nepal, largely in low-income or marginalized rural communities where health-care is poorly developed. The number of reported cases of kala azar in the Indian subcontinent from 2001 to 2006 is shown in Figure 7.29. Elimination of KA in these South Asian countries is feasible because of its unique epidemiological features: the sandfly vector species responsible for transmission can be controlled and has limited geographical distribution, and humans are the only reservoir for the disease. Successful intervention can be achieved using rapid diagnostic tests rK39 and treatment with miltefosine, an effective and relatively safe oral drug, together with indoor residual spraying. Although political commitment to eliminate KA is high, including an endorsement from health ministers of endemic countries, until recently resource allocation has been low, implementation inadequate, and the capacity of national health systems insufficient. Eliminating KA in South Asian countries will relieve much suffering, promote poverty reduction and socioeconomic development, and augment the capacity of health systems.\textsuperscript{186}
Situational analysis

Regular epidemic cycles of KA every 15–20 years put about 200 million people at risk. Nearly 25 000–40 000 cases and 200–300 deaths are reported every year, but these official figures are gross underestimates. One study suggests there are 420 000 cases, highlighting a need to determine the true burden of disease. The disease has been reported in 109 districts (45 in Bangladesh, 52 in India and 12 in Nepal) (Figure 7.30). The number of cases fluctuate in Bangladesh and Nepal, but is steadily increasing in India. With almost 50% of all cases in the Indian subcontinent, the state of Bihar is a major source of infection for neighbouring countries. Figure 7.31 shows the number of kala azar cases in Bihar compared with those from other endemic areas. The disease is also reported in Bhutan.

Fig. 7.29 Burden of kala azar in the Indian subcontinent


Fig. 7.30 Kala azar-endemic areas in Bangladesh, India and Nepal

Chapter 7

Estimation of the kala azar burden

The UNICEF/UNDP/World Bank/WHO Special Programme for Research and Training in Tropical Diseases, supported multicentric studies in Bangladesh, India and Nepal to estimate the burden of disease, health-care-seeking behaviour, knowledge of care providers in the formal and informal health sector, and policy applications about KA elimination programmes, both in the public and private sector. The estimated total annual number of KA cases in 2007 for Bangladesh, India and Nepal were 136,500, 270,900 and 12,600, respectively. The allocated budget per head per year for the risk population by national programme was calculated at approximately US$ 0.20, 0.40 and US$ 0.30 for Bangladesh, India and Nepal, respectively (Table 7.6). Kala azar leads to an annual loss of about 400,000 DALYs in the WHO South-East Asia Region.

Diagnosis and treatment of KA is expensive and families are often forced to sell their assets and take out loans to pay for care, thereby causing further poverty and disease.

Fig. 7.31 Kala azar case comparison between Bihar and other endemic areas

![Graph showing Kala azar case comparison between Bihar and other endemic areas]


Table 7.6 Risk population, burden of disease and kala azar budget allocation

<table>
<thead>
<tr>
<th>Countries</th>
<th>Population at risk (millions)</th>
<th>Annual KA cases</th>
<th>Estimated cases based on WHO/TDR study 21 per 10,000 population</th>
<th>Annual budget allocated in millions US$</th>
<th>Budget allocated per head for risk population (US$ per person/year)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bangladesh</td>
<td>65</td>
<td>5 067</td>
<td>136 500</td>
<td>14</td>
<td>0.2</td>
</tr>
<tr>
<td>India</td>
<td>129</td>
<td>33 613</td>
<td>270 900</td>
<td>50</td>
<td>0.4</td>
</tr>
<tr>
<td>Nepal</td>
<td>6</td>
<td>1 341</td>
<td>12 600</td>
<td>2</td>
<td>0.3</td>
</tr>
</tbody>
</table>

Major findings showed that the current burden of disease for kala azar (21 cases per 10,000 population) is 20 times higher than the elimination target for the period 2010–2015. Treatment delay is high with 20% of cases taking more than three weeks between observation of symptoms and diagnosis. An even higher proportion (31%) takes more than three weeks from the time of diagnosis to treatment. Community knowledge about KA and precautions taken are acceptable in India and Nepal, but less so in Bangladesh. The rK39 test is used by 45%–58% of care providers in India and Nepal, but not yet in Bangladesh; knowledge among care providers about drugs other than antimony, and miltefosine in particular, is good in India and Nepal but unsatisfactory in Bangladesh. Policy applications in the Indian states of Bihar and West Bengal were found to be deficient and not available for the private sector. A blueprint was presented for a focused intervention in KA hot spots identified by GIS mapping. Based on the current burden of disease, there is an estimated number of 420,000 cases per 200 million population at risk. This clearly indicates that the disease is highly underreported.

In Bangladesh a direct agglutination test and rK39 are available in some areas on a pilot basis, but their use is limited. Programme and funding constraints have been identified in the operational plan of the KA elimination programme. There is a need to strengthen integrated vector control measures, surveillance and community participation. In India diagnostic kits rK39 are available at the district and primary health-care level, and supply chain management is adequate in India and Nepal. However, planning and close monitoring are required to ensure that the supply chain remains uninterrupted.

In Bangladesh periodic vector surveys are done and control includes the use of dichlorodiphenyltrichloroethane (DDT) spraying on a limited scale, even though it has been banned for general use such as agriculture since 1994 and fresh stocks are not being procured. Indoor residual spraying is a main vector control strategy, but during the past several years none has been done for either malaria control or KA elimination.

For three consecutive years in India, vector control comprised of DDT indoor spraying, entomological monitoring, sanitation and personal protection. As part of active case detection, every two weeks a KA information, education and communication activity is held with limited success. Capacity-building has been emphasized at all levels. NGOs and the private sector have not been fully involved. In all countries, localized spraying of DDT could not be completed due to logistic and technical problems.

Milestones in kala azar elimination

A memorandum of understanding was signed by the health ministers of Bangladesh, India and Nepal to eliminate KA through intercountry cooperation at an event organized during the World Health Assembly in May 2005. This high-level political support played an important role in mobilizing national commitment and support for cross-border collaboration.

In 2005 a technical consultation with partners was organized by WHO at Behror, Rajasthan, India, and participants included UNICEF, the World Bank, the Bill and Melinda Gates Foundation, Gesellschaft für Technische Zusammenarbeit (GTZ) GmbH, and the Drugs for Neglected Diseases Initiative. The consultation was organized to develop a common understanding among partners on various interventions for the elimination of KA in endemic countries in the Region. The goals and targets for elimination of KA in Bangladesh, India and Nepal were endorsed during the consultation. An advocacy kit developed by WHO was released in Dhaka, Bangladesh, in August 2006 during a meeting of health ministers.
Early diagnosis and case management

Effective case management of KA requires improved home care management (improved health-care practices) and an increase in trained health-care personnel (including but not limited to doctors and nurses) and reliable laboratory facilities and adequate supply of medicines. Early diagnosis and treatment helps reduce case-fatality rates and raises the credibility of the health system, thus improving the utilization of health services by people suspected to be suffering from this disease. The case definition for suspected KA is a history of fever of more than two weeks in a patient with no response to antibiotics and antimalarials. The case definition is likely to be sensitive but not specific and should apply only to areas known to be endemic for KA. Additional symptoms include darkening of the skin, weight loss and an enlarged spleen. Patients with these symptoms in endemic areas should be screened by rK39 and if positive, treated with an effective drug approved by national policy. Confirmation of KA can be done by examination of bone marrow aspirate, but this is an invasive and technically demanding procedure.

Integrated vector management and vector surveillance

The mainstay of vector control is indoor residual spraying. While DDT can still be used for the control of KA in India, suitable alternatives are needed in Bangladesh and Nepal since DDT is not available there or is not recommended by national policy. Pyrethroids can be considered, although these are expensive and rapid development of resistance is a constraint. Adoption of a uniform insecticide strategy is advisable through intercountry cooperation.

District water bodies relevant to KA should be identified and spraying carried out within a radius of one kilometre. Where available, the use of remote sensing and GIS, or both, can facilitate the mapping process. The mapping of district water bodies is useful in limiting spraying operations to areas where the highest impact on vector control is likely. Selective indoor residual spraying is advisable only when surveillance is effective and geographical mapping with validation is available. If this is not the case, indoor residual spraying based on incidence reporting should continue. Community mobilization enhances indoor residual spraying by ensuring maximum cooperation from households. Another strategy that complements such spraying is reducing human vector contact through insecticide-treated nets (ITNs). Strategies for ITNs should be developed and distribution monitored for impact, as has been done in some districts in all three countries. The success of ITNs and environmental sanitation depends on effective behavioural change communication (BCC). A BCC strategy that includes ITNs and environmental management is to be considered a part of integrated vector management. Information on vector surveillance is crucial for the planning and programming of an integrated vector management strategy.

Effective disease surveillance through passive and active case detection

For surveillance purposes, KA cases should be classified into (a) suspect, (b) clinical, and (c) confirmed. Surveillance includes the reporting of cases of post-kala azar dermal leishmaniasis since these are responsible for continued transmission of the disease.

Surveillance through passive case detection is currently done in government institutions, but this does not represent an accurate picture of case numbers, since the majority of KA cases go to private doctors and quacks and there is no reporting from these sources. Treatment is often started without a
definitive diagnosis of KA and many people do not seek health care at all because of poverty and sociocultural constraints. Despite this, passive case detection and reporting is used to monitor disease trends. The best strategy is to strengthen reporting through improved diagnosis and treatment and to establish partnerships with private health-care providers, including private doctors. Ensuring that communities are empowered with knowledge of the risks of seeking the services of quacks for diagnosis and treatment, and making appropriate treatment available through qualified professionals, will help elimination efforts. For improved surveillance, KA should be made a notifiable disease in affected areas. Proper recording of KA cases is recommended for surveillance on a sentinel basis. Disease surveillance for KA should comprise of monthly reporting and feedback at the district level, and a regular reporting mechanism with state and national authorities.

As the elimination programme improves and capacity increases, passive case detection should be supplemented with active case detection supported by laboratory diagnosis. While active case detection is recommended at least once a year in the beginning, and if possible, two times per year, it becomes more important as cases reported through passive case detection declines. Active case detection should also be supplemented by laboratory confirmation of suspected cases.

Social mobilization and building partnerships

Behaviour change interventions are central to KA elimination programmes and for the success of early diagnosis and treatment adherence. Effective BCC can also help in promoting early care seeking. The participation of community and families in indoor residual spraying and in reducing human vector contact is essential. Social mobilization should be an integral part of the elimination programme from inception. For effective BCC, national programme plans need to include provision for adequate resources.

Developing partnerships between district, state, national and international stakeholders improves effectiveness of elimination programmes. Networking and collaboration with other programmes, such as vector-borne diseases (malaria, dengue and lymphatic filariasis), HIV/AIDS, tuberculosis and leprosy, help reach mutual goals. Kala azar elimination efforts can ideally partner with programmes such as anaemia control and nutritional and poverty alleviation.

Clinical and operational research

Diagnostic and therapeutic tools are available for elimination of KA but diagnostic tests should be validated under field conditions. More clinical research is required to enable the addition of new drugs, including combination drugs, and diagnostics. More research is needed to identify and evaluate techniques for rapid assessment and mapping of the disease and to develop mechanisms for monitoring the effectiveness of intervention strategies. Operational research is recommended to establish monitoring of drug resistance, drug efficacy and quality of drugs used in the programme. Research is also needed in searching for cases of post-kala azar dermal leishmaniasis and for satisfactory treatment of cases, as this is currently constraining KA elimination efforts. The implementation of research is required in pilot districts, where elimination programmes should be closely monitored to identify operational constraints and lessons learnt. Research is also needed on increasing access to interventions for the poorest people. Integrated vector management, development of public-private partnerships and translation of research outcomes to policy reforms and action will be essential to accelerate the KA elimination programme in the Region.
Implementation of the elimination programme

The KA elimination programme consists of four consecutive phases:

**Preparatory phase: two years (2005–2006)**

The preparatory phase began after the operational plan had been prepared and was approved by Bangladesh, India and Nepal. This included preparation for operations, with a pilot total-coverage spraying operation and establishment of diagnosis and treatment facilities in selected districts in endemic countries; and monitoring, including passive and active case detection and vector monitoring.

**Attack phase: five years (2007–2011)**

The attack phase began in 2007 when the preparatory phase had ended. This phase is providing effective implementation and monitoring of the designed programme.

**Consolidation phase: three years (2012–2014)**

The consolidation phase will begin when total coverage by spraying has concluded, for example, at the end of the attack phase. This phase will end after three years of active surveillance has shown no increase in the incidence rate at district and subdistrict levels in endemic countries.

**Maintenance phase: duration to be decided**

During this phase, surveillance against reintroduction of KA will be the responsibility of the country disease control programme until KA is no longer a public health problem. During this phase, the case incidence at the district and subdistrict level should be less than 1 per 10,000 population. An international review commission should verify the achievements of the programme. Countries, or affected districts in countries where elimination targets have not been reached, will require corrective measures. The maintenance phase will be followed by certification of the elimination status.

**7.9 Lymphatic filariasis**

Lymphatic filariasis is a parasitic infection with filarial worms transmitted to humans through the bite of an infected mosquito. There are three species of human filarial parasites: *Wuchereria bancrofti*, *Brugia malayi* and *Brugia timori*. The parasites develop into adult worms in the lymphatic vessels and nodes, producing microfilaria that circulate in the blood and can be picked up by vector mosquitoes when they bite an infected person.

The microfilariae develop through three larval stages in the flight muscles of mosquitoes, ending up in the mouth from which they are transferred to the victim’s skin when the mosquito bites. The parasites then pass through the wound and enter the bloodstream, eventually ending up in the lymph system where they mature into adults.

In many cases, infected individuals show no signs of the disease even though microfilaria can be found in their blood. Individuals with the acute form of the disease suffer from filarial fevers associated with inflammation of the glands or lymph nodes, lymphatic vessels or connective tissue under the skin. In chronic forms of the disease, the adult worms damage the lymphatic system, resulting in
hydrocele, lymphoedema or elephantiasis. Hydrocele is swelling caused by the accumulation of fluid in the scrotal tissues, including the *tunica vaginalis*. Lymphoedema, or build-up of lymph fluid in the legs, combined with secondary infections, results in hardening of the skin and eventual elephantiasis. Both hydrocele and elephantiasis cause debilitating physical and emotional suffering to those infected.

The disease is transmitted by a variety of mosquito species from the three major vector groups: *Culex*, *Anopheles* and *Aedes*. While both *B. malayi* and *B. timori* are transmitted by night-biting mosquitoes, there are two forms of *W. bancrofti*: one is transmitted by night-biting mosquitoes and the other by day-biting mosquitoes.

**Burden of disease**

Globally, lymphatic filariasis is endemic in 83 countries and represents one of the leading causes of disability worldwide. In the Asia Pacific Region, lymphatic filariasis is endemic in 34 countries, with a total estimated population at risk of 882.9 million people (Figure 7.32). The Region accounts for about 68% of the global population at risk. With more than 500 million people at risk of lymphatic filariasis, India alone represents 42% of the global population at risk. Other countries with large populations at risk are Indonesia (150 million), Bangladesh (70 million), Myanmar (40 million) and the Philippines (21.3 million). In terms of economic impact, the 34 endemic countries of the Asia Pacific Region account for 63% of the total global burden, estimated at 5.8 million DALYs lost annually due to lymphatic filariasis.

**Control measures**

The Global Programme for the Elimination of Lymphatic Filariasis was launched in 1999 following a resolution adopted by the Fiftieth World Health Assembly in 1997, which called for the global elimination of lymphatic filariasis by 2020. The global programme is built on two strategies: (1) mass
drug administration (MDA) of the entire population at risk with high rates of coverage using a combination of albendazole and diethylcarbamazine (DEC) annually for a period of five to six years; and (2) alleviation and care of disability associated with lymphatic filariasis.

**Progress**

In 2005 MDA campaigns covered 370 million people living in 21 endemic countries in the Asia Pacific Region. The MDA scale-up from 2001–2005 is given in Figure 7.33.

In seven of 16 countries and areas in the Pacific Ocean, 1.7 million people will have completed five rounds of mass drug administration by the end of 2006. Samoa and Cook Islands will continue with a sixth round because they were not able to meet the criteria for stopping MDA after the fifth round. Although the population covered by lymphatic filariasis elimination in the Pacific is small, it marks a major achievement and an example of how small island countries and areas can effectively work together. Among the countries with large populations carrying out MDA, Sri Lanka completed five rounds in 2006.

China has the distinction of being the first country to have eliminated lymphatic filariasis based on the global criteria. The Chinese programme began in the 1950s and used a variety of strategies including both mass drug administrations and medicated salt. The Republic of Korea is expected to be the second country to meet the global criteria to confirm elimination.

The number of lymphatic filariasis chronic patients, people with elephantiasis, receiving regular care is steadily increasing due to a home-based approach adopted in many countries.

**Future outlook**

The successful elimination of lymphatic filariasis by 2020 will require substantial scaling up of MDA coverage, especially among countries with the highest populations at risk, namely Bangladesh, India, Indonesia, Myanmar and the Philippines. Insufficient resources are currently the main obstacle to
scaling up in these and other countries. In the Philippines, for example, funds are currently available only to cover roughly 50% of the endemic population. Therefore, the national elimination programme had to abandon plans to scale up and instead has focused on completing MDA in areas where the programme is already under way. Nepal and Myanmar face similar problems.

At present the largest global donor partner is GlaxoSmithKline PLC, which donates all the albendazole required by the national elimination programmes. Many countries are finding it difficult to procure diethylcarbamazine, either due to insufficient funds or due to the global shortage of the drug since only a few manufacturers are WHO pre-qualified.

The Global Alliance for Elimination of Lymphatic Filariasis was established in 1999 to support global lymphatic filariasis control and treatment efforts. The members of the alliance are the ministries of health of endemic countries and about 35 other partners drawn from bilateral and multilateral development agencies, international foundations, and representatives of pharmaceutical companies, NGOs and universities. The fourth meeting of the Global Alliance for Elimination of Lymphatic Filariasis was held in March 2006 in Fiji. The alliance was restructured during the Fiji meeting in order to strengthen its support to lymphatic filariasis endemic countries.

If adequate funding and issues related to diethylcarbamazine procurement are not resolved, mass drug administration scale-up both globally and in the Asia Pacific Region will be adversely affected, putting some countries at risk of not achieving their goals by the 2020 target.

7.10 Soil-transmitted helminthiasis and schistosomiasis

It is estimated that more than 1.2 billion people in the Asia Pacific Region are chronically infected with soil-transmitted helminthiasis (STH) and/or schistosomiasis. The most important soil-transmitted helminth infections in humans are caused by *Ascaris lumbricoides* (roundworms), *Trichuris trichiura* (whipworms), *Ancylostoma duodenale* and *Necator americanus* (hookworms).

Available data suggest that the disease burden due to STH is enormous. According to the World Bank, STH is responsible for 16.7 million DALYs lost among children aged 5–14, representing 11.3% of the total disease burden in this age group.

High prevalence of STH is closely associated with poverty, poor environmental hygiene including poor sanitation, contaminated food, inadequate personal hygiene and lack of health services. It is also generally associated with areas that are basically agricultural and low on the economic and human development scale. Such conditions prevail in the poorer sections of most countries of the Asia Pacific Region. Prevalence of STH is found to be as high as 100% among high-risk communities.

The STH worms do not multiply in the human host, but they produce a large number of eggs which are passed in the faeces. The life cycle of these worms includes a soil stage, whereby immature stages must undergo development and multiplication before entering the human body again. There are many ecological factors such as temperature, humidity, soil quality and rainfall that affect the transmission of STH infections. Hence, the infection rates significantly differ by ecological zones even when the living conditions, personal hygienic habits and socioeconomic status do not differ significantly. This means that even within a single country, the prevalence of STH may vary greatly depending on ecological factors. These differences can be seen in Figure 7.34 that shows the
highest and lowest prevalence of STH within selected countries from surveys conducted over the past decade.

All age groups and both sexes are vulnerable to infection; however, in most places the prevalence and intensity rates are lower in extreme ages and higher among schoolchildren aged 5–14 years. Figure 7.35 shows the age distribution of STH in Pemba Island (United Republic of Tanzania) in 1988–1992. This is an example of a typical age distribution of infections in an endemic country.

The situation seen with hookworm is slightly different. The prevalence and intensity of hookworm infection show a slow increase with age in contrast to what is seen with roundworms and whipworms. In general, more adults than children have high infection rates with hookworms and a higher worm burden.

Some countries (Sri Lanka and Thailand) which had high worm burdens in the past show a steady downward trend over the last two decades due to targeted deworming campaigns combined with an overall improvement in socioeconomic conditions. Both Sri Lanka and Thailand currently have overall infection rates of less than 25%.
Effects of soil-transmitted helminthiasis infections

Soil-transmitted helminthiasis infections cause morbidity by affecting nutritional equilibrium, reducing growth, inducing intestinal bleeding, causing physical complications such as obstruction and rectal prolapse, and have been demonstrated to affect the cognitive development of children. Although death is a rare complication, each year throughout the Asia Pacific Region 20,000 deaths are directly attributable to hookworm infections, another 20,000 to *Ascaris lumbricoides* and 6,000 to *Trichuris trichiura*. School-age children and women of reproductive age are the two groups with the highest risk of morbidity and mortality. A study conducted in Sri Lanka in 2003 showed that deworming of pregnant women during the second trimester improved their anaemia status significantly by the third trimester, increased the weight of children at birth by 60 grams and reduced infant mortality by 40% in the first six months. Another study in Nepal conducted showed that two rounds of deworming of preschool children within a year reduced the prevalence of STH infections by 43% and of anaemia by 77%.

Progress in the control of the disease and major achievements

Until recently very little attention was paid to controlling STH infections, mainly due to the prohibitive cost of interventions including chemotherapy. The improvement of sanitation was considered to be essential for any significant sustainable impact. Chemotherapy alone was not considered sufficient due to the high probability of rapid reinfection. There is, however, evidence from many Asian countries that regular treatment with anthelmintics alone can improve the health of affected groups despite reinfection. Four drugs have been recommended by the World Health Organization for deworming: albendazole, mebendazole, levamisole and pyrantel. These broad-spectrum anthelmintic drugs are now available at a low cost, and treatment with single doses is both safe and highly effective. It has
also been shown that regular and systematic treatment of those population groups at highest risk of morbidity can be delivered in an affordable and sustainable manner through existing channels. For many Asian countries, it has been estimated that the cost of deworming one school-age child costs approximately US$ 0.03.

With this background of a new hope for effective control of STH, the World Health Assembly in May 2001 adopted resolution WHA 54.19 that called for a global target to cover at least 75% of school-aged children annually with regular deworming by 2010. Many countries in the Asia Pacific Region are progressing towards achieving this target.

Bhutan, Cambodia, the Lao People’s Democratic Republic, Maldives, Myanmar, Sri Lanka, Thailand and Timor-Leste, together with most of the Pacific island countries and areas, were targeted to cover their entire high-risk school-aged populations with regular deworming by the end of 2005. In addition, there has been increased interest in expanding the scope of deworming to cover other high-risk groups, including pregnant women and infants. Nepal became the first country in the world in 1999 to have covered its entire preschool population with two annual rounds of deworming. A few countries have also introduced deworming for women of childbearing age. Sri Lanka in 1988 was the first country to target all pregnant women for deworming during antenatal visits, and many more countries are considering adopting similar deworming policies.

In the Philippines, mass deworming of preschool and school-aged children has been conducted in a campaign for children known as the Garantisadong Pambata, which is usually done twice a year in April and October. The high cost of sustained mass deworming treatment for STH hinders most local governments from pursuing control measures. This prompted the Department of Health to formulate the Integrated Helminth Control Policy that brought together all existing health programmes, such as the National Filariasis Elimination Program and Garantisadong Pambata, within the Department of Health; the deworming programme for schoolchildren under the purview of the Department of Education; and the feeding programmes under that of the Department of Social Welfare and Development. NGOs and governmental organizations involved in mass deworming pooled all their resources and created a Technical Working Group for this purpose in 2006.

Due mainly to the simplicity and safety of the intervention, deworming can easily be integrated into other public health intervention programmes. There are many successful examples of countries that have integrated deworming into general school health programmes or into programmes for vitamin A distribution, school feeding, lymphatic filariasis elimination and immunization. Additional programmes need to be added.

**Major problems and constraints**

Despite its cost-effectiveness and simplicity, helminth control is still not a priority among some policy-makers. Even though it costs a very little to deworm an individual, most developing countries still require external financial support to treat large numbers who are at risk.

**Schistosomiasis**

Schistosomiasis is totally absent from the Pacific island countries and areas. The only Schistosoma species transmitted in Asia are *Schistosoma japonicum* and *S. maekongi*.
The transmission of *S. japonicum* is confined to China, where schistosomiasis is a major problem in parts of eight provinces (Anhui, Hubei, Hunan, Jiangsu, Jiangxi, Sichuan, Yunnan and Zhejiang), Indonesia (Central Sulawesi) and the Philippines. *S. mekongi* is transmitted in areas along the Mekong River in southern parts of the Lao People’s Democratic Republic and two adjacent provinces in Cambodia, namely Kratie and Stung Treng.

**Effects of schistosomiasis**

The manifestations of infections with *S. japonicum* and *S. mekongi* are very severe and can lead to the progressive illness and death of infected individuals, especially when the disease has been established for several years and periodic treatment was not provided.

The major symptoms and signs include hepato-splenomegaly, stunting and retardation of puberty; portal hypertension; ascites; cachexia; and rupture of esophageal varices.

The disease also significantly decreases productivity and, therefore, has had a palpable impact on the economy of the populations affected, contributing to and perpetuating poverty.

**Progress in the control of schistosomiasis and major achievements**

Annual treatment with praziquantel (60 mg/kg) greatly reduces the number of parasites infecting the individual and prevents the development of severe morbidity. The intervention is very cost-effective and possible even when resources are scarce.

If mass campaigns are maintained for sufficient time, perhaps seven or eight years, complete control of the morbidity is achieved and in some cases interruption of transmission is also observed. Once morbidity and transmission are under control, it is important not to discontinue mass treatment abruptly because this could lead to the resurgence of the disease. The strategy presently suggested maintains the disease under control and reduces the cost of the mass distribution by increasing the intervals between mass administrations and providing very sensitive monitoring of the prevalence of the infection.

Limited control activities are in place in Indonesia. In the Philippines, the creation of the “Formula One for Health Initiative (F1)” provided a new implementation framework for vital health sector reforms intended to implement critical health interventions with speed, precision and effective coordination to achieve the three major goals of the health-care system: better health outcomes, more responsive health system and more equitable health-care financing. This initiative focuses on disease for elimination as a public health problem and includes schistosomiasis among the diseases targeted. A much higher budget was allotted to the programme in order to realize the programme goal.

In China, control measures were successful in nearly eliminating the disease. But there has been a recent resurgence of cases in some areas, leading China to once again place schistosomiasis high on its list of priority communicable diseases.

In Cambodia, after eight years of MDA the prevalence dropped dramatically from 80% to no cases being identified in 2006. In the Lao People’s Democratic Republic, control activities restarted in 2007 following the example of Cambodia.
Partnerships and collaborative efforts for STH and schistosomiasis

Partners for Parasite Control is a major partnership working towards expanding the prevention and control of STH and schistosomiasis. It is a partnership made up of WHO Member States, United Nations agencies, research institutes, universities, the pharmaceutical industry and a multitude of nongovernmental organizations. Unlike many other partnerships, the Partners for Parasite Control has a loose structure with no formal membership. It serves as a platform for sharing the latest technical and scientific information, as well as providing practical programmatic information to control programmes. In addition to Partners for Parasite Control, several partnerships at country and local levels have been formed and are functional across the Asia Pacific Region. In most of these partnerships, national governments are the key partners. In order to be successful there must be intense collaboration between ministries of health and education as well as other local bodies. Parasite control must be a multisectoral programme where activities are coordinated. It cannot be left to ministries of health alone.

There are many success stories of STH control from countries in the Asia Pacific Region, including Cambodia, the Lao People’s Democratic Republic, Myanmar, Nepal and Viet Nam. Other partners for helminth control in the Asia Pacific Region are The Bill and Melinda Gates Foundation, Sasakawa Memorial Health Fund, German Pharma Health Fund, United Nations agencies, Japan International Cooperation Agency, the United Kingdom Department for International Development, Cooperative for Assistance and Relief Everywhere, Save the Children Fund, the Government of Luxembourg and the Carlo Urbani Italian Association. Schistosomiasis was effectively controlled in parts of China and Cambodia with financial support from the World Bank in China and Sasakawa Memorial Health Fund in Cambodia.

Schistosomiasis and STH control in the context of Millennium Development Goals

Regular distribution of anthelminthic drug to high-risk groups contributes towards reducing susceptibility to infections, improving nutritional status, improving school attendance and achievements, and decreasing maternal morbidity and infant and child mortality – all of these increases productivity. It therefore contributes towards the achievement of four of the Millennium Development Goals and, more importantly, towards the eradication of extreme poverty and hunger.

For more information please visit www.who.int/wormcontrol

7.11 International Health Regulations and the Asia Pacific Region

The substantially revised International Health Regulations (2005), popularly known as IHR (2005), are a legally binding global framework for preventing, protecting against and providing a public health response to the international spread of disease while avoiding unnecessary interference with international traffic and trade. IHR (2005) set out many new requirements, rules and procedures concerning public health event detection, reporting, risk assessment and rapid response at national, regional and global levels. The Regulations entered into force on 15 June 2007 and are legally binding on all WHO Member States.
The challenges associated with emerging infectious diseases such as Nipah virus, SARS, avian influenza A (H5N1) and cholera in the Asia Pacific Region clearly highlight the need for effective implementation of IHR (2005) and further development of basic capacities required for surveillance, response and emergency preparedness. IHR (2005) provide a good opportunity for countries and WHO to strengthen such core capacities and international collaboration. Effective implementation of the Regulations in the Region contributes greatly to national, regional and international health security.

**Regional approach to comply with IHR (2005)**

The Asia Pacific Region is home to 53% of the world’s population. In recent years, the combined efforts of Member States, WHO and international partners in this Region have led to significant improvement in the response to outbreaks and public health events of international significance. Key to an effective response is the capacity for early detection at local and national levels and early response to outbreaks, thereby minimizing morbidity, mortality and the spread of disease.

Infectious diseases do not respect geographical and political boundaries. Given that the countries of the Asia Pacific Region share common borders and face similar disease threats, an Asia Pacific Strategy on Emerging Diseases (APSED) has been developed to guide countries, WHO and other partners to strengthen country core capacities required in the fight against emerging infectious diseases. The Strategy was endorsed by the WHO Regional Committees for South-East Asia and the Western Pacific in September 2005 as a regional tool to comply with IHR (2005) core capacity requirements. The Asia Pacific Region intends to build capacity within countries and implement sustainable, and as far as possible, evidence-based measures that will help countries cope not only with the current threat of an influenza pandemic but other emerging diseases as well. To ensure a consistent approach across countries in the Region and in line with IHR (2005) requirements, the Strategy is currently being used as a common framework for strengthening national core capacities required for effective prevention and control of emerging infectious diseases and other public health threats in the Region.

The Asia Pacific Strategy on Emerging Diseases is intended to improve health protection through effective prevention, preparedness, early detection of, and rapid response to any emerging infectious disease, thereby minimizing its potentially severe health, economic and social impact. The Strategy provides guidance to Member States to prepare for, identify and respond to emerging diseases, with specific and immediate support for a response to avian influenza A (H5N1), preparedness for pandemic influenza, and compliance with IHR requirements. A five-year APSED Workplan (2006–2010) has been developed to help achieve a regional capacity-building goal: all countries will have at least the minimum capacity for epidemic alert and response by 2010.

The Asia Pacific Regional Technical Advisory Group on Emerging Infectious Diseases has been established to provide technical advice and a monitoring mechanism for implementation of the APSED and IHR (2005) in the Region. The first Technical Advisory Group meeting held in Manila in 2006 recommended that all countries in the Region develop a national APSED implementation plan to support the establishment and maintenance of the core capacities required under the IHR (2005).

**Regional activities**

With the world facing the increasing threat of pandemic influenza arising from avian influenza A (H5N1) outbreaks or possible other novel influenza viruses, the Asia Pacific Region has been actively responding to avian influenza outbreaks and improving pandemic influenza preparedness in the context
of IHR (2005). For example, a conference of ministers of health, agriculture and livestock in the Asia Pacific Region, organized by the Government of India in collaboration with WHO and the Food and Agriculture Organization of the United Nations in July 2006, endorsed the “Delhi Declaration on Prevention and Control of Avian Influenza”. The agreed actions include developing a framework for prevention and control of avian influenza and the pandemic influenza threat; defining uniform standards and monitoring their implementation; sharing available knowledge and expertise; and intensifying efforts to make sufficient resources available. A task force has been formed to take the Delhi Declaration forward in line with the development of IHR (2005) core capacities. Some countries have incorporated activities related to avian influenza and pandemic preparedness into their national capacity development plan for surveillance and response.

The Asia Pacific Region is committed to its obligations under IHR (2005) and has been taking action to comply with them to contribute to public health security. Considerable efforts and activities have been implemented in the Region to:

- increase awareness and improve understanding about IHR (2005) and foster regional partnerships;
- improve regional outbreak and public health event alert and response systems and operational capacities, including effective communications and timely information sharing between National IHR Focal Points and WHO;
- develop, strengthen and sustain the country core capacities for surveillance and response through effective APSED implementation;
- strengthen public health measures and capacities at points of entry; and
- ensure national legislative support and meet IHR (2005) legal and procedural requirements.

**International Health Regulations advocacy, awareness and partnerships**

Understanding the new obligations and procedures under IHR (2005) is the first important step towards ensuring compliance with the Regulations. A series of regional meetings and workshops were organized in the Asia Pacific Region to advocate IHR (2005) for policy-makers and major stakeholders. Advocacy materials, including IHR guidance for national policy-makers and partners, have been developed and distributed to increase awareness. Information and documents about IHR (2005) have also been disseminated through various websites.

Considering the regional importance of IHR (2005) and challenges ahead for the development of the core capacities, IHR implementation issues were discussed in detail in several important regional forums. WHO technical and financial support was also provided to many countries in need to assist in organizing multisectoral national workshops on IHR (2005) implementation. Most countries have now conducted their national-level workshops and meetings to inform government ministries, sectors and agencies of the new IHR (2005) requirements and opportunities. These country-level efforts have greatly helped build multisectoral collaboration and foster partnerships in facilitating national implementation of IHR (2005).
International Health Regulations: communication, regional alert and response

International Health Regulations (2005) emphasize the importance of early detection, timely verification and notification, risk assessment of, and rapid response to public health events, especially those that may contribute to a public health emergency of international concern. In order to manage public health events of international importance, effective communications and operational links between Member States and WHO are essential.

In the Asia Pacific Region, all Member States have now officially designated their National Focal Points for urgent, event-based communications with WHO. To ensure that WHO can be accessible at all times for urgent communications with the National Focal Points, the WHO IHR Contact Points in the Region have established their IHR Communications Systems. Relevant operating protocols on event communications have been developed and are currently being used to guide necessary actions.

International Health Regulations (2005) also requires WHO to strengthen its regional and international outbreak alert and response capacities. Both WHO Regional Offices of South-East Asia and the Western Pacific have now established a Strategic Health Operations Centre (SHOC) with necessary communications technology and facilities. The Regional Strategic Health Operations Centre is equipped to enable WHO conduct collective event risk assessments and operational responses and provide timely support to Member States in dealing with public health emergencies. Standard operating procedures for outbreak or public health event reporting and communication are being developed. Regional outbreak alert and response capacities are being improved through the strengthening of the Global Outbreak Alert and Response Network (GOARN).

The WHO Regional Office for South-East Asia has established communicable disease surveillance and response subunits in Delhi (India) and Bangkok (Thailand). The role of these subunits is to increase the reach and efficiency of the Regional Office in alert and response operations and bring technical support operations closer to countries. Meanwhile, WHO country offices are the front-line offices of the Organization and closest to national counterparts. To facilitate national implementation of IHR (2005), WHO country offices continue to establish and strengthen close day-to-day communications with the national governments to receive and respond to any information regarding disease outbreaks and other public health events.

Strengthening national core capacities required under IHR (2005)

The assessment of core capacities required under IHR (2005) is necessary to identify gaps in technical competency and resource mobilization. Many countries will need to invest significant effort and resources in achieving the 2010 deadline for core capacity development under the Asia Pacific Strategy for Emerging Diseases. In some countries, the capacity for detection and reporting is limited in that there is a lack of adequately trained personnel, necessary laboratory support and information systems to detect, verify and respond to unusual events. These gaps in capacity have been defined through systematic assessments, and plans have been developed to strengthen capacity in the area of legal framework, surveillance and response, laboratory support, clinical case management, infection control and risk communication. Strengthening core capacities in those areas would help facilitate early detection, verification and response to unusual events.
As of December 2007, with the support of WHO more than 20 countries in the Asia Pacific Region have conducted assessments of their existing surveillance and response systems and capacities, using relevant assessment tools from IHR (2005) and the APSED. As a result of such assessments, a number of countries have developed draft national plans of action for strengthening core capacities.

The country assessments have helped identify strengths and weaknesses of existing systems in the Region. The assessments have shown that capacity development and preparedness levels vary from country to country. They also highlighted an urgent need to operationalize or institutionalize National IHR Focal Points. Many ongoing activities for strengthening national capacities for surveillance and response of avian and pandemic influenza under National Influenza Pandemic Preparedness Plans were complementary for implementation of the IHR (2005).

Preventing disease spread through international travel

Ensuring public health measures and response capacities at points of entry and border crossings contributes to public health security in travel and transport. Member States are required to designate their international airports, ports and ground crossing points that need to develop the core capacity required under IHR (2005). Given that the volume of international travel and trade is huge and the risk of cross-border transmission and international spread of disease persists in the Region, there is the need to strengthen this area of work, including the mobilization of regional experts in supporting those countries with the greatest needs and in documenting best practices.

National legislation to support IHR (2005)

To support national compliance with IHR (2005) and ensure that domestic legislation is compatible with the Regulations, many countries have started reviewing and adjusting their existing laws or public health acts.

Conclusion

Meeting all the requirements for IHR (2005) compliance is a challenging task. However, IHR (2005) provides a good opportunity for the Region to work collectively to fight emerging diseases and other public health threats. There is the need for continuing advocacy and improved understanding at all levels about the new IHR (2005) requirements. Ensuring functions of National IHR Focal Points, strengthening surveillance and response capacity at all levels, implementing public health measures and capacity-building at designated points of entry, cross-border collaboration and communication, and national legislation to support implementation of IHR (2005) will continuously require collective efforts and international collaboration.

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