



INFECTIOUS DISEASES





SUMMARY

SDG Target 3.3 is focused on the major infectious diseases and includes HIV/AIDS (1.2 million deaths), TB (1.1 million deaths) and malaria (438 000 deaths). Encouraged by the major achievements of the MDG era, ambitious new global targets have been set for HIV, TB and malaria in the World Health Assembly and by the Joint United Nations Programme on HIV/AIDS (UNAIDS) Programme Coordination Board. The SDG target also goes beyond the MDGs in broadening the scope of attention to specifically include ending neglected tropical diseases (NTDs), and combating waterborne diseases, viral hepatitis and other communicable diseases.

Globally, the number of deaths due to infectious diseases, including parasitic diseases and respiratory infections, fell from 12.1 million in 2000 to 9.5 million in 2012. The percentage of all deaths due to infectious diseases decreased from 23% to 17%. In the African Region, and to a lesser extent the South-East Asia Region and the Eastern Mediterranean Region, infectious diseases are still a leading cause of death. The three regions account for 81% of all deaths and 89% of all YLL due to infectious and parasitic diseases in the world.

MDG Target 6 has been met for the major infectious diseases. Incidence (new HIV infections and new cases of malaria and TB) has declined: compared to 2000, the number of people newly infected with HIV was 35% lower; the malaria incidence rate among the population at risk was 37% lower and the TB incidence rate was 18% lower.

Major increases in the coverage of key interventions have been recorded for all three diseases. In 2014, 14.9 million people living with HIV were receiving ART, up from 690 000 in 2000. Coverage of (new) malaria interventions also increased rapidly. For instance, in sub-Saharan Africa an estimated 68% of children under five were sleeping under an ITN in 2015, compared to less than 2% in 2000. TB case detection rates increased from 38% to 63%, while maintaining high levels of treatment success (85% or higher) since 2007.

MDG progress has been made because of increased political commitment, strong global partnerships, drastic increases in funding, scaling up of new and existing interventions and better monitoring and use of data.

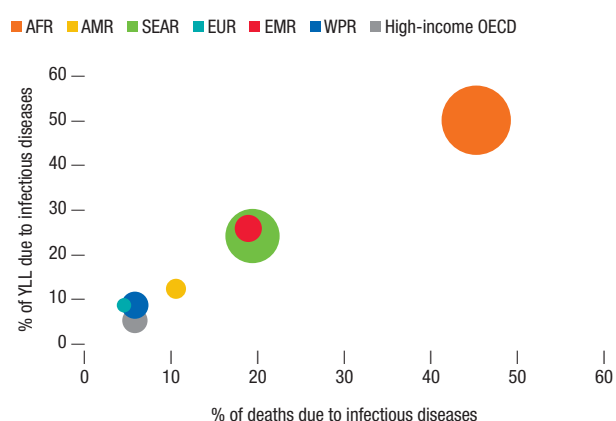
Infectious disease outbreaks remain a concern to all countries, imposing a significant burden on economies and public health. Several respiratory infectious disease outbreaks have occurred since 2000, including the 2003 severe acute respiratory syndrome (SARS) epidemic and the 2009 A(H1N1) influenza virus epidemic. Cholera is endemic in many countries and the Haiti outbreak of 2010–2011 provided a vivid reminder of its potential to spread. Most recently, the outbreak of Ebola virus disease in West Africa resulted in over 28 000 cases and more than 11 295 deaths (as of 23 September 2015), causing considerable concern across the globe.

The spread of infectious diseases is affected by multiple socioeconomic, environmental and ecological factors as well as rapidly increasing antimicrobial resistance. The SDGs provide a new platform for an integrated approach across the economic, social and environmental pillars of development, which should be used to address all infectious diseases.

Infectious and parasitic diseases are on the decline. Globally, the number of deaths due to infectious diseases, including parasitic diseases and respiratory infections, fell from 12.1 million in 2000 to 9.5 million in 2012.¹ The percentage of all deaths that was due to infectious diseases decreased from 23% to 17%. Yet, infectious diseases are still a major global public health problem for several reasons.

First, deaths due to infectious diseases occur at younger ages than deaths due to other causes, and thus account for a higher proportion – an estimated 26% worldwide – of YLL. Second, infectious diseases continue to weigh heavily in certain regions (Figure 5.1). For example, in the African Region, 50% of YLL are due to infectious and parasitic diseases, while in the South-East Asia Region and the Eastern Mediterranean Region, they account for 24% and 27% of all YLL, respectively. Globally, the three most affected regions account for 81% of all deaths and 89% of all YLL due to infectious and parasitic diseases.

Figure 5.1
Percentage of deaths and years of life lost (YLL) due to infectious diseases* by region, 2012^{1,2}



* The size of the bubble indicates the relative number of deaths due to infectious diseases.

Third, emerging infectious diseases – 60% of which are zoonotic, mostly originating in wildlife and livestock^{3,4} – impose a significant burden on global economies and public health. The spread of emerging infections is highly correlated with socioeconomic, environmental and ecological factors such as population growth, density and movement, urbanization, environmental and land-use changes, climate change and changing human behaviours, and thus presents particular challenges for prevention and control. Finally, the threat of infectious diseases is further intensified by increased antimicrobial resistance. The pathogens that cause infectious diseases and the vectors that carry them are increasingly resistant to the drugs and insecticides used to control them, threatening the effective prevention and treatment of an ever-increasing range of infections caused by bacteria, parasites, viruses and fungi.⁵

Infectious diseases are a key focus of the SDG health goal, with Target 3.3 calling specifically to, “By 2030, end the

epidemics of AIDS, TB, malaria and neglected tropical diseases and combat hepatitis, waterborne diseases and other communicable diseases”.⁶ This represents a significant widening of focus relative to MDG 6 in two ways: a shift from control to elimination and specific reference to TB, NTDs, hepatitis and waterborne diseases in addition to HIV/AIDS, malaria and “other diseases” (Figure 5.2).⁷

SDG Target 3.3 includes HIV/AIDS (1.2 million deaths)⁸, TB (1.1 million deaths)⁹ and malaria (438 000 deaths).¹⁰ Encouraged by the major achievements of the MDG era, ambitious new global targets have been set for HIV, TB and malaria in the World Health Assembly and by the UNAIDS Programme Coordination Board (see Table 5.1 in the strategy section).

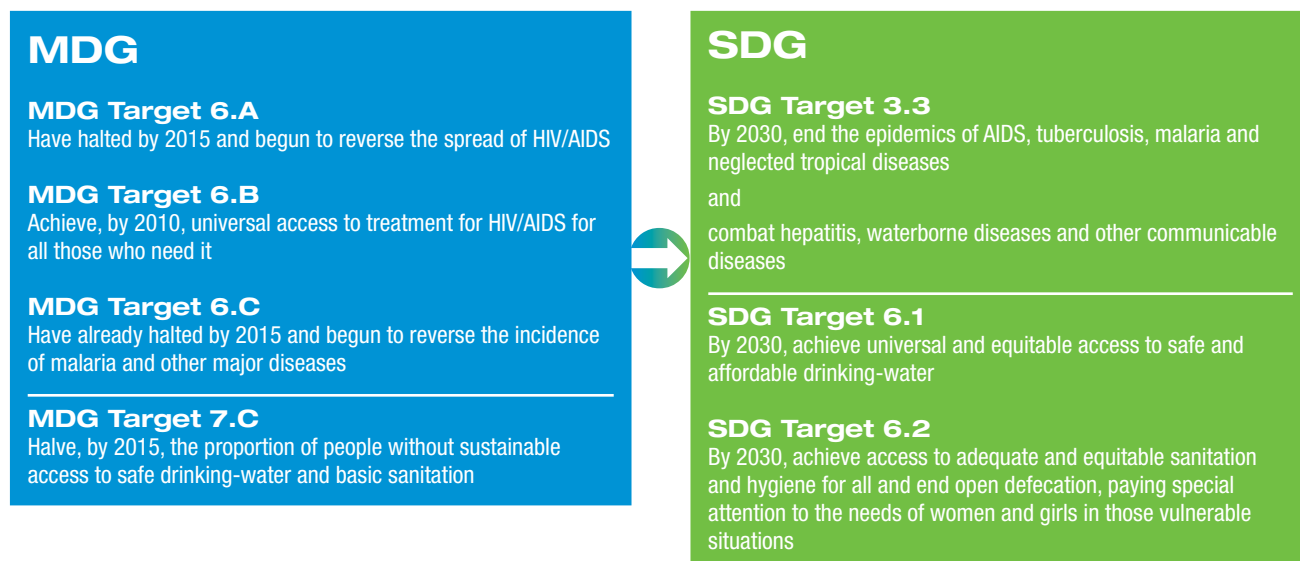
As noted, the SDGs also go beyond the MDGs in broadening the scope of attention to include NTDs, waterborne diseases (including 1.5 million deaths due to diarrhoeal diseases) and viral hepatitis (1.4 million deaths). Tackling the 17 NTDs would reduce an important source of disability and chronic illness, NTDs being endemic in 149 countries and putting more than 1 billion people at risk of infection. NTDs represent a disease burden of at least 26 million disability-adjusted life years (DALYs), that is roughly half the burden of TB or malaria.¹¹

There is also a strong case for tackling hepatitis, which was relatively neglected during the MDG era, despite having a disease burden comparable to infections such as HIV, TB or malaria. Viral hepatitis infection is a major cause of death mostly through liver cirrhosis or cancer due to chronic hepatitis B and C,¹² but major reductions can be achieved through prevention and treatment.

With regard to waterborne diseases, diarrhoeal diseases being the most prominent subgroup, the case for a target is also strong. Diarrhoea is a symptom of infections caused by a host of bacterial, viral and parasitic organisms, such as *Rotavirus* and *Escherichia coli*, and diarrhoeal diseases are responsible for 1.5 million deaths every year – more than half of that burden, or 842 000 deaths per year, attributable to unsafe water supply, and lack of sanitation and hygiene.¹³ Addressing the problem requires a multisectoral response, a fact reflected in the SDGs. Goal 6 (Ensure availability and sustainable management of water and sanitation for all) includes targets to achieve universal and equitable access to safe and affordable drinking-water (6.1) and adequate and equitable sanitation and hygiene for all (6.2). This is an expansion of MDG target 7.c on water and sanitation.

Several important diseases (referred to as “other communicable diseases”) are not specifically mentioned in the SDG target, including meningitis, which was associated with an estimated 395 000 deaths in 2012, and sexually transmitted infections (STIs), which account for an estimated half a billion new infections every year.¹⁴

Figure 5.2
MDG to SDG targets related to infectious diseases



As an example, STIs are included in this chapter. Lower respiratory infections (especially pneumonia) and vaccine-preventable diseases such as measles are also not specified in the SDG. In this report, they are discussed in Chapter 4 in the context of SDG Target 3.2 for child health.

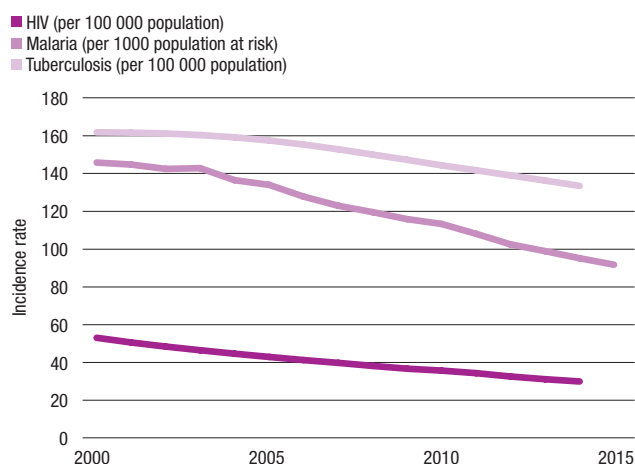
Infectious disease outbreaks, such as epidemics of influenza, Ebola or cholera, are a global concern with potentially large economic and public health consequences. The most relevant SDG target is Target 3.d “Strengthen the capacity of all countries, in particular developing countries, for early warning, risk reduction and management of national and global health risks”.

While there is no explicit SDG target on antimicrobial resistance, the issue is mentioned in paragraph 26 of the SDG declaration: “We will equally accelerate the pace of progress made in fighting malaria, HIV/AIDS, tuberculosis, hepatitis, Ebola and other communicable diseases and epidemics, including by addressing growing anti-microbial resistance and the problem of unattended diseases affecting developing countries.”

ACHIEVEMENTS

The MDG target has been met for the major infectious diseases. Incidence rates have declined since 2000 (or possibly earlier) (Figure 5.3). HIV incidence increased dramatically during the 1990s but, by 2014, the number of people newly infected with HIV was 35% lower than in 2000. New HIV infections among children declined from 520 000 in 2002 to 220 000 in 2014, mainly due to increased access to ARVs for HIV-infected pregnant women.⁸ The malaria incidence rate among population at risk decreased by 37% globally between 2000 and 2015.

Figure 5.3
Global trends in HIV, malaria and TB incidence rates, 2000–2015^{9,10,15}

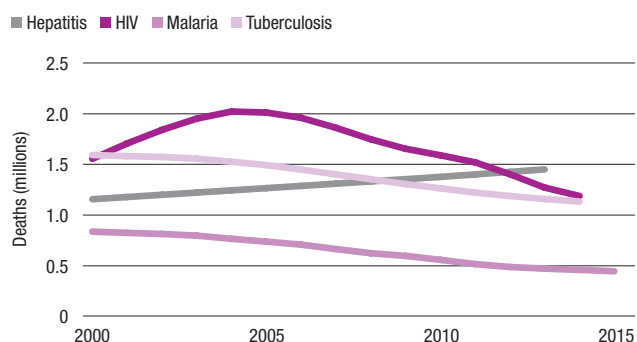


Of 106 countries with ongoing transmission of malaria in 2000, 102 are estimated to have met the MDG target for incidence reversal, while increasing numbers of countries are moving towards malaria elimination.¹⁰ Between 2000 and 2014, the TB incidence rate fell at an average rate of 1.5% per year.⁹ The TB incidence rate is also falling in all WHO regions and most of the high-burden countries.

In spite of the growing world population, the declines in incidence rates have meant that absolute numbers of new infections and cases of disease have also been falling: to 214 million cases of malaria in 2015, and 9.6 million cases of TB disease and 2.0 million new HIV infections in 2014.

Mortality also fell for the three diseases (Figure 5.4). By 2014, AIDS-related deaths had declined by 42% since mortality peaked in 2004. Malaria deaths are estimated to have declined by 53% between 2000 and 2015 and TB deaths fell by 29% between 2000 and 2014. By contrast, deaths due to hepatitis have increased since 2000.

Figure 5.4
Global number of deaths due to hepatitis, HIV, malaria and TB, 2000–2015^{8,9,10,16}

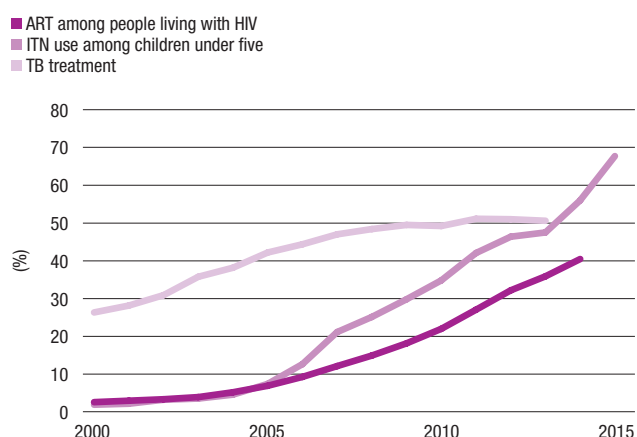


Progress towards the MDG 6 targets is also measured by several intervention coverage indicators.

Increases in the coverage of key interventions have been recorded for all three diseases. In 2014, 14.9 million people living with HIV were receiving ART, up from 690 000 in 2000.⁸ This represents 40% of the estimated 36.9 million people living with HIV compared with 2% in 2000 (Figure 5.5).¹⁷ Coverage of (new) malaria interventions also increased rapidly. For instance, in sub-Saharan Africa an estimated 68% of children under five were sleeping under an ITN in 2015, compared to less than 2% in 2002.¹⁰ Regarding TB, the case detection rate for new and relapse cases (defined as the number of reported cases divided by estimated incidence in the same year) increased from 38% in 2000 to 63% in 2014. The global TB treatment success rate was 86% in 2013, and has been sustained at 85% or higher since 2007.⁹ This corresponds to about 51% effective coverage, defined as successful treatment outcome among all cases.

While inclusion in the MDG infectious disease targets seems to have had a positive impact on the disease programmes concerned, there has also been progress in areas not specifically mentioned in the MDGs. For example, concerted efforts to combat NTDs, both at the global level and in endemic countries, have resulted in the passing

Figure 5.5
Global coverage of interventions: ART among people living with HIV, ITN use among children under five and successful treatment for TB cases, 2000–2015^{8,10,18}



of some important milestones, including unprecedented reductions in the numbers of new cases of human African trypanosomiasis (sleeping sickness), dracunculiasis (guinea-worm disease) and visceral leishmaniasis (Kala-Azar).¹⁹

The headline achievement with regard to hepatitis is the reduction in hepatitis B infections as a result of expanded hepatitis B vaccination programmes. Global coverage with three doses of hepatitis B vaccine in 2014 is estimated to be 82% and is as high as 88% and 92% in the WHO Region of the Americas and the Western Pacific Region, respectively.²⁰ The latter region is on track to reach its goal of reducing the prevalence of chronic hepatitis B (HBV) infection to less than 1% by 2017.²¹ The development of new safe oral medicines that can cure over 90% of cases of chronic hepatitis C (HCV) infection has the potential to be a “game-changer” for the hepatitis response in the post-2015 era.

On the waterborne diseases front, there has been a sharp decline in diarrhoeal disease-related mortality (see Chapter 4) largely due to improvements in access to safe water and sanitation. Access to an improved drinking-water source grew from 76% coverage in 1990 to 91% in 2015, an increase of 2.6 billion people.²² Today 58% of the global population now enjoys the highest level of access: a piped drinking-water connection on their premises. Progress has been less impressive with regard to sanitation. The MDG sanitation target called for a reduction of the proportion of the global population without access to improved sanitation to 23% in 2015, but one third is still without access.

Trends in mortality due to infectious disease outbreaks are difficult to ascertain, but annual numbers of deaths are considerably smaller than those caused by, for instance, HIV, TB and malaria. The SARS epidemic in 2003, for example, was associated with just 8098 cases and 774 deaths, but caused considerable disruptions in trade and travel. The MERS-CoV epidemic first occurred in 2012 in the Kingdom of Saudi Arabia and has resulted in 1112 confirmed cases and 422 deaths (as of 11 May 2015).²³ The most severe recent epidemic occurred in 2009, and was caused by the A(H1N1) influenza virus, a recombination of swine, bird and human influenza viruses. The epidemic is estimated to have resulted in more than 200 000 deaths.^{24,25} Other outbreaks, such as the H5N1 avian influenza virus in 2003 and H7N9 in 2013, caused concern but were not associated with high case numbers or deaths.

The global trend in cholera cases is difficult to ascertain as official reporting is grossly inadequate. During 2000–2014, an annual average of 208 000 cases and 4157 deaths were reported to the WHO, with a low of 101 383 cases in 2004.²⁶ Africa remains the continent most affected by cholera, but the incidence spikes in 2010–2011 were caused by a severe outbreak in Haiti following the catastrophic

earthquake and subsequent UN emergency response. Over 7000 deaths occurred due to cholera in Haiti and the neighbouring Dominican Republic in 2010–2011.

Most recently, the outbreak of Ebola virus disease in West Africa resulted in 28 295 cases and more than 11 295 deaths (as of 23 September 2015) and caused considerable concern across the globe.²⁷ Since its discovery in 1976, there have been Ebola virus disease outbreaks in multiple countries in the African Region, the outbreaks generally occurring in remote communities and lasting for a short time.²⁸ The most recent outbreak in three countries in West Africa is quite different, however, involving major urban as well as rural areas, crossing international borders in a number of cases,²⁹ and affecting far more people. The outbreak is also projected to lead to major declines in economic activity in the three most severely affected economies of Guinea, Liberia and Sierra Leone.³⁰

SUCCESS FACTORS

Although there are several important differences between the diseases and the programmes devoted to tackling them, there are common elements that have contributed to the impressive achievements made in recent years.

Political commitment: The establishment of a specific MDG for infectious diseases in the Millennium Declaration in 2000, and the subsequent investments in monitoring progress towards achieving the MDGs,⁷ have positively influenced the battle against HIV, TB and malaria. HIV was also the topic of UN General Assembly special sessions in 2001 and 2011. Multiple resolutions on the three diseases were endorsed by the World Health Assembly (see below for detail). This translated into significantly strengthened global and country action. Also water and sanitation received greater attention through the International Decade “Water for Life”.³¹

Global advocacy and partnership efforts: The establishment of broad partnerships committed to addressing the diseases and their consequences has made a major difference. UNAIDS was established in 1996, the Roll Back Malaria Partnership was founded in 1998 and the Stop TB Partnership in 2001. These partnerships have played important roles in, for example, advocacy, resource mobilization, price negotiations with industry, setting a research agenda, coordination of activities and civil society engagement.

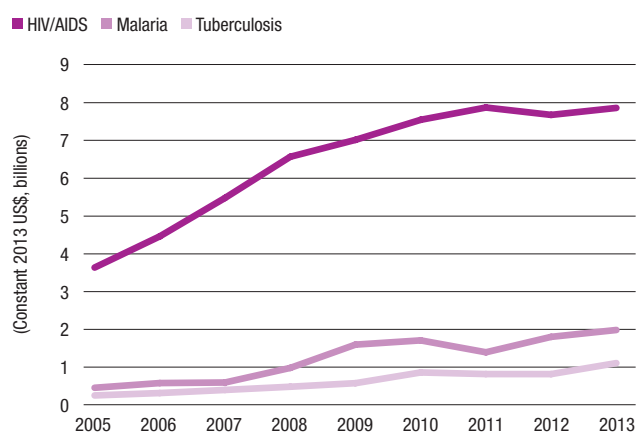
There are striking examples of the power of partnerships for all three diseases. For HIV, alongside the establishment of UNAIDS, the UN General Assembly calls for action as well as the creation of special funds such as the Global Fund, the United States President’s Emergency Plan for

AIDS Relief (PEPFAR) and UNITAID are key aspects of the worldwide response. In addition, there has been a plethora of global, regional, country and local civil society initiatives. Especially in HIV/AIDS, a strong civil society response played a critical role at all levels, raising the bar for the role of civil society in all other health and disease areas. The 3 by 5 Initiative launched in 2003 by WHO and UNAIDS led to a rapid uptake of ART and showed that complex treatment programmes could be rolled out in resource-poor countries.

Strengthened partnerships and advocacy, notably through the Stop TB Partnership, have been crucial in mobilizing enhanced and collaborative action to address the challenge of TB, framed around three global five-year plans to stop TB. The Global Fund and UNITAID contributed significantly to the increase in resources. Improved control of malaria has been achieved thanks to the alignment of ministries of health and international agencies around WHO policy recommendations and a unified Global Malaria Action Plan, with increased support from, for instance, the Global Fund, the President’s Malaria Initiative (PMI) and the Bill & Melinda Gates Foundation. Progress on hepatitis has been achieved in large part due to GAVI support, which enabled significant reductions in the price of hepatitis B vaccine and its introduction into the routine vaccination schedule as a component of the pentavalent vaccine.

Increased funding: International funding for control of infectious diseases in low- and middle-income countries has increased considerably over the past decade, especially for HIV, TB and malaria. Domestic funding also increased significantly in many middle-income countries. ODA disbursements for HIV more than doubled between 2005 and 2013 to US\$ 7.9 billion per year, a figure that dwarfs the ODA funding directed to other infectious diseases (Figure 5.6).³² As much as US\$ 113 billion was invested in sub-Saharan Africa for HIV between 2000 and 2014, including domestic funding. Total funding for HIV in low- and middle-income countries in 2015 is estimated to reach US\$ 21.7 billion. The United States is the largest donor for HIV, accounting for 47% of all bilateral assistance since 2000.⁸

Figure 5.6
ODA disbursements for HIV/AIDS, malaria and TB, 2005–2013³²



International TB funding increased gradually to nearly US\$ 1 billion in 2013 and malaria to about US\$ 2 billion, with the Global Fund and the United States Government as lead donors. Other funding sources, such as foundations, have also increased support for control of infectious diseases, notably HIV. Domestic funding increases for TB were considerable: overall, about 87% (US\$ 5.8 billion) of the US\$ 6.6 billion available in 2015 is from domestic sources. In lower middle-income countries, TB domestic funding has risen from US\$ 0.2 billion in 2006 to almost US\$ 0.5 billion in 2015.⁹

New interventions and approaches: The development and global scale-up of access to ART has been one of the most successful public health interventions of the MDG era. The spectacular drop in the prices of ARVs, from around US\$ 10 000 per person per year in 2000 to around US\$ 100 by 2011,⁸ due to global advocacy, greater predictability of demand, economies of scale, increased competition among manufacturers, engagement of generic manufacturers³³ and voluntary licensing, has made treatment more affordable and sustainable. Innovative health system approaches, such as task shifting among health workers and decentralization, were used to deliver the ARVs.³⁴ Treatment regimens were standardized and simplified where possible. For instance, ARV therapy was based on eight pills a day in 2000, and only one in 2015.⁸ Malaria control efforts received a major boost

through scaling up of multiple new interventions, including LLINs, ACT and rapid diagnostic tests. The development of a range of highly effective, safe, oral direct-acting antivirals that result in cure rates exceeding 90% for people with chronic HCV infection provide new opportunities to push back against HCV epidemics.

Scaling up effective approaches: Global strategies and related policy/normative guidance have provided a foundation for success. Progress in several areas was driven by more successful implementation of existing interventions. Clearly it is not just a question of spending more, but spending smart – that is to say spending money on approaches that work. Successful prevention and treatment programmes have resulted in declines in new infections, cases and mortality for several diseases. For example, reductions in diarrhoeal diseases have been achieved through significant improvements in access to safe drinking-water sources. Reductions in HBV infection are due to expanded vaccination. Reductions in HIV infections in newborns have resulted from programmes for the prevention of mother-to-child transmission of HIV.⁸ TB progress is largely due to the widespread adoption of a standardized approach to diagnosis and treatment based on global strategies developed by WHO (the DOTS strategy from the mid-1990s until 2005, and the Stop TB Strategy during 2006–2015).



Global response to infectious disease outbreaks: Another critical development has been the revision of the IHR, spurred by the outbreak of SARS in 2003. The revised IHR, endorsed in 2005, came into force in 2007. Its scope is limited to five hazards: infectious, zoonoses, food safety, chemical, and radio nuclear.^{35,36} Several global collaborations have also helped strengthen health security mechanisms. For example, the Global Outbreak Alert and Response Network (GOARN), a multidisciplinary technical collaboration of over 200 technical institutions and networks that works with over 600 partners worldwide, was established in 2000 by WHO and partners and contributes to global health security by ensuring that countries have rapid access to the most appropriate resources and experts for the identification, assessment and response to public health emergencies of international importance.^{37,38} The WHO Global Influenza Surveillance and Response System (GISRS) monitors the evolution of influenza viruses and provides recommendations in areas including laboratory diagnostics, vaccines, antiviral susceptibility and risk assessment. It also serves as a global alert mechanism for the emergence of influenza viruses with pandemic potential.³⁹ Also notable in this context is the framework for pandemic influenza preparedness, adopted by the World Health Assembly in 2011, which has been developed in part out of the need to ensure novel influenza virus sharing for collective risk assessment and to increase access to vaccines and other products.^{40,41}

Better data and monitoring: Increased investments in population-based surveys and disease surveillance, combined with better population-based measurement methods, including testing for HIV antibodies, TB presence and malaria parasites have resulted in better data for country policy-makers and implementers in many countries, and improved global reporting. Some progress was also made in monitoring risk- and treatment-seeking behaviours.

CHALLENGES

Increasing funding: Despite significant increases in resources, there are still major funding shortfalls in key programme areas in many developing countries. For example, in 2015 there is an estimated funding gap of US\$ 1.4 billion for a full response to the global TB epidemic in low- and middle-income countries.⁹ Inadequate investment in TB R&D is also an issue, with an estimated funding shortfall of US\$ 1.3 billion per year for R&D related to new TB diagnostics, drugs and vaccines in 2013.⁴² The funding gap for malaria programmes was estimated to be US\$ 2.4 billion (53% of the total need) in 2013.⁴³ It is also estimated that an additional US\$ 8–12 billion needs to be available annually by 2020 for HIV.⁸ NTD programmes in many low-income countries have been highly dependent on community volunteers and external funding, with only two major

bilateral donors.¹⁹ To date, there has been no significant external funding for public health programmes addressing viral hepatitis, apart from HBV vaccination. Domestic levels of investment in infectious disease control have been growing, especially among middle-income countries, but are still inadequate.

Reducing rates of new infection and disease: Given the absence of effective vaccines for prevention of HIV, TB and malaria, it is essential to step up primary prevention and improve early recognition and treatment-seeking behaviour. With regard to HIV, for example, universal access to, and uptake of, condoms is still lacking. In 2014, two out of three women with multiple sexual partners still reported not using a condom the last time they had sex.⁸ Young women are especially vulnerable due to gender inequalities and gender violence. Interrupting HIV and hepatitis virus transmission among sex workers, men who have sex with men, people who inject drugs and other most-at-risk populations, remains challenging in many countries. Service access problems are often compounded by stigma and discrimination. In many instances, infection rates are as much a function of awareness and individual behaviours as they are of service availability. Some behavioural risks are surprisingly persistent. For example, it is estimated that only 19% of people globally wash their hands with soap and clean water after defecation or contact with excreta.⁴⁴ Inadequate drinking-water, sanitation and hygiene are estimated to cause 842 000 preventable deaths each year.¹³

Improving intervention coverage: Ensuring that people in need of health services get them is a challenge for all of the infectious diseases for which SDG targets have been set. New treatment guidelines indicate ART should be initiated in everyone living with HIV,⁴⁵ yet only 40% are on treatment currently, notwithstanding the significant increases in coverage over the past decade. In spite of steady progress for more than a decade, only 54% of new TB cases are currently detected, treated and cured. In 2013, 278 million of the 840 million people at risk of malaria in sub-Saharan Africa lived in households without even a single ITN, 15 million of the 35 million at risk pregnant women did not receive preventive treatment and between 56 and 69 million children with malaria did not receive ACTs.⁴³ Very often, it is the rural poor who suffer most from lack of access. For example, of the 150 million people still relying on untreated surface water, over 92% live in rural areas. Rural residents also account for 70% of the 2.4 billion people who do not have access to an improved sanitation facility.²² The majority of people requiring preventive chemotherapy for at least one NTD are not getting it (61%).¹⁹ An estimated 62% of newborns are not receiving hepatitis B immunization.²⁰ Despite the effectiveness of curative treatments for chronic HCV infection, and suppressive treatment for chronic HBV infection, few public health programmes exist, with most treatment provided through individual clinical care for those who can pay for treatment.

Improving quality of care: The quality of care is a challenge for infectious diseases as in other areas of public health. An issue of significant concern is unsafe injection and blood transfusion practices. Reuse of syringes and needles without sterilization is thought to have declined from very high levels, but is still common and contributes to transmission of hepatitis B and C and HIV.^{46,47} Patient behaviour is another area of concern. For example, it is estimated that 50% of patients self-administering medical treatments fail to follow the full course prescribed.⁴⁸ Suboptimal adherence to treatment schedules can also contribute to increasing resistance to medicines.

Increasing drug resistance: Antimicrobial resistance is a huge global concern across a wide range of infections. Box 5.1 describes some of the major issues in antibacterial resistance. HIV, TB and malaria face specific drug resistance challenges. There were an estimated 480 000 new cases of multidrug-resistant TB (MDR TB) in 2014. Reducing the burden of MDR TB will require preventing the development of drug resistance through high-quality treatment of drug-susceptible TB, and development of more effective treatment regimens for those with MDR TB (successful treatment rates average around 50% globally). With regard to malaria, *Plasmodium falciparum* is already resistant to artemisinin in five countries. Strains of drug resistant HIV are also emerging and, while the use of combination therapies has been successful in keeping levels of resistance manageable, they impose a much higher treatment cost.

Insecticide resistance: Major achievements in reducing the global burden of malaria in the last 10–15 years have been driven by scaling up access to LLINs. With insecticide resistance of vectors becoming widespread in disease-endemic areas, the effectiveness of this tool that currently uses a single class of insecticides (pyrethroids) is threatened. Effective and sustained use of insecticide-

based vector control tools will require enhanced investment in product development, monitoring and management of insecticide resistance, and capacity strengthening in public health entomology and low-risk use of pesticides.

Climate change: Rising temperatures, changes in precipitation patterns, increases in extreme weather events and biodiversity loss may affect the spread of infectious diseases in complex ways.⁴⁹ Climate change may alter the distribution of disease vectors such as mosquitoes carrying dengue⁵⁰ or malaria, enhance the spread of diseases through contaminated water including cholera and create conditions favourable to the transmission for pathogens such as West Nile or Hantavirus.⁵¹

Addressing the social determinants: The incidence and consequences of infectious diseases are not randomly distributed in the population,⁵² the poor, the less educated and rural populations generally bearing the greater disease burden. Gender issues play a critical role, especially with regard to HIV.⁵³ The SDGs will have to reinvigorate efforts to address the determinants in an integrated and more effective manner than the MDG did.

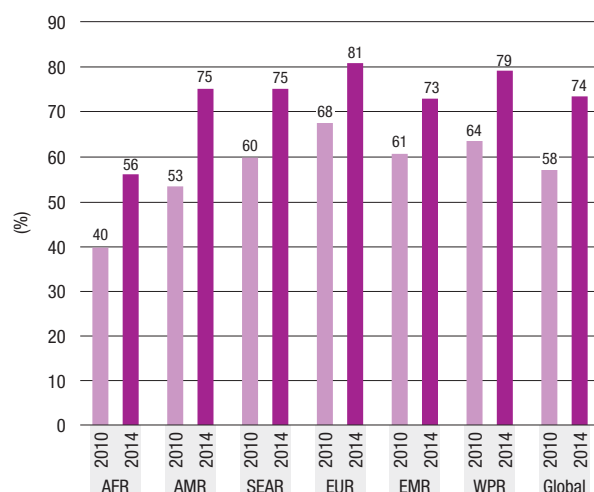
Enhancing the response to outbreaks: The continued and increasing risks of emerging and re-emerging infectious disease outbreaks due to virulent, drug-resistant and lethal microbial organisms are a major concern, as is the risk of bioterrorism, for example in the form of a deliberately dispersed pathogenic biological agent. Even though there has been progress in the implementation of the IHR core capacities in recent years, the situation in 2014 is far from satisfactory, especially in the African Region (Figure 5.7). In fact, 84 of the 196 IHR States Parties (43%) have requested and obtained extensions to 2016 to meet IHR core capacity requirements.⁵⁴ There are still major deficiencies in preparedness, surveillance, response capacity and other critical capacities.⁵⁵ The Ebola epidemic in West Africa has stimulated in-depth reflection on the state of global health security, not least in terms of inadequate global capacity for quick response. WHO was first alerted to the outbreak on 23 March 2014, but it was not until 8 August 2014, after a meeting of the International Health Regulations Emergency Committee, that it declared a public health emergency of international concern.⁵⁶ The epidemic has also revealed weaknesses in the funding mechanisms used to finance outbreak responses. Of the US\$ 2.89 billion that the international community pledged to support the Ebola response, little more than 40% had reached the affected regions by the beginning of 2015.⁵⁷

Box 5.1
Antimicrobial resistance: a global threat

Antimicrobial resistance threatens the effective prevention and treatment of an ever-increasing range of infections caused by bacteria, parasites, viruses and fungi. For instance, increasing rates of antibacterial resistance are reported for multiple respiratory, gastrointestinal, wound and other infections caused by *E. coli* and *Klebsiella pneumoniae*, which are resistant to third generation cephalosporins. For example, *Streptococcus pneumoniae*, is showing reduced susceptibility to penicillin, leading to invasive pneumococcal disease (e.g. pneumonia and meningitis), especially in children and elderly people. *S. aureus* is showing high rates of methicillin-resistance, with implications for common skin and wound infections. *Neisseria gonorrhoeae* is increasingly resistant to third generation cephalosporins, the treatment of last resort for gonorrhoea.

The consequences of antibacterial resistance are multiple. Patients with infections caused by bacteria resistant to a specific antibacterial drug generally have an increased risk of worse clinical outcomes and death and consume more health-care resources than patients infected with the same bacteria not demonstrating the resistance pattern in question. Available data are insufficient to estimate the wider societal impact and economic implications when effective treatment for an infection is completely lost as a result of resistance to all available drugs. Nevertheless, it is clear that antimicrobial resistance is a global health security threat that requires concerted cross-sectoral action by governments and society as a whole. Surveillance that generates reliable data is the essential basis of sound global strategies, and public health actions to contain antimicrobial resistance are urgently needed around the world.⁵

Figure 5.7
IHR implementation status: average of 13 capacity scores, 2010 and 2014⁵⁸



Developing new products: The importance of new drugs and vaccines in combating infectious diseases has already been stated, but it is clear that continuous drug and vaccine R&D is vital if momentum is to be maintained. R&D investments in diseases that are major public health problems in low- and middle-income countries is only small fraction of global R&D investment.⁵⁹ The task is daunting. For example, work on an effective malaria vaccine has been going on for at least 20 years, and has thus far resulted in one semi-viable vaccine, RTS,S/AS01.⁶⁰ It is a similar story with HIV, where dozens of clinical trials of vaccines are ongoing (Phase I and II), testing a variety of candidates and vaccine concepts. It remains to be seen whether any winner will emerge. The only TB vaccine that is currently in use was developed in the 1920s, and while it provides protection against severe forms of TB in children, its efficacy in preventing TB in adults (who account for about 90% of the world's cases) is highly variable. There are currently 15 TB vaccine candidates in clinical trials. With regard to NTDs, there is an urgent need for more R&D to combat the emergence of resistance to medicines as well as to pesticides for vector control. There are multiple new medicines in the pipeline to cure chronic HCV infection, however, their high prices and the lack of simple and affordable diagnostics pose barriers to implementing scalable public health programmes. There is also the need for more effective, curative treatment and simpler diagnostics for chronic HBV infection.

STRATEGIC PRIORITIES

The SDG targets for infectious diseases are very ambitious, but are in line with what a number of disease-specific strategies and WHA resolutions have already been exploring. For all infectious diseases, the targeted reductions aimed at progressing towards elimination goals in the coming 15 years far outstrip what has been achieved since 2000.

New strategies include:

- UNAIDS global strategy Fast Track: Ending the AIDS Epidemic by 2030 and the draft WHO Global Health Sector Strategy on HIV 2016–2021,^{61,62}
- The End TB Strategy,^{63,64}
- Global Technical Strategy for Malaria 2016–2030,⁶⁵
- NTD Roadmap;⁶⁶ and Water Sanitation and Hygiene for Accelerating and Sustaining Progress on NTDs: A Global Strategy 2015–2020,⁶⁷
- Draft Global Health Sector Strategy on Viral Hepatitis 2016–2021.⁶⁸

The strategies and related documents have proposed a number of more specific targets and indicators for monitoring progress towards the goals, linked to the overall SDG target (Table 5.1).

The battle against infectious diseases needs to focus on the geographic areas and populations that are at the highest risk. The African Region has by far the highest burden of infectious diseases, followed by the South-East Asia Region and the Eastern Mediterranean Region. Major reductions in new infection rates are needed, implying an emphasis on prevention efforts complemented by effective treatment. A number of common strategic priorities can be identified for all infectious diseases.



Table 5.1
Summary of specific targets in global plans and other international agreements for SDG Target 3.3 on infectious diseases

SDG target	Specific plan – main targets 2030
Ending the epidemic of AIDS	Reduce the annual number newly infected with HIV by 90% and the annual number of people dying from AIDS-related causes by 80% (compared with 2010)
Ending the epidemic of TB	90% reduction in TB deaths 80% reduction in TB incidence rate (to less than 20 per 100 000 population) Zero TB-affected families facing catastrophic costs due to TB
Ending the epidemic of malaria	90% reduction in global malaria mortality rate 90% reduction in global malaria case incidence Malaria eliminated from at least 35 countries Re-establishment of malaria prevented in all countries identified as malaria-free
Ending the epidemic of NTDs	90% reduction in the number of people requiring interventions against NTDs
Combat hepatitis	95% decline in new cases of chronic HBV infection between 2010 and 2030; 80% reduction in new cases of chronic HCV infection over the same period; 65% reduction in HBV- and HCV-related deaths
Combat waterborne diseases ⁶⁹	No one practises open defecation (by 2025) Everyone uses a basic drinking-water supply and handwashing facilities at home Everyone uses adequate sanitation when at home (by 2040) All drinking-water supply, sanitation and hygiene services are delivered in progressively affordable, accountable and financially and environmentally sustainable manner

and NTDs; (ii) behavioural changes such as safe sex and condom use to reduce HIV, STI and hepatitis B transmission; (iii) harm reduction for people who inject drugs to prevent HIV, HBV and HCV acquisition; (iv) use of ITNs for malaria prevention; and (v) improved health-care safety to reduce nosocomial transmission of HIV, hepatitis and other pathogens. Preventive chemotherapy based on large-scale delivery of free, safe, single-dose, quality-assured medicines at regular intervals is a cornerstone of tackling NTDs. Child vaccination is a priority intervention to combat hepatitis B, including the administration of a birth dose, and *Rotavirus* vaccination to reduce the incidence of diarrhoea (see Chapter 3). For other diseases, continued investments in the development of vaccines are needed which may pay off in the coming 15 years.

Detection, diagnosis and treatment: Expansion of effective case detection, rapid diagnosis and high-quality treatment are essential components of the post-2015 strategies for all infectious diseases. The encouragement of health-seeking behaviour and provision of good diagnostic and treatment facilities are essential to increasing treatment coverage. Lack of awareness of HIV status is often the main reason for low coverage with ARVs, which requires easy access and high utilization of HIV testing for all relevant population groups.⁸ Effective and simple screening, diagnosis and disease staging are critical to identify people with chronic HBV and HCV infection and to determine their eligibility for treatment.

High-level coverage with quality interventions is a core strategy for all programmes. This requires the availability of low-cost, quality medicines for all, evidence-based

health service delivery and high adherence to prescribed treatments by individuals. Maintaining high-quality treatment programmes has been a cornerstone of TB programmes for two decades. For HIV too, coverage expansion is a core strategic objective, as countries work to meet the requirements of the new WHO treatment initiation guidelines. For NTDs, treatment coverage expansion is vital, and if high-quality coverage is sustained for long enough – as few as three years for some NTDs requiring preventive chemotherapy – it may be sufficient for transmission to be completely interrupted. However chemotherapy must be complemented with interventions to improve water, sanitation and hygiene, to be most effective. High treatment coverage is not only an important preventive measure for diseases such as TB and malaria, where a cure can be achieved, but also for HIV, for which it has been shown that effective viral suppression can lead to reduced incidence in the general population.⁷⁰ Advances in treatment of chronic HBV and HCV infection need to be translated into public health programmes.

Antimicrobial resistance: In response to the antimicrobial resistance challenge, the WHO draft global action plan on antimicrobial resistance was presented to the World Health Assembly in May 2015.^{71,72} The goal of the global action plan is to ensure, for as long as possible, continuity of successful treatment and prevention of infectious diseases with effective and safe medicines that are quality assured, used in a responsible way and accessible to all who need them. To achieve this goal, the action plan sets out five strategic objectives:

- improve awareness and understanding of antimicrobial resistance;

- strengthen knowledge through surveillance and research;
- reduce the incidence of infection;
- optimize the use of antimicrobial agents;
- ensure sustainable investment in countering antimicrobial resistance.

Integrated approach and universal health coverage (UHC): Priority strategies for the infectious disease SDGs will necessarily reflect the principal challenges identified. Expanded population coverage with quality prevention and management services supported by adequate funding must be at the centre of efforts in the post-2015 era. The proximity of this objective to that of UHC suggests that there will be many opportunities for alignment, integrating disease-specific initiatives with broader, system-wide reforms. The specific strategies outline such a focus. For instance, HIV focuses on inclusiveness: a focus on populations that have been left behind by the HIV response, such as adolescent women, key populations such as sex workers, migrants, children and older people. TB focuses on integrated, patient-centred care and prevention, including early diagnosis of TB; treatment of all people with TB, including those with drug-resistant TB; collaborative TB/HIV activities and management of co-morbidities; preventive treatment of people at high risk; and vaccination against TB. HIV also aims for an integrated HIV response that expands the contribution towards UHC, including health workforce, procurement systems, injection and blood safety, and treatment of coinfections.⁷³ All require universal access affordable quality services.

IHR implementation: A report submitted to the World Health Assembly in 2015⁷⁴ identified several strategic priorities for improving IHR implementation. Many of these are based on lessons learnt from Ebola outbreaks and focus on the need to be able to draw upon existing public health capacities and networks during emergencies. Key actions needed in the coming decade include: (i) in-country leadership, integration of laboratory services and surveillance systems to improve integrated surveillance; (ii) building multisectoral surveillance capabilities at local and community levels, with trained staff working

with clinicians, integrating surveillance systems for both communicable diseases and other hazards, and establishing early warning alert and response systems; (iii) building up core capacities at points of entry, particularly in terms of surveillance, preparedness and response capacities; and (iv) identifying new mechanisms to address continuing gaps in core capacities in countries and the inadequacy of current methods to accurately monitor their development and status, including independent status assessment of IHR core capacities complementing self-assessment. Preventing and reducing the likelihood of outbreaks, detecting threats early, and rapid, effective response requires multi-sectoral, international coordination and communication.⁷⁵

Intersectoral action: This is also critical, especially for preventive purposes. An obvious example is waterborne diseases where better water supply, safer sanitation, strengthened action in the crucial area of hygiene promotion and expanded efforts in neglected rural areas all require the involvement of multiple sectors.⁷⁶ But multisectoral action is also critical for many other diseases such as HIV, malaria and NTDs, including addressing the social determinants of health, such as gender, education etc. Tackling the causes and consequences of climate change also requires a multisectoral approach, investing in public health and collaboration across multiple disciplines and countries to protect the health of people and animals.⁴⁹ Similarly, addressing antimicrobial resistance requires the engagement of multiple sectors.

Monitoring and research: Monitoring and surveillance is needed to detect infectious disease patterns and trends, not only to respond to major disease outbreaks, and to identify successful (and unsuccessful) interventions and approaches. Research is essential to optimize implementation, document impact and develop and promote innovations. Strengthening country capacity for both monitoring and research with regular quality data is thus critical. In addition, greater investment is needed in research and development of effective interventions for NTDs in developing countries.

HIV/AIDS

More than 30 years since the disease was first described in 1981, HIV remains a leading cause of ill-health and mortality. While investments in the HIV response have achieved unprecedented results, globally, in 2014, there were 36.9 million people living with HIV, 2.0 million new infections and 1.2 million deaths.⁸ Seven out of ten people living with HIV are in sub-Saharan Africa, where HIV is a leading cause of death among adults, women of child-bearing age and children.

ACHIEVEMENTS

MDG Target 6A (halting and beginning to reverse the spread of HIV by 2015) has been achieved. By 2014, the number of people newly infected with HIV was about 40% lower than peak incidence in the second half of the 1990s (Figure 5.8). AIDS-related deaths have declined by 42% since the peak in 2004. New HIV infections among children declined from 520 000 in 2000 to 220 000 in 2014, mainly due to increased access to ARVs for HIV-infected pregnant women.⁸

There has also been good progress towards MDG Target 6.B (universal access to treatment) with 14.9 million people living with HIV receiving ART globally by the end of 2014, up from 690 000 in 2000 (Figure 5.9). However, this still only represents 40% of the estimated 36.9 million people living with HIV.¹⁷ In sub-Saharan Africa, the ART coverage rate stands at 10.7 million of a total of 25.8 million people living with HIV.⁸

Figure 5.8
Global trends in HIV incidence and mortality, 1990–2014⁸

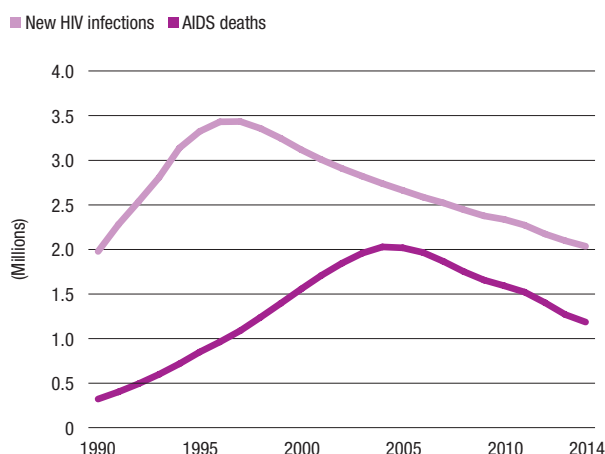
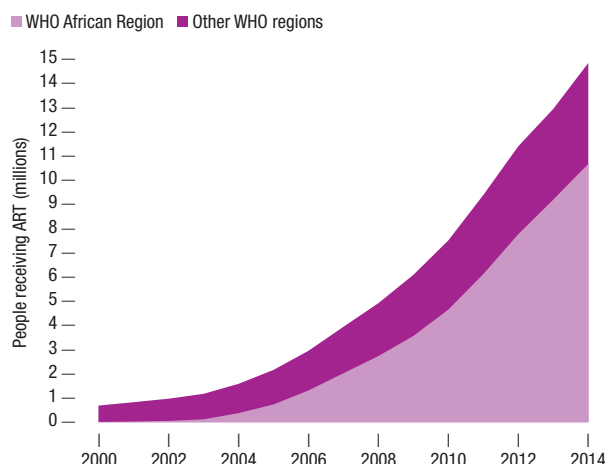


Figure 5.9
Scale-up of ART in the WHO African Region and other WHO regions, 2000–2014¹⁵



SUCCESS FACTORS

The worldwide response and partnership: The strong combination of domestic, donor and public-private financing, based on the UN General Assembly declarations on HIV/AIDS and the establishment of new and innovative funding mechanisms for HIV such as PEPFAR, the Global Fund and UNITAID, along with global and local civil society mobilization, have provided leadership, advocacy, coordination and resources for a worldwide response.

Preventive interventions: Combinations of effective interventions have contributed to reduced HIV transmission, including behaviour change communication to encourage changes in sexual behaviour; programmes targeting key populations such as harm-reduction programmes for people who inject drugs; maximizing the prevention benefits of ARVs, including for the prevention of mother-to-child transmission of HIV;⁷¹ and voluntary medical male circumcision in high HIV-prevalence settings.

ART: The development and global scale-up of access to ART has been one of the most successful public health interventions of the MDG era. The drop in the prices of ARVs, owing to global advocacy, greater predictability of demand, economies of scale, increased competition among manufacturers, involvement of generic manufacturers³³ and voluntary licensing have made treatment more affordable.

Increased funding: In 2015, US\$ 21.7 billion, four times that in 2000, was invested in the AIDS response in low- and middle-income countries; in 2014, 57% of these investments came from domestic sources. Since 2000, international funding has increased approximately tenfold, rising from nearly US\$ 900 million to US\$ 8.6 billion in 2014.⁸

Innovative approaches to services delivery: The use of task shifting, decentralization and community involvement helped stretch health-care delivery systems to expand services without compromising quality. This has extended the public health approach into communities.

CHALLENGES⁷⁸

Africa: 70% of people living with HIV are in the African Region, where nearly one in every 20 adults is infected (Figure 5.10). An integrated multisectoral, multifaceted approach will require continued substantial external funding together with increased domestic contributions.

Treatment coverage: The 2015 revision of the WHO guidelines for ART⁴⁵ removes the threshold for treatment initiation, recommending treatment for all, which expands the population eligible for treatment and presents an obvious coverage challenge. The main obstacle to higher treatment coverage is not access to treatment, but unawareness of HIV status; it is estimated that about half of all people living with HIV are not aware that they are infected.^{8,79,80}

Vaccines: More than 30 clinical trials of HIV vaccines, testing a variety of candidates and vaccine concepts, are currently under way (Phases I and II), but no effective vaccine is likely to be available in the near future.

Bringing down incidence: Universal access to, and uptake of, male and female condoms is still lacking, especially for young people. Young women are especially vulnerable, due to various factors, including gender inequalities and gender violence. Interrupting HIV transmission among key populations, including sex workers, men who have sex with men, people who inject drugs, transgender people and prisoners, remains a challenge in many countries.

Stigma and discrimination: Legal environments in many countries increase HIV vulnerability, contribute to risk behaviours and inhibit access to HIV services. Many countries retain laws that either criminalize, or sanction the persecution of, people (or their behaviours) who are at higher risk of HIV infection.

Eliminating health-care associated transmission: In spite of major reductions in HIV transmission through unsafe injections and blood transfusion, 24% of blood donations in low-income countries are not screened for one or more viruses (HIV, HBV, HCV) using basic quality procedures.

Coinfections and other comorbidities: TB, hepatitis (B and C), and other communicable diseases occur in conjunction with HIV infection. As people living with HIV live longer on ART they experience a broader range of NCDs related to their chronic HIV infection, side-effects of their treatment and ageing, including cardiovascular disease, diabetes, respiratory disorders and cancers, all requiring chronic care.



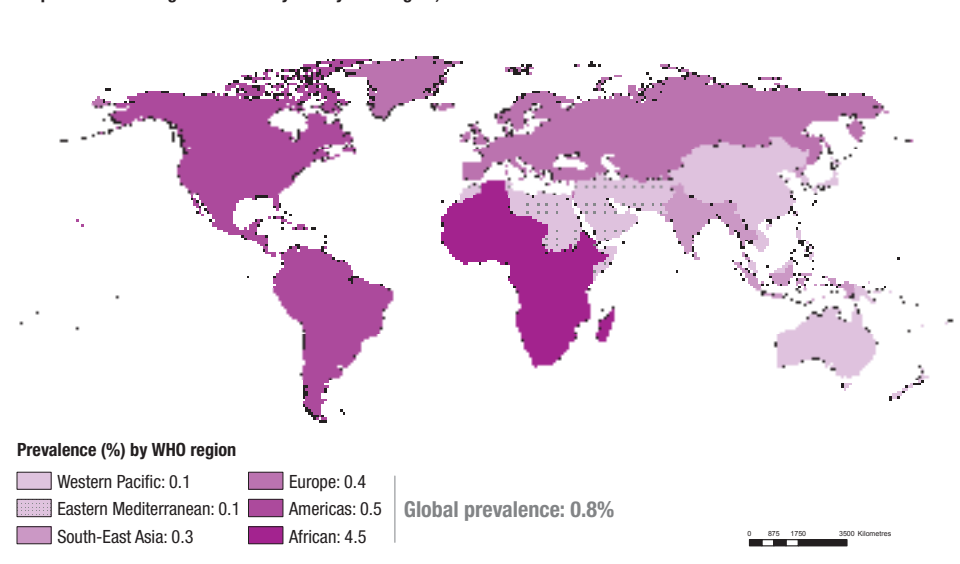
STRATEGIC PRIORITIES

The SDG target is to end the AIDS epidemic by 2030. UNAIDS has led the development of a global strategy, Fast Track: Ending the AIDS Epidemic by 2030, while more detailed, sectoral strategies such as the WHO Global Health Sector Strategy on HIV 2016–2021 are under development.^{61,62} The global strategy targets a reduction in the annual number of people newly infected with HIV by 90% and the annual number of people dying from AIDS-related causes by 80% (compared with 2010).

The main areas of focus post-2015 include:

- a focus on populations that have been left behind by the HIV response, such as adolescent girls, key populations (sex workers, men who have sex with men, people who inject drugs and transgender people), migrants, children and older people;
- a focus on locations where the greatest HIV transmission is occurring and with the greatest HIV burden, and the use of data to support the impact of programmes;
- an integrated HIV response that expands the contribution towards UHC, including health workforce, procurement systems, injection and blood safety and treatment of coinfections;
- sustainable programmes with transitioning to domestic funding of essential HIV services.

Figure 5.10
HIV prevalence among adults 15–49 years by WHO region, 2014¹⁵

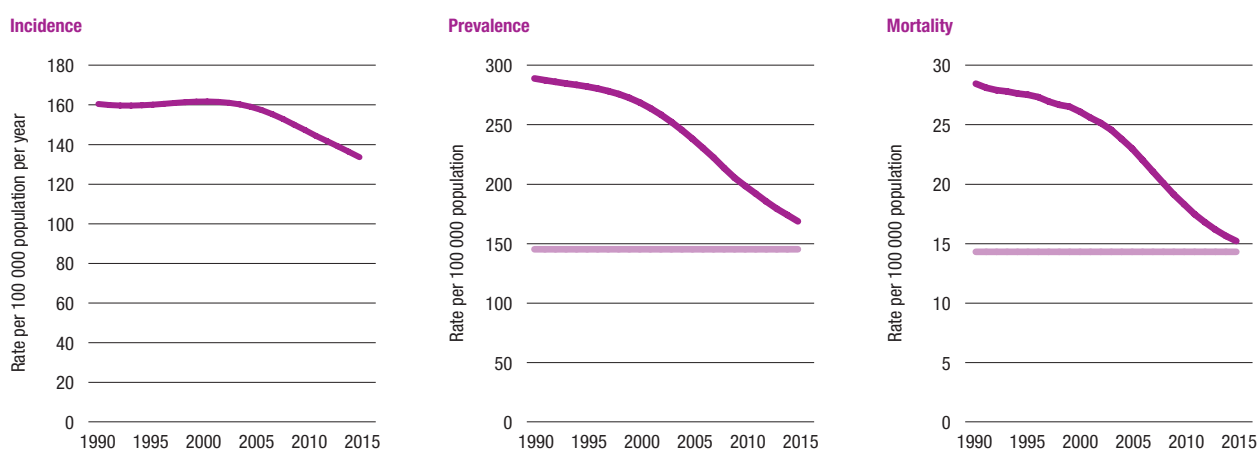


TUBERCULOSIS

TB is a treatable and curable disease, but remains a major global health problem. In 2014, there were 9.6 million new TB cases and 1.5 million deaths, including 0.4 million deaths among HIV-positive people.⁹ For the past two decades, national and international efforts in TB prevention, diagnosis and treatment have been guided by the DOTS strategy (mid-1990s until 2005) and subsequently the Stop TB Strategy (2006–2015).⁸¹ The Stop TB Strategy was designed to achieve global TB targets set for 2015 within the context of the MDGs.⁸²

Figure 5.11
Global trends in TB incidence, prevalence and mortality rates, 1990–2015⁸

■ Estimates ■ 2015 target



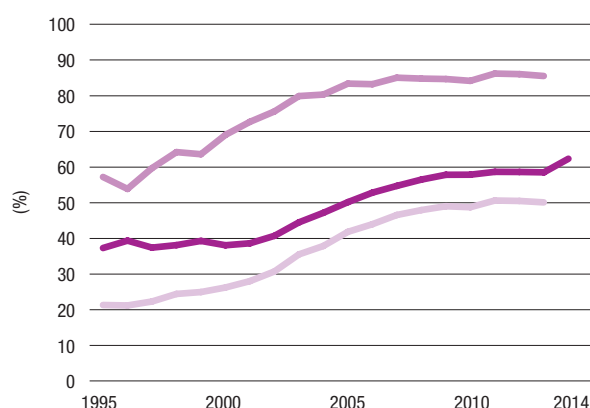
ACHIEVEMENTS

MDG 6C targeted a decline in the TB disease incidence rate by 2015.⁸³ Targets to halve prevalence and mortality rates by 2015 compared with 1990 levels were established during the development of the Global Plan to Stop TB 2001–2005.⁸⁴ Global progress on all these fronts has been remarkable (Figure 5.11). The TB incidence rate has been falling since 2000 at an average rate of 1.5% per year during 2000–2014, while TB mortality and prevalence rates have fallen by 47% and 42%, respectively, during 1990–2015.

Case detection and treatment success rates have been monitored at national and global levels since 1995, following the establishment of global targets (70% and 85%, respectively) for these indicators.⁸⁵ The case detection rate for new and relapse cases increased to 63% by 2014, up from 38% in 2000. The global TB treatment success rate was 86% in 2013, and has been sustained at around 85% since 2007. In combination, this means that 51% of TB cases were reported to have received diagnosis and successful treatment in 2013 (Figure 5.12).⁸⁶

Figure 5.12
Global trends in TB case detection and treatment success rates, with estimated effective coverage, 1995–2014^{9,18}

■ Case detection ■ Treatment success ■ Effective coverage



MAIN SUCCESS FACTORS

Adoption of effective interventions: The widespread adoption of DOTS and the Stop TB Strategy since the mid-1990s has been critical to progress. By 2007, virtually all countries had adopted DOTS.⁸⁷

Increased funding: An estimated US\$ 6.6 billion was available for TB prevention, diagnosis and treatment in 2015, more than double the level of 2006 (US\$ 3.2 billion).⁹

Strengthened partnerships and advocacy: The Stop TB partnership was founded in 2001 and by 2014 included 1300 international and technical organizations, government programmes, research and funding agencies, foundations, nongovernmental organizations, civil society and community groups and the private sector. In 2001, it established a Global Drug Facility, which by 2014, had delivered more than 24 million high-quality affordable treatment courses to 133 countries.



CHALLENGES^{9,42,88}

Reaching missed cases: Each year more than 3 million people who develop TB disease are either detected but not reported or not diagnosed at all, resulting in high TB mortality, especially in the African Region and the South-East Asia Region (Figure 5.13).

MDR TB epidemic: Although there is no evidence that the epidemic is worsening at the global level, there were an estimated 480 000 new cases of MDR TB in 2014. Reducing the burden of MDR TB will require preventing the development of drug resistance through high-quality treatment of drug-susceptible TB and better treatment regimens for MDR-TB. Globally, the cure rate is only 50%.

TB/HIV epidemic: Coverage of ART among HIV-positive TB cases is still low and needs to be increased.

Inadequate funding: Despite increases in funding, there is an estimated funding gap of US\$ 1.4 billion for a full response to the global TB epidemic in low- and middle-income countries in 2015. In several countries, more than 90% of available funding in 2015 is from international donor sources.

Inadequate investment in TB R&D: The Global Plan to Stop TB 2011–2015 estimates that an additional US\$ 2 billion per year is required for R&D related to new TB diagnostics, drugs and vaccines. In 2013, there was a shortfall of US\$ 1.3 billion.

STRATEGIC PRIORITIES

SDG Target 3.3 aims to end the epidemic of TB by 2030. The End TB Strategy, endorsed by the World Health Assembly in 2014,^{63,64} has the overall goal of ending the global TB epidemic by 2035. The targets for 2030 are a 90% reduction in TB deaths and an 80% reduction in the TB incidence rate (to less than 20 per 100 000 population) compared with 2015. An earlier target, linked to progress towards UHC, is that zero TB-affected families should face catastrophic costs due to TB by 2020.

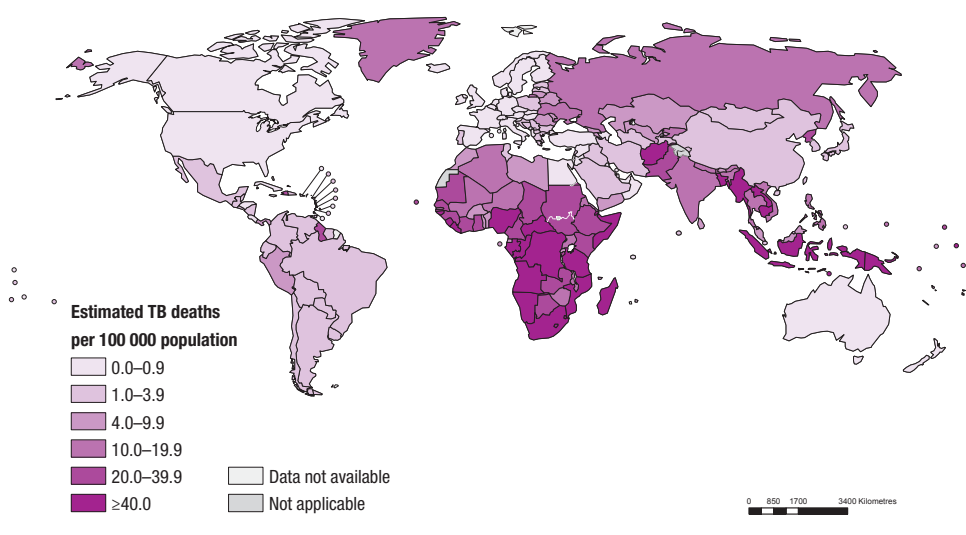
The three main pillars of the End TB Strategy are:

Integrated, patient-centred TB care and prevention: including early diagnosis of TB; treatment of all people with TB, including those with drug-resistant TB; collaborative TB/HIV activities and management of co-morbidities; preventive treatment of people at high risk; and vaccination against TB.

Bold policies and supportive systems: including political commitment with adequate resources for TB care and prevention; engagement of communities, civil society organizations and public and private care providers; UHC policy and regulatory frameworks for case notification, vital registration, including ascertainment of causes of deaths in hospitals and communities, quality and rational use of medicines, and infection control; and social protection, poverty alleviation and actions on the other determinants of TB.

Intensified research and innovation: including discovery, development and uptake of new tools, interventions and strategies; and research to optimize implementation, impact and promotion of innovations.

Figure 5.13
TB mortality rates excluding TB deaths among HIV-positive people, 2014⁹



MALARIA

Almost half the world's population, living in nearly 100 countries and territories, are at risk of malaria. There are an estimated 214 million cases and approximately 438 000 deaths in 2015 – most of these in children under five living in Africa. Sub-Saharan Africa bears the highest burden of the disease, accounting for 89% of cases and 91% of deaths. More than two thirds of malaria deaths occur in children under five.

ACHIEVEMENTS

The incidence rate of malaria is estimated to have decreased by 37% globally between 2000 and 2015 and malaria mortality rates have fallen by 60% (Figure 5.14). Hence the MDG Target 6.C (to have halted by 2015 and begun to reverse the incidence of malaria) has been met. Of 106 countries with ongoing transmission of malaria in 2000, 102 are estimated to have met the MDG target of reversing the incidence of malaria. An increasing number of countries have moved towards eliminating malaria from within their borders. In 2014, 13 countries with malaria in 2000 reported zero indigenous cases. Another six countries reported fewer than 10 cases.¹⁰

The coverage of key interventions has increased dramatically during the MDG era. In sub-Saharan Africa, an estimated 68% of children under five were sleeping under an ITN in 2015, compared to less than 2% in 2000. (Figure 5.15).¹⁰ Coverage of at least one dose of intermittent preventive treatment in pregnancy (IPTp) increased from less than 5% in 2000 to 57% by 2013. The proportion of suspected malaria cases that was tested for parasites rose from 47% in 2010 (when the WHO recommendation to test all suspected malaria cases was introduced) to 62% in 2013, mainly due to an increase in the use of rapid diagnostic tests. By 2013, ACT had been adopted as the national policy for first-line treatment in 79 of 87 countries in which *P. falciparum* is endemic.⁴³ However, treatment with appropriate antimalarial drugs continues to be inadequate with an estimated 13% of febrile children receiving ACTs in 2015.

Figure 5.14
Global trends in malaria incidence and mortality rates, 2000–2015¹⁰

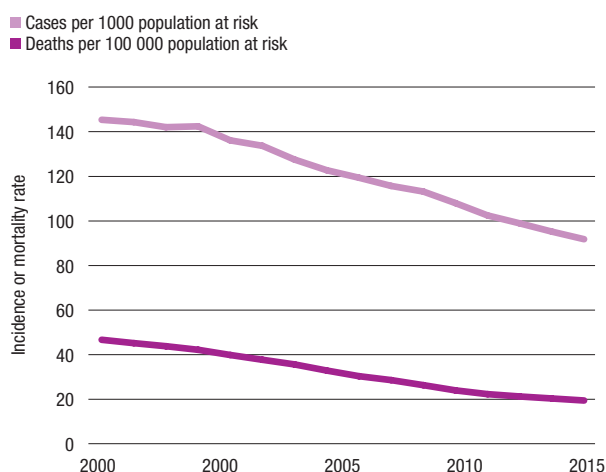
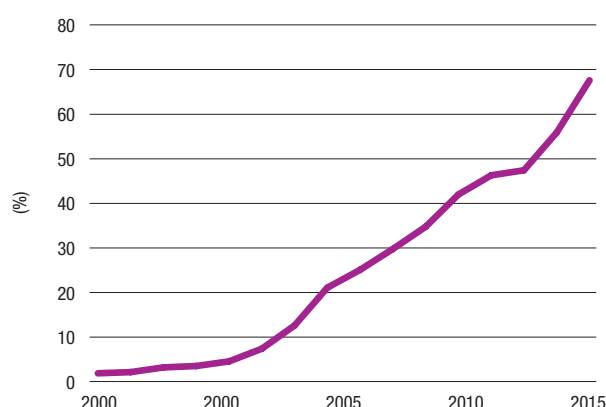


Figure 5.15
Proportion of children under five sleeping under insecticide-treated mosquito nets, sub-Saharan Africa, 2000–2015¹⁰



SUCCESS FACTORS

Increased funding: Annual funding for malaria control and elimination totalled US\$ 2.7 billion in 2013. International financing for malaria control has increased 20 fold since 2000, reaching US\$ 2.2 billion in 2013. Domestic investments have also increased year on year.¹⁰

Innovation: Programmes have benefited from technologies that were not available in 2000, including LLIN, rapid diagnostic tests and ACTs.

Partnership and advocacy: The Roll Back Malaria Partnership, comprising more than 500 partners, was established in 2001 as a global framework to mobilize resources, forge consensus among partners and implement coordinated action against malaria.

Planning and programming: Malaria control is now high on the agenda of ministries of health and international agencies, which have aligned their malaria control policies with WHO recommendations. They also united their efforts around a Global Malaria Action Plan developed in response to a call for universal access to malaria interventions by the UN Secretary-General in 2008. Malaria-endemic countries have defined national strategies aiming to ensure that cost-effective interventions are accessible to all in need. Effective partnerships have been formed at the country level to help implement national strategic plans.

Economic development and rising incomes have also contributed to reductions in malaria incidence and mortality. Among the many benefits of increased prosperity is the strengthening of health systems that have reduced both the risk of acquiring malaria and the consequences of infection.

CHALLENGES^{10,43}

Sub-Saharan Africa: Children under 5 living in sub-Saharan Africa suffer the largest burden of malaria disease and mortality, where malaria accounts for 10% of all deaths in this age group in 2015 (Figure 5.16).

Inadequate funding: The funding gap for malaria programmes was estimated to be US\$ 2.4 billion (53%) in 2013.

Resistance: The effectiveness of vector control is threatened as malaria mosquitoes develop resistance to the insecticides used in ITNs and indoor residual spraying. Resistance of *P. falciparum* to artemisinin in five countries and multiple drug resistance in western Cambodia highlights the importance of eliminating *P. falciparum* in the Greater Mekong subregion.

Gaps in intervention coverage: In 2013, 278 million of the 840 million people at risk of malaria in sub-Saharan Africa lived in households without even a single ITN; 15 million of the 35 million pregnant women did not receive preventive treatment; and between 56 and 69 million children with malaria did not receive ACTs. This is because a substantial proportion of these patients do not seek care, and not all those who do seek care receive appropriate antimalarial treatment.

STRATEGIC PRIORITIES

The SDG Target 3.3 is to end the malaria epidemic by 2030. New malaria goals and targets were endorsed by the World Health Assembly in 2015.⁶⁵ The targets for 2030, with 2015 as the baseline year, are:

- 90% reduction in global malaria mortality rate;
- 90% reduction in global malaria case incidence;
- malaria eliminated from at least 35 countries;
- re-establishment of malaria prevented in all countries identified as malaria-free

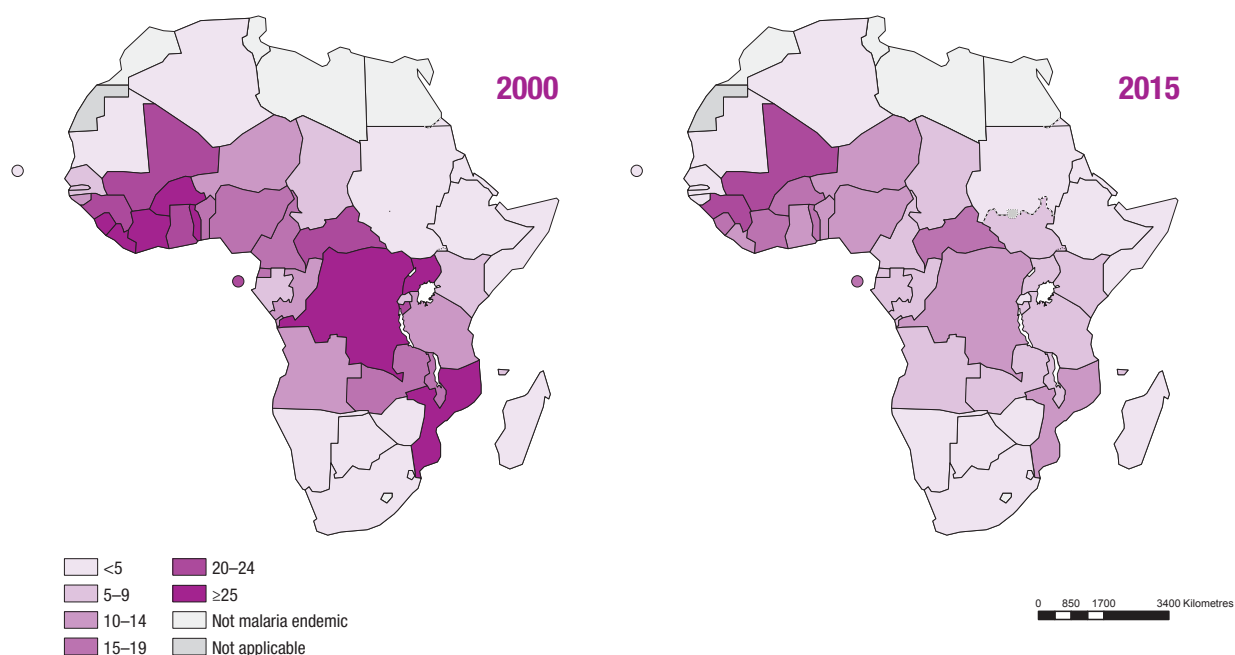
The global technical strategy for 2016–2030 aims to maximize the impact of current interventions, focusing on three pillars:

- ensuring universal access to malaria prevention, diagnosis and treatment;
- accelerating efforts towards elimination and attainment of malaria-free status;
- transforming malaria surveillance into a core intervention.

This strategy is to be supported by optimizing the use of innovation, expanding research and strengthening the enabling environment, including political and financial commitments, multisectoral approaches and capacity strengthening.

Figure 5.16

Percentage of deaths caused by malaria in children under five in sub-Saharan Africa, 2000 and 2015¹⁰



NEGLECTED TROPICAL DISEASES

NTDs⁸⁹ are endemic in 149 countries. More than 1 billion people are at risk of infection and 17 NTDs currently account for a disease burden that is around half the burden of TB or malaria.¹ There are five key interventions to tackle NTDs: preventive chemotherapy based on large-scale delivery of free, safe, single-dose, quality-assured medicines at regular intervals; innovative and intensified disease management; vector ecology and management based on sound ecological principles and the judicious use of pesticides to reduce the transmission of diseases carried by insects; improvements in water, sanitation and hygiene in NTD-endemic areas to sustain reductions in prevalence; and veterinary interventions among animals to protect and improve human health.

ACHIEVEMENTS^{19,90,91,92,93}

- In 2014, there were just 126 cases reported of dracunculiasis (guinea-worm disease), compared to almost 1800 in 2010 and 3.5 million in the mid-1980s.
- In 2014, the number of new cases of human African trypanosomiasis dropped to fewer than 4000 annually for the first time in 50 years.
- In 2013, Colombia became the first country where WHO verified the elimination of onchocerciasis, followed by Ecuador in 2014 and Mexico in 2015.
- In 2014, the elimination of visceral leishmaniasis (Kala-Azar) as a public health problem has been achieved in 87% of endemic districts and subdistricts in the South-East Asia Region.

Since 2006, more than 5 billion NTD treatments have been delivered to people in need. In 2012 alone, 800 million people received preventive chemotherapy for at least one disease, the number dropping to a little more than 785 million in 2013, as a result of the successful interruption in transmission in a number of areas. Indeed, by the end of 2014, 18 countries with endemic lymphatic filariasis (elephantiasis) had achieved a reduction in infection such that preventive chemotherapy was no longer required.⁹⁴ Globally, 43% of people requiring preventive chemotherapy for at least one NTD received it in 2013 (Figure 5.17).

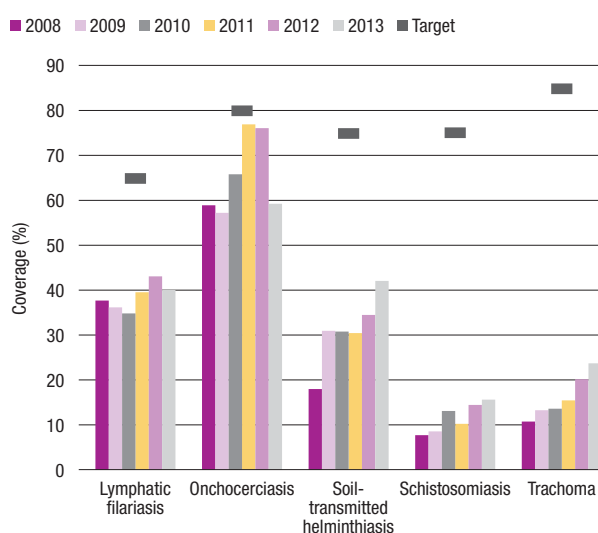
SUCCESS FACTORS

NTD concept and approach: The concept of NTDs and the integrated approach to their prevention and control began to take shape in the early years of the MDGs. The focus on poor, rural and marginalized populations and co-implementation of key interventions across the diseases most common to those populations have boosted the investment case for NTDs.

Global leadership and country ownership: WHO established global strategies in the Global Plan to Combat Neglected Tropical Diseases, 2008–2015. The NTD Roadmap for implementation, launched in 2012, set clear targets for universal access to interventions and the eradication or elimination of 11 NTDs by 2020. Countries have taken ownership of implementation, building on existing health systems at the community level.

Partnership: The NTD Roadmap was followed by the London Declaration on NTDs,⁹⁷ with a broad set of partners, including the pharmaceutical industry, pledging to provide the resources necessary for implementation. In 2012–2013 alone, 2.5 billion treatments were donated. External assistance is estimated at US\$ 200–300 million per year, excluding the drug donations of the pharmaceutical industry.⁹⁸ The Roadmap has given renewed impetus for collaboration between WASH and NTD actors, and in 2015 a joint strategy was developed to ensure more effective delivery of WASH alongside other NTD interventions.⁶⁷ Partnerships with civil society have been critical in many countries globally.

Figure 5.17
Global status of preventive chemotherapy coverage: proportion of people receiving preventive chemotherapy out of those requiring it for five NTDs,⁹⁵ 2008–2013⁹⁶



CHALLENGES

Inequality within countries: Today 1 billion (about three quarters) of the world's poor live in middle-income countries. Similarly, most (about two thirds) of the people requiring, but not yet receiving interventions against NTDs, live in middle-income countries (Figure 5.18).

Funding gap: NTD programmes have been disproportionately dependent on community volunteers and development assistance, with most funding provided by just two bilateral donors. Domestic levels of investment are still inadequate, especially in middle-income countries. Additional investment of US\$ 450 million per year is targeted in the period 2015–2020 for treatment and care, including preventive chemotherapy (excluding vector control).

Inadequate coverage: Coverage with early diagnosis and treatment as well as appropriate and timely implementation of vector management, water, sanitation and hygiene, and veterinary public health interventions remain patchy. The “last mile” of preventive chemotherapy coverage is the most difficult and costly; when preventive chemotherapy stops, another challenge begins – verifying the interruption of transmission and maintaining surveillance to prevent recrudescence.

Climate change: The distribution and incidence of at least some NTDs are expected to increase with climate variability and long-term environmental changes, as well as unplanned urbanization and increased international movement of people and goods. This is especially true of the rapidly expanding burden of dengue and chikungunya. Capacity-building and mitigation measures need to be developed in the most vulnerable areas.

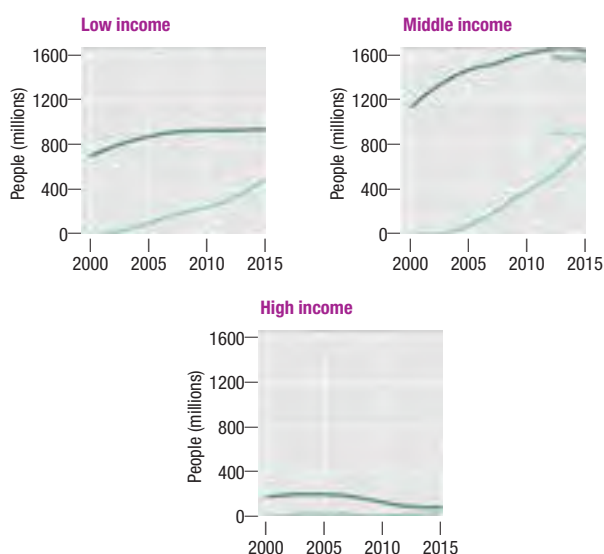
R&D: There is a need for more R&D across the five key interventions, and containment of the emergence of resistance to medicines as well as to pesticides. Improved diagnostics would be a priority through broad-based efforts such as the Special Programme for Research and Training in Tropical Diseases (TDR).¹⁰⁰ Discovery of insecticides with new modes of action, development of new vector control tools – particularly to curb the spread of vectors that spread disease such as dengue and chikungunya – and insecticide resistance management are the priorities for effective vector management.

STRATEGIC PRIORITIES

SDG Target 3.3 is to “end the epidemic” of NTDs. NTDs are also closely linked to the UHC target, as a measure of success in reaching the poorest. The UHC target of 80% coverage of essential health services by 2030 is consistent with coverage targets for the prevention of NTDs by 2020 (Figure 5.16).¹⁰¹ If high-quality coverage is sustained for long enough – as few as three years for some NTDs requiring preventive chemotherapy – transmission may be completely interrupted. The total number of people requiring interventions against NTDs may begin to decrease as soon as 2017, as diseases are eradicated, eliminated and controlled (Figure 5.19). Scale-down for some diseases should free up resources for the management of epidemic-prone NTDs, including dengue, chikungunya and leishmaniasis.

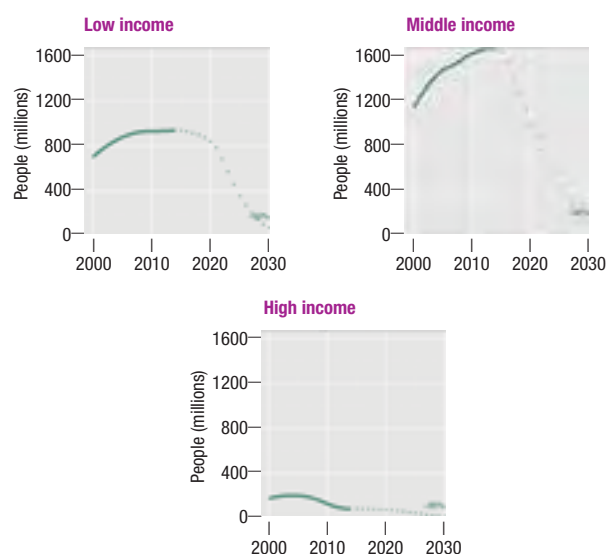
For global advocacy purposes, the existing coverage and eradication or elimination targets for individual NTDs could be brought together under a single indicator and target for 2030: for instance, a 90% reduction in the number of people requiring interventions against NTDs. This means a 90% reduction in the number of people in need of preventive chemotherapy and in the number of new cases requiring innovative and intensified disease management. It includes, but is not limited to: eradication of dracunculiasis (2015¹⁰²) and yaws (2020); global elimination¹⁰³ of leprosy (2020), lymphatic filariasis (2020), trachoma (2020), onchocerciasis (2025) and human African trypanosomiasis (2020, with zero incidence in 2030); and regional elimination¹⁰³ of schistosomiasis (2015–2020), rabies (2015) and visceral leishmaniasis (2020). These remain critical milestones on the path towards the end of the NTD epidemic by 2030.

Figure 5.18
Number of people requiring and receiving interventions against NTDs, by country income group, 2000–2015^{a,99}



^a The period 2013–2015 is based on an assumption of linear scale-up from actual coverage reported in 2012 towards 2020 targets.

Figure 5.19
Targeted number of people requiring interventions^a against NTDs if coverage targets are met, by country income group, 2015–2030⁹⁹



^a Preventive chemotherapy and innovative and intensified disease management.

HEPATITIS

Viral hepatitis is caused by five different viruses, and transmission occurs through contaminated food or water (hepatitis A and E) or through exposure to blood or body fluids (hepatitis B, C, D). Viral hepatitis infection kills an estimated 1.45 million per year, with approximately 90% of deaths due to chronic HBV and HCV infection, which cause cirrhosis and liver cancer.¹² The majority (85%) of viral hepatitis deaths occur in Asia, North Africa, East Africa and West Africa. A comprehensive set of hepatitis prevention interventions exists (Table 5.2) and effective treatment can cure more than 90% of patients with chronic HCV infection and suppress viral replication of hepatitis B. Despite the high disease burden and available prevention and treatment interventions, hepatitis has not received the same attention as other diseases with a comparable burden of disease, such as HIV, TB or malaria.

Table 5.2.
Elements of a comprehensive hepatitis prevention programme

Virus	Prevention intervention
A E	Safe water and food
A	Hepatitis A vaccination according to the country's epidemiological situation
B	Hepatitis B vaccination for all children and administration of birth dose
B C	Access to safe blood (universal screening of all blood donations in a quality-assured manner)
B C	Access to sterile injections and other invasive medical equipment in formal and informal health settings
B C	Access to sterile injection equipment and other harm-reduction measures for people who inject drugs
A B C	Promotion of safe sex practices

ACHIEVEMENTS

Vaccination: The reduction in HBV infections as a result of hepatitis B vaccination programmes is the greatest achievement in hepatitis control. By the end of 2014, 194 countries had introduced the vaccine into their immunization schedules.^{104,105} Global coverage with three doses of hepatitis B vaccine is estimated to be 82% (Figure 5.20) and is as high as 92% in the WHO Region of the Americas and the Western Pacific Region. The Western Pacific Region is on track to reach its goal of reducing the prevalence of chronic HBV infection to <1% by 2017.²¹ In China, the prevalence of chronic HBV infection has been reduced to 1% among children age 1–4 years (Figure 5.21).¹⁰⁶ Eighteen countries¹⁰⁴ have introduced universal childhood hepatitis A vaccination by the end of 2014 and reductions in incidence have been documented.¹⁰⁷

Injection safety: Surveys data from developing countries suggest that, between 2000 and 2010, reuse of injection equipment decreased from 39.6% to 5.5% – an 86% reduction.¹⁰⁹ Over the same period, unnecessary injections also fell, the average number of injections per person in developing countries declining from 3.4 to 2.9. In 2000, unsafe injections were responsible for 19.7 million new hepatitis B cases, 1.9 million new hepatitis C cases and 267 000 HIV infections. In 2010, those numbers had dropped to an estimated maximum 34 000 for HIV, 1.7 million for hepatitis B and 315 000 for hepatitis C.

Figure 5.20
Global coverage of third dose of hepatitis B vaccine in infants, 1990–2014¹⁰⁸

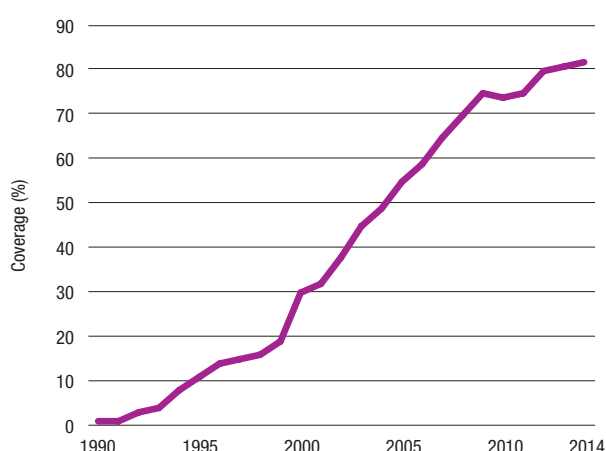
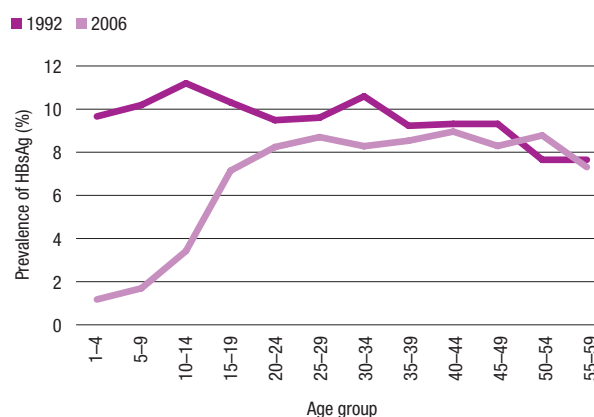


Figure 5.21
Prevalence of hepatitis B surface antigen (HBsAg) by age group, China, 1992 and 2006¹⁰⁶



SUCCESS FACTORS

Hepatitis B vaccination: Support by GAVI led to reductions in the price of hepatitis B vaccine and its introduction in the routine vaccination schedule as a component of the pentavalent vaccine. This led to a dramatic increase in immunization coverage.

Injection safety: The Safe Injection Global Network (SIGN) was created with the support of partners, including PEPFAR. Its three core strategies are: to promote behaviour change among patients and health-care workers in order to reduce unnecessary injections and ensure safe practices; to increase the availability of essential and good quality injection devices and supplies; and to properly manage sharps disposal.

Harm-reduction programmes: Expansion of sterile needle and syringe programmes, opioid substitution treatment for opioid users and peer outreach programmes have resulted in significant reductions in risk behaviours, although the high infectivity of HCV requires enhanced harm-reduction programmes.

New treatments: Dramatic progress in drug development has yielded a number of safe, oral treatment regimens that can cure almost all chronic HCV infections and suppress hepatitis B viral replication.

CHALLENGES

Lack of political engagement: Viral hepatitis was not included in the MDGs, reflecting a general lack of political engagement and funding. As a result, hepatitis control did not feature prominently in international health strategies such as those promoted by WHO and much will need to be done to address this gap.

Strategic information: There is a lack of reliable data on infection incidence and prevalence as well as for health outcomes and impact. This lack of data undermines national planning efforts as well as advocacy.

Comprehensive programmes: Addressing viral hepatitis requires a holistic approach that involves many components of the health sector. However, only a few countries have comprehensive public health programmes for viral hepatitis.

Mother-to-child transmission of hepatitis B: This remains a major source of infection. To minimize this risk, WHO recommends that all children receive a dose of hepatitis B vaccine within 24 hours of birth. Global coverage of the birth dose is currently estimated to stand at just 38%.

Hepatitis diagnosis and screening: The majority of people with chronic HBV and HCV infection are unaware of their status until they become sick. Improved and affordable diagnostics and testing approaches are required to identify people with chronic viral hepatitis early.

Scaling up care and treatment services: This will be a major challenge that will depend on major reductions in the prices of medicines, particularly for the treatment of chronic HCV infection.

STRATEGIC PRIORITIES

Combating hepatitis is now an explicit SDG target (part of Target 3.3). In 2014, the World Health Assembly requested that WHO initiate a process to examine the feasibility of eliminating hepatitis B and hepatitis C. Accordingly, a Global Health Sector Strategy on Viral Hepatitis is under development that will set global targets towards the elimination of HBV and HCV as public health threats by 2030.¹¹⁰

Vaccination will remain a priority preventive intervention, along with expanding blood and injection safety within and beyond health-care settings, and taking harm-reduction programmes to scale for people who use drugs. Expansion of treatment will require innovations in diagnostics, including point-of-care technologies, reductions in prices of medicines and a public health approach to treatment and care.

Implementation of the global strategy will aim to achieve a 90% reduction in new cases of chronic HBV and HCV infection and hepatitis deaths from 1.4 million to fewer than 500 000 by 2030. To achieve this impact, services will need to be expanded to achieve universal access to HBV vaccination (including birth dose), safe injections and harm reduction, and 80% of people with chronic hepatitis receiving treatment.

Table 5.2 shows the priority interventions of a comprehensive programme, including prevention of transmission through safe water, safe sex, and safe medical practices as well as vaccination.



WATERBORNE DISEASES

Waterborne diseases, by definition, are those that are transmitted by ingestion of contaminated water. Important waterborne diseases include diarrhoeal diseases, cholera, shigella, typhoid, hepatitis A and E, and poliomyelitis. Diarrhoeal diseases alone account for an estimated 3.6% of the global burden of disease (DALYs), and are responsible for of 1.5 million deaths (2012). It is estimated that 58% of that burden in low- and middle-income countries – 842 000 deaths per year, including 361 000 in children under five – is attributable to unsafe water supply, inadequate sanitation and lack of hygiene.¹³

ACHIEVEMENTS

Between 1990 and 2012, the number of diarrhoeal diseases attributable to inadequate water, sanitation and hygiene fell from 1.8 million to 842 000, with all regions experiencing major declines (Figure 5.22).

Substantial progress has been made in improving access to safe drinking-water and sanitation in both urban and rural populations (MDG 7).²² Access to an improved drinking-water source jumped from 76% coverage in 1990 to 91% in 2015, an increase of 2.6 billion people. Of the global population, 58% (4.2 billion people), now enjoy the highest level of access: a piped drinking-water connection on the premises. On the sanitation front, progress has been less impressive. Open defecation decreased from 24% to 13% between 1990 and 2015, and 2.1 billion people gained access to improved sanitation, but almost one third of the global population remains without access, well short of the MDG coverage target of 23% lacking improved sanitation. Despite improvements during the MDG era, people living in rural areas remain at a considerable disadvantage in terms of access to both safe water and sanitation compared with those in urban areas (Figure 5.23). In 2015, only an estimated one person in three living in rural areas had piped water on the premises, compared with 79% in urban areas. Although half of those living in rural areas were using improved sanitation facilities, this compares poorly with over 80% of those in urban areas.

Figure 5.22

Decline in diarrhoea deaths attributable to inadequate water and sanitation in low- and middle-income countries, by WHO region, 1990 and 2012¹³

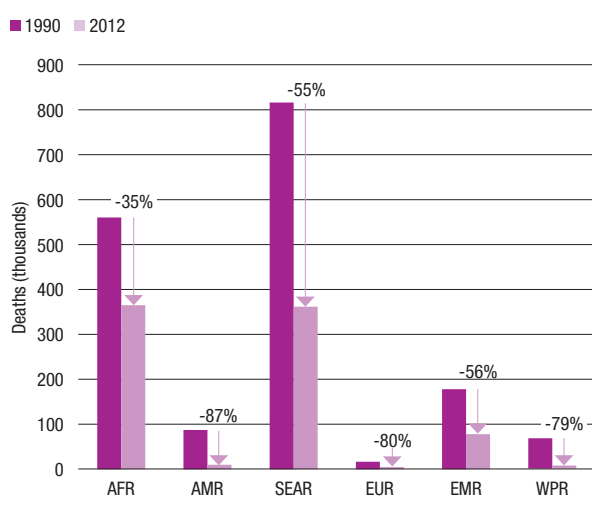
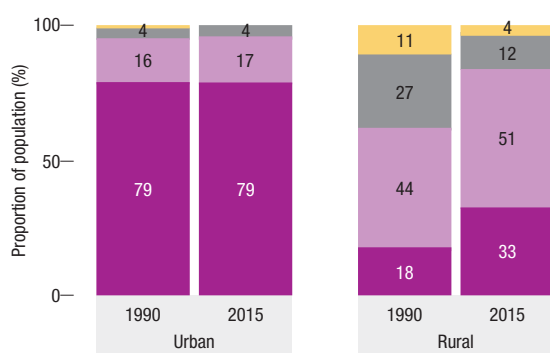


Figure 5.23

Trends in proportion of the global population with access to improved drinking-water source and improved sanitation, urban and rural, 1990 and 2015²²

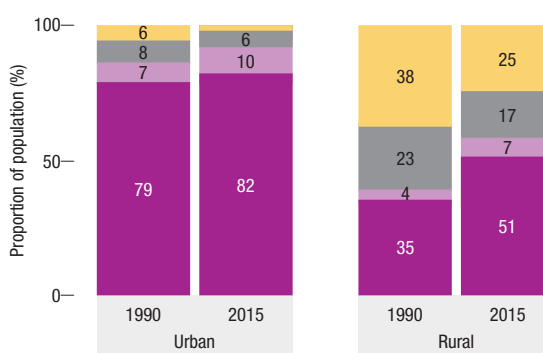
Drinking-water

Surface water Unimproved Other improved Piped on premises



Sanitation

Open defecation Unimproved Shared Improved



SUCCESS FACTORS

Global advocacy and action: Increased attention on the issue of water and sanitation, typified by the International Decade for Action “Water for Life” 2005–2015³¹ and the sector-wide technical consultation on drinking-water, sanitation and hygiene (WASH),⁷⁶ has helped drive change, as has improved collaboration between global agencies and organizations. The WHO/UNICEF Joint Monitoring Programme has sharpened focus on the issue and enhanced collaboration.¹¹¹

Country action: The push to improve access to safe water and sanitation has been broadly supported at the country level. Two thirds of surveyed countries recognize access to both safe drinking-water and sanitation as human rights in national legislation,¹¹² while national policies on drinking-water and sanitation have been approved in over 80% of surveyed countries. Many governments are investing in infrastructure development, especially in transitional economies.

Funding: Development assistance commitments for water and sanitation increased by 30% since 2000 to over US\$ 10.9 billion in 2012, with support increasingly directed towards low-income countries.¹¹²

Improved case management and treatment: Increased recourse to oral rehydration therapy, better nutrition and other evidence-based interventions have probably contributed to reductions in diarrhoeal disease related mortality, especially among children.

CHALLENGES

Marginalized rural populations: Of the 159 million people still relying on untreated surface water, 93% live in rural areas. Rural residents also account for 70% of the 2.4 billion people who do not have access to an improved sanitation facility, while open defecation (that is, without even basic sanitation such as a pit latrine) is predominantly a rural issue, with 90% of open defecators living in rural areas.²²

Lack of focus on health facilities and schools: Inadequate water and sanitation policies and practices are fuelling the spread of disease, not only in households and communities, but in schools and health facilities.

Poor hand hygiene: It is estimated that only 19% of the world’s population wash hands with soap after defecation or contact with excreta.⁴⁴

Poor maintenance: Even improved water supplies are frequently contaminated (though not as frequently or as seriously as unimproved supplies) and improved sanitation facilities are often associated with environmental discharges of untreated faecal waste.

Weak country capacity to implement plans: Despite strong political support for universal access to water and sanitation, few countries surveyed have the capacity to fully implement their national WASH plans and conduct meaningful monitoring and review.

Inadequate funding: Current funding levels are insufficient to meet targets for drinking-water and sanitation in many countries. Out-of-pocket payments to obtain or connect to existing water and sanitation services exclude the poorest; affordability schemes to subsidize water supply to the poorest are only operational in a minority of countries.¹¹²

STRATEGIC PRIORITIES FOR THE SDG

The overall SDG health goal (Goal 3) includes a specific target (3.3) for waterborne diseases, while Goal 6 (Ensure availability and sustainable management of water and sanitation for all) includes targets to achieve universal and equitable access to safe and affordable drinking-water (6.1) and adequate and equitable sanitation and hygiene for all (6.2), as well as reducing the proportion of untreated wastewater (6.3). Meeting these challenges will require a multisectoral response and monitoring. To a large degree, strategies to increase access to safe and sufficient drinking-water and adequate sanitation, along with improved hygiene, are also implied in multiple SDGs, including the eradication of poverty and hunger, achieving health and well-being for all and ensuring environmental sustainability.¹¹²

There is a broad consensus on what needs to be done regarding drinking-water, sanitation and hygiene, as indicated by the proposed policy goals that emerged from the broad, sector-wide technical consultation on WASH.⁷⁶ However, effectively implementing WASH policies at the national level is going to require efforts on several fronts, starting with securing, absorbing and targeting sustained international and national financing. The priority areas for action are:

- renewed focus on health facilities;
- strengthened action in the crucial area of hygiene promotion;
- support for the operation and maintenance of existing infrastructure and services;
- expanded efforts in neglected rural areas where the need for improved services is greatest;
- developing effective monitoring and evaluation to track progress and identify gaps.



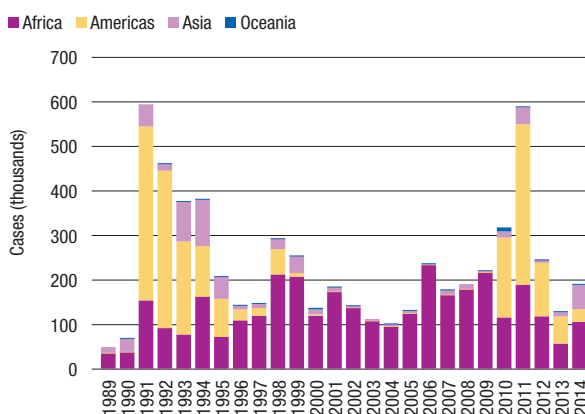
CHOLERA

Cholera is an acute diarrhoea caused by infection due to ingestion of food or water contaminated with the bacterium *Vibrio cholerae*. It is endemic in more than 50 countries, mostly in Africa and Asia, and may also cause epidemics.¹¹³ More than 1 billion people are at risk of cholera in endemic countries, with an estimated 2.9 million cholera cases and 95 000 deaths per year.¹¹⁴ The most recent major cholera epidemic occurred in Haiti in 2010–2011, following an earthquake, causing over 7000 deaths in Haiti and neighbouring Dominican Republic.^{115,116} Environmental factors are critical in the epidemiology of cholera. Climate change, war, natural disasters, population movement and urbanization are complicating efforts to control the disease.¹¹⁷

TRENDS

From the reported data on cholera cases it is difficult to ascertain whether progress has been made in reducing global incidence rates, as official reporting is far from complete. Figure 5.24 shows the global and regional numbers of reported cases to WHO during the last two decades. In general, Africa is the most affected continent. Peaks in the numbers of cases occurred in 1991–1992 and 2011, associated with severe outbreaks in the Americas. In 2015, a cholera outbreak was reported in the Kigoma region of the United Republic of Tanzania. Cholera is endemic in the region, but due to a recent influx of thousands of Burundian refugees, overcrowding and poor sanitation, the situation has deteriorated.

Figure 5.24
Reported cholera cases by continent, 1989–2014²⁶



POSITIVE DEVELOPMENTS

Water and sanitation: Cholera is a waterborne disease and can be largely prevented when people have access to safe drinking-water and sanitation facilities. A major achievement during the MDG era has been the progress in improving access to safe drinking-water and sanitation in urban and rural populations (MDG 7).²² Access to an improved drinking-water source jumped from 76% coverage in 1990 to 91% in 2015, an increase of 2.6 billion people. On the sanitation front, progress has been less impressive. Open defecation decreased from 24% to 13% between 1990 and 2015, and 2.1 billion people gained access to improved sanitation, but one third of the global population is still without access in 2015.

Case management: Alongside progress in cholera prevention, there have also been advances in the ability to effectively manage cholera. In particular, the use of oral rehydration therapy has become a more widely applied standard of care. Very severely dehydrated patients require administration of intravenous fluids. Such patients also require appropriate antibiotics to diminish the duration of diarrhoea, reduce the volume of rehydration fluids needed and shorten the duration of *V. cholerae* excretion. Recommended control methods, including standardized case management, have proven effective in reducing the case-fatality rate and reduce the mortality of severe cholera to less than 1%, even in resource-limited settings.¹¹⁸

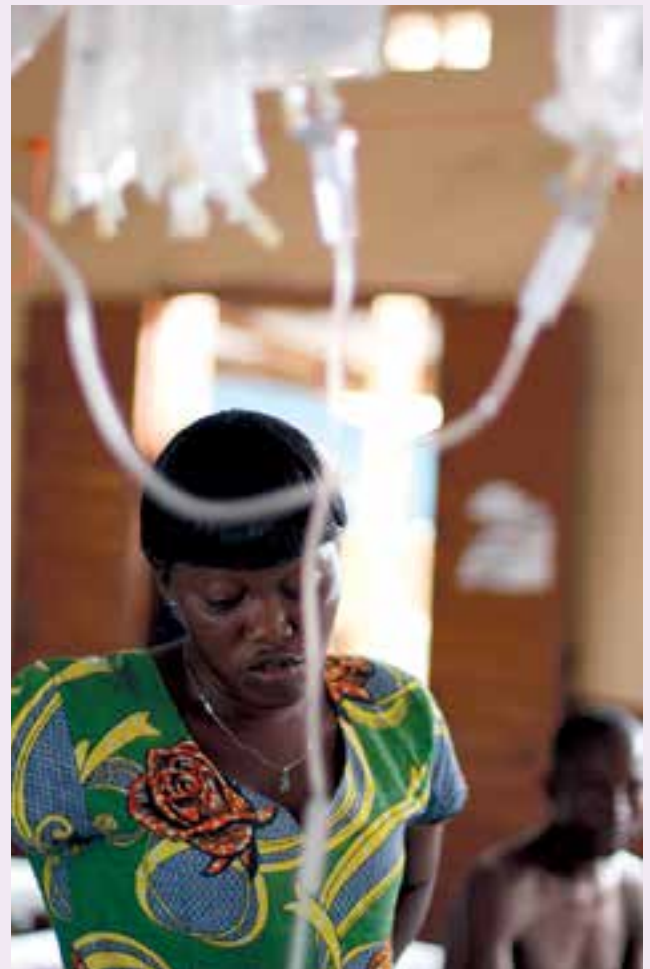
CHALLENGES

New strains: The majority of cholera outbreaks are caused by one strain – *V. cholera*, but recently new variant strains have been detected in several parts of Africa and Asia. Observations suggest that these strains cause more severe cholera with higher case fatality rates. The main reservoirs of *V. cholerae* are people and aquatic sources such as brackish water and estuaries. Recent studies indicate that global warming creates a favourable environment for the bacteria.¹¹⁹

Prevention: Cholera transmission is closely linked to inadequate environmental management. Typical at-risk areas include peri-urban slums, where basic infrastructure is not available, as well as camps for internally displaced people or refugees, where minimum requirements of clean water and sanitation are not met. The consequences of a disaster – such as disruption of water and sanitation systems, or the displacement of populations to inadequate and overcrowded camps – can increase the risk of cholera transmission should the bacteria be present or introduced.

Vaccination: A review of recent studies shows levels of protective effectiveness ranging from 23–58% (overall 37%)¹²⁰ and there is also evidence of some beneficial indirect effects on the unvaccinated population.¹²¹ However, the use of the parenteral cholera vaccine has never been recommended by WHO due to its low protective efficacy and the high occurrence of severe adverse reactions. Very few countries have vaccination programmes.

Preparedness: Early in cholera epidemics mortality rates can still exceed 10% before appropriate response mechanisms, such as local treatment centres become available to improve rapid access to therapy and minimize the time to initial rehydration, as the incubation time and the time between onset of symptoms and dehydration and death is short.^{122,123}



STRATEGIC PRIORITIES

In 2011, the WHO Member States unanimously agreed that cholera needs to be recognized as an increasing public health threat for many countries and regions, as it is on the rise due to climate change.¹²⁴ This requires prevention, epidemic preparedness and response. Proper, timely and solid surveillance systems, improved environmental management – in particular, access to clean water and proper sanitation – and the adequate use of cholera vaccines as a complementary measure are essential. Cholera prevention requires access to safe water, adequate sanitation, adequate food safety, appropriate hygiene and a community-based approach.

An internationally licensed oral cholera vaccine is currently available on the market in limited stocks and is suitable for travellers. WHO recommends that it should always be used as an additional public health tool, but should not replace usually recommended control measures such as improved water supplies, adequate sanitation and health education. Countries neighbouring an area affected by cholera should improve preparedness to rapidly respond to an outbreak and improve surveillance for risk assessment and early detection of outbreaks.

Cholera is recognized as a clear marker of environmental management, as well as an indicator of how the global public health community should engage with the IHR and conduct surveillance.

SEXUALLY TRANSMITTED INFECTIONS

STIs are caused by more than 30 different bacteria, viruses and parasites and are spread predominantly by sexual contact. Of the eight pathogens known to be transmitted through sexual contact linked to the greatest incidence of illness, four are currently curable (syphilis, gonorrhoea, chlamydia and trichomoniasis) and four incurable (the viral pathogens hepatitis B, herpes, HIV and human papillomavirus [HPV]), but susceptible to mitigation through treatment.

ACHIEVEMENTS

STIs are an important cause of morbidity and mortality; gonorrhoea and chlamydia, for example, being major causes of pelvic inflammatory disease, adverse pregnancy outcomes and infertility, while HPV infection causes 264 000 cervical cancer deaths each year.¹ Syphilis in pregnancy leads to 305 000 fetal and neonatal deaths every year and leaves 215 000 infants at increased risk of dying from prematurity, low birth weight or congenital disease. Some STIs can increase the risk of HIV acquisition three-fold or more. Despite steady progress in reducing the prevalence and incidence of STIs, there are still an estimated 357 million new infections of curable STIs per year (Table 5.3) as well as 84 000 deaths. Trichomoniasis and chlamydia represent the bulk of curable STI cases, but gonorrhoea infection is also significant, at an estimated 78 million new cases per year. The burden of viral STIs is also high with an estimated 417 million cases of herpes infection and 291 million women infected with HPV.^{125,126,127} The epidemiology of STIs is changing, with an increase in viral infections, while other previously common infections, such as chancroid, have nearly disappeared.^{128,129}

Reduced syphilis infection: Syphilis data show a decreasing trend since 1995, while there has also been substantial progress towards global elimination of congenital syphilis. Maternal and congenital syphilis decreased by 33% between 2008 and 2012.¹²⁶ Cuba achieved elimination of mother-to-child transmission of syphilis and HIV in 2015 and 13 more countries are promising candidates for elimination of vertical syphilis transmission.

SUCCESS FACTORS

Evidence-based, affordable and cost-effective interventions: The Global Strategy for the Prevention and Control of Sexually Transmitted Infections: 2006–2015 has been adapted for use in all WHO regions and is being used by the majority of countries. Most countries report using syndromic case management for STI treatment and 88% of reporting countries has updated national STI guidelines since 2006. In addition, 60% of reporting countries has a national strategy in place for elimination of mother-to-child transmission of syphilis. Nearly 90% of countries reported offering symptomatic STI treatment for sex workers in 2013 and 80% reported that STI services were available for men who have sex with men.¹²⁶

Linkage to HIV prevention: Interventions for prevention of STIs and HIV overlap to a large degree and programmes targeting key populations for HIV are reaching those most at risk for STIs.

Advances in diagnosis and treatment: Rapid tests to diagnose syphilis infection have become widely available, contributing to increased coverage of syphilis screening and treatment, especially among pregnant women. Antenatal screening for STIs increased globally from 78% in 2008 to 84% in 2013 and syphilis seropositivity among pregnant women decreased by nearly half over the same period, from 1.4% to 0.6%.⁵ Treatment regimens for common STI syndromes have been standardized and simplified with use of single-dose treatments wherever possible.

Table 5.3
Global estimates of new cases of curable STIs, 2012¹²⁵

STI	Estimated new cases (millions)
<i>Chlamydia trachomatis</i>	130.9
<i>Neisseria gonorrhoeae</i>	78.3
Syphilis	5.6
<i>Trichomonas vaginalis</i>	142.6
Total	357.4

CHALLENGES

Inadequate funding: National STI programmes are experiencing funding gaps and staffing crises due to shortage of funds. Globally, there are no special funds for STI control other than HIV.

Coverage of STI prevention and treatment services: Most of the implemented interventions are not of a scale or scope sufficient to achieve universal access. Barriers to access include persistent stigma and discrimination, criminalization of behaviours of highest risk populations, weak political commitment to STI control and lack of funding.

Lack of quality data: Few etiological and prevalence studies have been conducted in the past decade as STI programmes were merged into HIV programmes. STI surveillance systems lack the capacity to provide robust and consistent information and data to support decision-making.

Global threat of gonococcal antimicrobial resistance: The Global Antimicrobial Resistance Surveillance Programme (GASP) has been reintroduced as a response to the emergence of gonococcal antimicrobial resistance, but with insufficient funding and staff. Monitoring for antimicrobial resistance is still patchy in the majority of WHO regions.

Changing epidemiology: STI epidemiology is changing with viral STIs becoming more prevalent than bacterial pathogens, requiring updated information for locally appropriate prevention and treatment strategies. More research is needed for development of prevention interventions for viral infections, such as vaccines, microbicides and other new technologies.

Lack of diagnostic test capability: The majority of STIs are asymptomatic (especially among females), and require development and widespread availability of reliable and simple diagnostic tests to augment syndromic management of symptomatic cases.

STRATEGIC PRIORITIES

There is no explicit STI target but STIs relate to multiple targets in the health goal. STI prevention and control activities will support the SDG targets to reduce child and neonatal mortality (3.2), end the epidemics of AIDS and other communicable diseases (3.3), reduce NCDs and improve mental health (3.4), sexual and reproductive health (3.7) and universal health coverage (3.8). The current STI prevention and control strategy ends in 2015 and development of the next phase will focus on building on successes to achieve universal coverage, developing new technologies for diagnosis and prevention and improving behaviour change interventions. The next phase of the global STI strategy will address the following areas:

- **Strengthening financing mechanisms** for services for STIs and increasing human resource capacity.
- **Increasing coverage of services** through the integration of STI prevention and management into the broader agendas on HIV infection and reproductive health. Strategies for increasing access to services for key populations and other vulnerable populations, such as adolescents, are needed.
- **Strengthening surveillance and data quality** to improve knowledge and increase the number of countries reporting on prevalence, etiologies of STI syndromes and antimicrobial resistance.
- **Developing strategies for addressing gonococcal antimicrobial resistance**, which threatens to reverse successes achieved to date. An aggressive response is needed to prevent gonorrhoea from becoming a non-curable disease.
- **Accelerating research on and access to innovations**, including point-of-care diagnostic tests, more efficacious therapeutics, STI vaccines, microbicides and health promotion methods. There is a growing need for rapid diagnostic tests to augment syndromic management and detect asymptomatic infections, particularly in women.
- **Eliminating the consequences of STI**, particularly congenital syphilis and cervical cancer.



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- 2 Graph uses WHO regional grouping with high-income OECD countries separated (see Annex 1).
- 3 Jones KE, Patel NG, Levy MA, Storeygard A, Balk D, Gittleman JL et al. Global trends in emerging infectious diseases. *Nature*. 2008;451:990–4 (<http://www.nature.com/nature/journal/v451/n7181/abs/nature06536.html>, accessed 17 September 2015).
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