**Key points**

- HIV incidence has declined sharply where countries have scaled up HIV prevention strategies to change behaviours. There has been a steady improvement in access to ART in the past decade, with 10 countries in the Region now having coverage of more than 80%. This improvement was possible because of the use of standardized, simplified treatment protocols and decentralized service delivery models to deliver treatment to large numbers of HIV-positive adults and children.

- Improved coverage of major interventions has proven successful in the control of tuberculosis in the Region. These include expansion of the basic package that underpins the Stop TB Strategy (DOTS), improved diagnostics resulting in improved case detection in adults and children, and improved access to HIV testing and treatment for tuberculosis patients.

- The malaria mortality rate has decreased by over 50% in children in the past 12 years. This reduction is projected to reach 68% by 2015, due to improved availability and use of ITNs, diagnosis-based treatment with artemisinin-based combination therapy (ACT), engagement of communities in malaria control, and strengthening capacity in vector control for malaria.

- Following the effective implementation of the Integrated Disease Surveillance and Response (IDSR) strategy over the past decade, significant improvement in the detection, reporting and response to priority diseases has been recorded. The importance of early detection was underscored by the ongoing epidemic of Ebola virus disease in western Africa, which has surpassed all other outbreaks in terms of cases, deaths and geographic spread.

- Mass administration of medicines for diseases such as lymphatic filariasis, onchocerciasis, schistosomiasis and soil-transmitted helminthiasis, and early case finding and decentralized case management for Buruli ulcer, dracunculiasis, human African trypanosomiasis, leprosy, leishmaniasis and yaws have been useful for preventing and eliminating NTDs.

- The Region is still at an early stage in the epidemic of NCDs. To stem the tide of these disorders and conditions, it will need to develop a response to this challenge using low-cost solutions, particularly prevention and health promotion.
4. Disease threats

Diseases, particularly communicable diseases, but increasingly NCDs including mental disorders, injuries and violence, pose major threats to human health. As stated in Chapter 1, communicable diseases account for two thirds of the total disease burden, the rest being due to NCDs and injuries. This chapter looks at how the dominant disease threats are being identified, controlled, mitigated and prevented in the Region.

Communicable diseases

HIV/AIDS

Although the Region was home to around 71% of all people living with HIV in 2012, there are encouraging signs that the HIV/AIDS epidemic is slowing down. New infections reported in sub-Saharan Africa have declined by 38.5% between 2001 and 2012. Data from testing of women attending antenatal clinics and from general population surveys in the Region confirm that prevalence rates have declined or stabilized in most countries. However, HIV is still spreading in the Region, with 1.6 million new infections reported in 2012. Young people aged 15–24 years accounted for almost half (42%) of new infections reported worldwide, and almost 80% of these were living in sub-Saharan Africa. Although the epidemic is slowing, more people are living with HIV. Since 2001, the population living with HIV has risen by 12% in the Region. This number is partly explained by increased survival rates due to improved access to ART. The number of people dying from AIDS-related causes is also on the decline, with 33% fewer AIDS-related deaths in Africa in 2012 than in 2005.

The HIV epidemic in the Region continues to be diverse with prevalence varying between and within countries, and between genders, groups and risk populations. HIV prevalence rates are much higher in women than men, with the largest differences being seen in the age group 15–24 years. Prevalence tends to be higher in urban than rural areas, although this difference is less in southern Africa. There are also wide variations across subregions and between
The health of the people: what works

countries. Southern Africa remains disproportionately affected by the epidemic, with just over one third of all people living with HIV in 2012 residing in the 10 countries of that subregion. The same countries are home to 31% of people newly infected with HIV, and 34% of people dying from AIDS-related causes.

What works?
Three major interventions have been successful in HIV prevention and treatment in the Region: increasing access to ART using a public health approach; the strategic use of ART to prevent PMTCT of HIV; and reducing new HIV infections using combination prevention strategies.

Increasing access to ART using a public health approach
In the past decade there has been a steady improvement in access to ART in the Region. This improvement was possible because of the use of standardized, simplified treatment protocols and decentralized service delivery models to deliver treatment to large numbers of HIV-positive adults and children.

By the end of 2012, a total of 7,524,000 people in need of treatment were receiving ART, an increase of more than 100% from 3,192,000 in 2009. The expansion of access to ART has been particularly impressive in the eastern and southern Africa subregions that account for about 50% of all people living with HIV and where, by 2012, almost 6.4 million people were receiving ART. Ten countries, six of which are in southern Africa (Botswana, Namibia, South Africa, Swaziland, Zambia and Zimbabwe), three in eastern Africa (Eritrea, Kenya and Rwanda) and one in western Africa (Cabo Verde) had ART coverage of more than 80% in 2012.

Strategic use of ART to prevent mother-to-child HIV transmission
Considerable progress has been made towards the elimination of mother-to-child transmission of HIV in the Region. Between 2009 and 2012, the Region experienced a 37% decline in

Box 4.1. Reducing mother-to-child transmission rates of HIV in Ghana

Until recently, Ghana had a high level of mother-to-child HIV transmission. In 2010, the country committed to scaling up prevention of mother-to-child transmission (PMTCT), setting as its goal “to ensure a generation free of AIDS and to eliminate mother-to-child transmission of HIV by 2015”. This commitment has borne fruit. By 2012, Ghana achieved the highest reduction in new infections among children in Africa and was ranked among the countries with the most successful PMTCT programmes. The risk that a woman living with HIV will transmit the virus to her child has declined from 31% in 2009 to 9% (7–11%) in 2012.

These results were driven by integrating PMTCT within maternal, newborn and child health services. Elements crucial to this success included:

- strong programmatic leadership, clear national guidelines, protocols and manuals for implementation and training;
- PMTCT delivery in the context of focused antenatal care and collaboration with the Family Health Department of the Ghana Health Service;
- a change in the type of antiretroviral therapy (ART) provided, replacing less effective with more effective medicines;
- including a PMTCT course as part of the curriculum in midwifery and community health training schools;
- integration of family planning with PMTCT services, including procurement and distribution of key commodities and using SMS texting (common information technology platform) for commodity stock monitoring;
- a highly motivated and dedicated cadre of health-care workers able to multitask.
the number of new HIV infections among children. The uptake of ART has also improved substantially, with 63% of pregnant women living with HIV receiving ART in 2012 compared with 34% in 2009. This has led to a decline of 37% in new HIV infections among children between 2009 and 2012. Provision of ART to HIV-infected children is steadily improving but remains low, with only 33% receiving ART in 2012. These results were driven by integrating PMTCT within maternal, newborn and child health services. Elements crucial to this success included, among others, strong leadership and a highly motivated and dedicated cadre of healthcare workers able to multitask (an example from Ghana is shown in Box 4.1).

Reducing new HIV infections using combination prevention strategies
Using a combination of behavioural and biomedical HIV prevention interventions that are tailored to national epidemics is the most effective approach for reducing new HIV infections. This involves behaviour change counselling; HIV testing and counselling; condom programming; voluntary medical male circumcision; infection control; and using standard precautions to ensure injection, surgical and blood safety. Where countries have scaled up HIV prevention strategies to change behaviours, HIV incidence has declined sharply. This has been seen in several African countries with generalized epidemics, the most notable recent example being South Africa (Box 4.2).

Tuberculosis
Tuberculosis is a major problem worldwide with 1.3 million new cases recorded in 2012, 27% of which occurred in the Region. Eight of the 10 countries with the highest tuberculosis incidence are from the Region. Although the prevalence of tuberculosis was high in 2012 (303 per 100 000 population), this is a significant improvement over 1990 when it was 404 per 100 000 (Fig. 4.1).

Box 4.2. Increasing access to antiretroviral treatment (ART) in South Africa
South Africa has more people on life-saving ART than anywhere else in the world, a decade after the country’s leaders launched a public sector programme to combat the HIV/AIDS epidemic. An estimated 2.4 million people are receiving ART, roughly 80% of those who require treatment based on WHO 2010 guidelines, and accredited nurses are initiating therapy. The successes of the national ART programme and prevention and research efforts in South Africa are clear:
- life expectancy among adults has increased – for example by 11 years among adults in rural Kwa-Zulu-Natal, the province worst hit by HIV/AIDS;
- fewer babies are born with HIV – rates have dropped from between 25% and 30% in infants born HIV positive in 2003 to 2.7% in 2011;
- the rate of new infections among adults is also declining;
- more than 20 million South Africans had been tested for HIV by December 2013;
- by December 2013, 1.2 million men had undergone medical male circumcision to reduce the risk of HIV infection.

Studies show that expansion of therapy has improved adult life expectancy and reduced mortality.

The Region is now on track to meet MDG target 6c of halting and beginning to reverse tuberculosis incidence.

This high tuberculosis burden is linked to socioeconomic factors, particularly poverty and overcrowding, compounded by the emergence of new problems such as HIV and strains of tuberculosis resistant to anti-tuberculosis therapy. About 46% of people with tuberculosis are found to be HIV positive, and tuberculosis is the leading cause of death among people living with HIV, accounting for one in five HIV-related deaths. Coinfection is increasingly causing tuberculosis to occur in younger, more economically productive members of society, especially in young women aged 15–24 years.

The number of people in the Region diagnosed with multidrug-resistant tuberculosis (i.e.
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Tuberculosis resistant to the two most powerful drugs, rifampicin and isoniazid), has increased dramatically from 115 in 2003 to 18,129 in 2012. The numbers of those found to have extensively drug-resistant tuberculosis (i.e. tuberculosis resistant to at least four of the core anti-tuberculosis drugs) has also increased considerably, from 85 in 2004 to 3,487 in 2012. Although the number of people with multidrug-resistant tuberculosis being treated has increased fivefold since 2008, only about 57% of people with this type of tuberculosis were receiving treatment at the end of 2012.

What works?
Four major interventions have proven successful in the control of tuberculosis in the Region:

- Expansion of the basic package that underpins the Stop TB Strategy (DOTS), resulting in an increased number of countries achieving tuberculosis treatment success rates of 85%;
- Improved diagnostics, resulting in improved case detection and, detection and treatment of multidrug-resistant and extensively drug-resistant tuberculosis;
- Implementation of WHO paediatric tuberculosis guidelines, leading to improved detection and notification of all forms of tuberculosis in children;
- Tuberculosis/HIV integration, resulting in improved access to HIV testing and treatment for tuberculosis patients.

Expansion of DOTS
DOTS is a standard course of antimicrobial drugs that is provided, along with information, supervision and support to the patient, by a health worker or trained volunteer. It is an approach that ensures patients continue taking their drugs until they are no longer infectious. DOTS coverage has been expanded since the beginning of the 1990s and by the end of 2008, the regional average for DOTS coverage was 93%.

Between 1995 and 2012, the treatment success rate (a measure of whether patients are no longer infectious) among patients with smear-positive pulmonary tuberculosis increased from 60% to 82%, and 18 countries surpassed the global target (85%). This high treatment success rate means that more of the people placed on treatment cease to be sources of infection to others. A high treatment success rate also reduces the risk of causing the emergence of drug-resistant tuberculosis, thus available medicines remain effective and the health security of the populace is guaranteed. The involvement of communities, and strengthening linkages with health facilities, enabled the rapid expansion of the strategy.

Improved case detection due to improved diagnostics
Introduction of tuberculosis rapid diagnostic tests that provide results within 2 hours has led to improved sensitivity, timeliness and simultaneous detection of drug resistance. In addition to offering the opportunity to rapidly detect tuberculosis among people living with HIV, this technique also permits timely detection of multi-drug-resistant tuberculosis or extensively drug-resistant tuberculosis in people living with HIV. The tuberculosis case detection rate has increased in the Region from 39% in 1995 to 59% in 2012.

Implementation of WHO paediatric tuberculosis guidelines
In 2005–2006, introduction of WHO paediatric tuberculosis guidelines and revision of tuberculosis reporting tools permitted notifications of cases in children who had smear-negative tuberculosis. Prior to 2005, only smear-positive tuberculosis cases were reported, a practice that led to underreporting of tuberculosis in children since most of them cannot expectorate sputum for diagnosis. Since then there has been an eight-fold increase in the number of children reported annually in the Region. As a result, more children are being treated early and more resources are being applied to caring for this previously unrecognized group. In 2013, nearly 10% of notified tuberculosis cases in the Region were in children under the age of 14 years.

Tuberculosis/HIV integration
Tuberculosis is common among people with HIV, thus tuberculosis/HIV collaborative activities were introduced in 2004 with a major focus on compulsory HIV screening of all tuberculosis patients. Before this, tuberculosis patients’ survival remained low, even when placed on early tuberculosis treatment, due to undetected coinfection with HIV. In 2013, 74% of people in the Region known to have tuberculosis had an HIV test. Of those found to be positive for HIV, 57% received WHO-recommended ART. Thus, this integration of HIV/tuberculosis services, both for testing and treating, has improved the health of people with both HIV and tuberculosis. Strong collaboration of both tuberculosis and HIV programmes through joint planning and supervision led to better scale up of these two programmes.

Malaria
Malaria remains a major global health problem and the WHO African Region is the world region most severely affected. In 2012, there were an estimated 207 million cases of malaria worldwide, 80% of them in the Region. Although too many people are still dying from malaria, especially mothers and children, control efforts are paying off. Numbers of cases and deaths are declining and the use of preventive strategies is increasing. The estimated number of malaria cases per 1000 persons at risk, which takes into account population growth over time, has been reduced by 29% globally between 2000 and 2012, and by 31% in the Region during the same period. If the annual rate of decrease over the past 12 years is maintained, then the malaria case incidence is projected to decrease by 36% globally and 39% in the Region by 2015. It is estimated that 337 million cases of malaria and 3.08 million malaria-
related deaths were averted between 2001 and 2012 in Africa.

In 2012, 90% of the estimated 627,000 malaria deaths worldwide occurred in the Region. In the general population, between 2000 and 2012, the malaria mortality rate decreased by about 50%. However, an estimated 462,000 deaths occurred in children less than 5 years of age in the Region. Although large numbers of children are still dying of malaria, malaria death rates have decreased by 54% in children less than 5 years of age. Again, if the annual rate of decrease seen over the past 12 years is maintained, malaria mortality rates are projected to decrease by 68% in children less than 5 years of age by 2015.

The progress in malaria control in the Region has been enabled by the commitment of governments, the African Union, subregional economic communities and massive international funding, which increased from less than US$ 100 million in 2000 to US$ 1.93 billion in 2013.

What works?
Four major interventions have proven very useful for the prevention and control of malaria. These are:
- availability and use of ITNs;
- diagnosis-based treatment with ACT;
- engagement of communities in malaria control;
- strengthening capacity in vector control for malaria.

Insecticide-treated nets
The 31% decline in malaria incidence and 49% drop in numbers of malaria deaths in the period 2000–2012 has been largely due to the expanded use of ITNs. This is a highly cost–effective intervention, with nets usually provided free or at a heavily subsidized price. Scale up of ITN use in the Region was deployed in two steps. Between 2005 and 2008, a mortality reduction objective was pursued through targeting ITN distribution to the two most vulnerable populations – pregnant women and children less than 5 years of age. As a result, ITN distribution was linked with other effective interventions such as antenatal care services and routine immunization. By 2009, the strategy of universal access was introduced to better scale up ITN ownership and use. Thus nationwide distribution of ITN to all populations at risk was adopted. Therefore by the end of 2012, all countries had adopted a policy on universal coverage with ITNs defined as two ITNs for two people at risk of malaria. This better scale-up strategy resulted in ITNs being distributed free in 39 of the 44 malaria-endemic countries of the Region, including distribution through antenatal clinics in 34 countries and through Expanded Programme on Immunization clinics in 26 countries. The percentage of households owning at least one ITN was estimated to be 53% at the end of 2012, while the population sleeping under an ITN was estimated as 36% in 2012. The proportion of the population sleeping under an ITN remained an estimated 36% in 2013. However, the percentage of children and pregnant women using nets still remains significantly below the 80% target set by the World Health Assembly (Fig. 4.2).

Diagnosis-based treatment with ACT
The practice of providing ACT to people with a confirmed parasitological diagnosis is expand-
ing in the Region and partly accounts for the 49% decline in malaria deaths during the period 2000–2012. ACT was used in 42 countries in 2012 (only Algeria and South Africa have not adopted this policy). If ACT is given early to people proven to be positive for malaria, most will recover from the disease. Of the 147 million ACT treatments distributed globally in 2012, 134 million were in Africa. The expansion of rapid diagnostic tests has enabled appropriate use of ACT, which should hinder the development of resistance by the malaria parasites. In 2012, 41 of 44 countries with ongoing malaria transmission in the Region reported adoption of the policy of providing parasitological diagnosis for all age groups. Hence the proportion of suspected malaria cases receiving a diagnostic test in the public sector at the end of 2012 was 61%. Most of this achievement in testing is attributable to an increase in the use of rapid diagnostic tests and its expansion to the community level. The rapid scale up of rapid diagnostic test use in the Region has been a major boost for improved quality of care and rational use of drugs. The proportion of patients in the public sector treated with ACTs reached 60% in 2012.

Engagement of communities
Recent assessment of approaches to malaria prevention has indicated that many communities regard malaria as the status quo – something that has always existed and will never be changed. Hence, when health workers advise draining of swamps, spraying homes and use of ITNs, this advice may be ignored. Work is now focusing on multisectoral malarial control – for instance, involving agricultural advisors whose advice is often taken more seriously by rural communities, such as was found in Kenya. Potential interventions include:

- water-management-based interventions;
- using a development-oriented focus such as advocacy for reducing the malaria
burden to increase productivity and food security;
■ collaborating with agrochemical businesses to integrate better malaria control;
■ collaborating with farmers’ field schools for integrating malaria with pest management programmes;
■ using intermittent wet/dry irrigation;
■ increasing the distance between residential areas and crops/methods that increase malaria.

A variety of strategies have been used to raise community awareness of malaria prevention and control interventions. iCCM is being promoted as a strategy for reducing morbidity and mortality in the population less than 5 years of age through the delivery of adequate services by volunteer community health workers. The focus of iCCM is training and equipping community volunteers to recognize, diagnose and treat malaria, diarrhoea and pneumonia – the three top childhood killers. The experience of Senegal is described in Box 4.3.

Strengthening capacity in vector control for malaria
Vector control is a major strategy of malaria control in the Region. However, technical capacity for vector control is weak in many countries. Where capacity does exist, poor collaboration between institutions with the expertise in vector control and national malaria control programmes leads to suboptimal use of entomological information.

Box 4.3. Successful implementation of integrated community case management (iCCM) of childhood illness in Senegal
Senegal has successfully implemented iCCM since 2003, with more than 4000 community sites in 72 out of 76 districts covered in 2013. This enabled community health workers to manage malaria, diarrhoea and pneumonia effectively. Malaria, diarrhoea and pneumonia were respectively responsible for 19%, 14% and 13% of deaths in children less than 5 years of age. An evaluation indicated that after the training of community health workers in the use of rapid diagnostic tests, the number of cases diagnosed as malaria declined significantly and therefore antimalarial drug use became more rational and cost-effective. Ninety-three percent of suspected patients benefited from a rapid diagnostic test and 100% of malaria-confirmed cases received adequate treatment.

Lessons learnt from the implementation of iCCM include:
■ establishing a favourable policy environment and effective institutional support;
■ reinforcing links between the health system and the communities;
■ rapidly scaling up the delivery of quality services by community health workers to households;
■ designing and implementing behaviour-change community activities for iCCM.

Box 4.4. Country project to strengthen capacity for vector control
This seven-country project contributed to filling gaps in skills, expertise, infrastructure and work procedures. It also strengthened the entomological skills of national malaria control programmes and local research institutions in the participating countries. Seven national reference entomology laboratories were renovated and fully equipped; more than 300 national technicians were trained in basic entomology and vector control; and 20 graduate students in four countries were sponsored to complete their BSc, MSc, and PhD courses. Functional sentinel sites for vector surveillance were also established within the countries. Insectaries equipped with vector sampling and rearing facilities were built to facilitate and intensify vector resistance monitoring activities. A regional database comprising over 1909 insecticide resistance patterns covering 364 different sites in 30 countries was developed and has since provided the basis for evidence-informed vector control. It was used to produce the first ever atlas of vector resistance in the WHO African Region that shows trends in malaria vector resistance to commonly used insecticides. Most countries are now able to undertake advanced entomological surveillance.
for decision-making. In 2008, a 4-year project to improve infrastructure and strengthen entomological skills was implemented in Cameroon, Kenya, Madagascar, Mali, Mozambique, Senegal and the United Republic of Tanzania (Box 4.4). Strong partnership between national authorities and research institutions within these countries was instrumental to the capacity-building effort. In all of these countries, researchers collaborated with the national malaria control programmes to define the need for specialized skills in vector control, develop a capacity-building plan and implemented and evaluated the plan.

**Epidemic- and pandemic-prone diseases**

Epidemic- and pandemic-prone diseases threaten public health security. They can be responsible for high levels of morbidity and mortality and have a devastating impact on the economies of the Region. These diseases can occur across borders and affect the world as a whole. Countries in the Region have reported epidemics of cholera, Ebola and Marburg viruses, influenza, yellow fever, meningococcal meningitis and Lassa fever. In 1998, the Integrated Disease Surveillance and Response Strategy was set up to address the burden of communicable diseases and improve the availability and use of data in detecting and responding to public health events.

Three major interventions have been useful for improving preparedness and response to epidemic and pandemic diseases: the enhancement of surveillance systems for timely reporting of notifiable diseases; the early detection of emerging dangerous pathogens; and enhanced systems for detection and response to pandemic influenza.

**What works?**

**Enhanced surveillance systems for timely reporting of notifiable diseases**

Following the effective implementation of the Integrated Disease Surveillance and Response Strategy over the past decade, significant improvement in the detection, reporting and response to priority diseases has been recorded. For example, between 2007 and 2013 a total of 877 526 cholera cases, including 23 461 deaths, were reported in the Region, giving an overall case fatality ratio of 2.7%. Fig. 4.3 illustrates progressive improvement in detection and reporting of cholera cases, from 1971 to 2013, in the Region.
Early detection of emerging dangerous pathogens

The Ebola virus was first diagnosed in 1976 in Yambuku, a village along the River Ebola in the Democratic Republic of Congo. Since then, more than 20 Ebola outbreaks have occurred, mainly in eastern and central African countries. Progress made by countries in strengthening their national public health laboratories’ capacities and the networking of laboratories at regional level has led to early detection of emerging dangerous pathogens, such as Ebola and Marburg viruses, and enabled a better, more effective response. There has been a significant progressive decrease in the number of cases and deaths recorded during Ebola virus disease outbreaks over the past 30 years.

The importance of early detection was underscored by the ongoing epidemic of Ebola virus disease in Guinea, Liberia and Sierra Leone. In March 2014, Guinea notified WHO about cases of Ebola virus disease. The cases were initially confined to rural Guinea with the epicentre being Gueckedou. What started as a rural outbreak has spread to Conakry, the capital of Guinea, as well as across the borders into Liberia and Sierra Leone. The current Ebola virus disease outbreak has surpassed all other outbreaks in terms of cases, deaths and geographic spread across Guinea, Liberia and Sierra Leone. As of 19 October 2014, the cumulative number of cases attributed to Ebola virus disease in the three countries stands at 9936, including 4877 deaths.

Enhanced systems for detection and response to pandemic influenza

When the pandemic influenza H1N1 emerged globally, countries in the Region enhanced their pandemic influenza preparedness and response systems. Actions taken included:

- reactivation of public health event management committees;
- updating the national pandemic influenza preparedness plans, based on the regional pandemic influenza preparedness plan;

Fig. 4.3. Trend of cholera cases and deaths reported in the WHO African Region, 1971–2013

<table>
<thead>
<tr>
<th>No. of cholera cases and deaths reported</th>
<th>Case fatality rate (per 100 cases)</th>
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<tbody>
<tr>
<td>1971–2013</td>
<td>0–20</td>
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stabilizing networking of influenza laboratories at the regional level;
- prepositioning of essential supplies, reagents and drugs;
- strengthening of early-warning alert and response systems;
- procurement of influenza vaccines.

These preparedness activities resulted in the early detection of the first case of pandemic influenza (H1N1) in South Africa in June 2009, and subsequent cases in other countries in the Region.

**Enhanced cross-border collaboration to improve preparedness and response to epidemic and pandemic diseases**

Following the adoption and implementation of the International Health Regulations (2005) to prevent, protect against, control and provide public health responses to the international spread of diseases, there has been increased collaboration between Member States to address priority epidemic- and pandemic-prone diseases likely to cross their borders. In 2011, ministers of health from Angola, the Congo, the Democratic Republic of Congo, Namibia and Zambia held a cross-border ministerial meeting in Lusaka, Zambia, signing a memorandum of understanding on cross-border collaboration on epidemic diseases and other public health issues. This collaboration has promoted synchronization of vaccination campaigns in the control of epidemics such as polio and yellow fever. In addition, the WHO Regional Office for Africa convened a 2-day emergency ministerial meeting on the Ebola virus disease outbreak in Accra, Ghana, in July 2014. The meeting reached a consensus on coordinated actions by all stakeholders, effective national leadership, and enhanced cross-border collaboration in the response. A subregional control centre has been established in Guinea to act as a coordinating platform to consolidate and harmonize technical support to countries by all major partners and assist in resource mobilization.

**Neglected tropical diseases**

The Region bears a disproportionately high burden of NTDs, diseases that affect mainly impoverished and disempowered populations. Some of these diseases, including guinea-worm disease, Buruli ulcer and human African trypanosomiasis, are found only on, or mainly on, the African continent. NTDs are distinguished by their slowly evolving symptoms that often lead to debilitating complications. All 47 countries in the Region are endemic for at least one NTD and 36 of them (78%) are co-endemic for at least five of these diseases.

Although neglected, hundreds of millions of people are at risk of these diseases: 470 million for lymphatic filariasis; 330 million for soil-transmitted helminthiasis; 250 million for blinding trachoma; 220 million for schistosomiasis; and 123 million for onchocerciasis. Chronic and insidious, these diseases impair the physical and intellectual capacities of affected people, thus perpetuating the poverty cycle and impeding socioeconomic development. Their impact on agricultural productivity contributes to poverty over
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Generations. In terms of DALYs and deaths, of the global burden attributable to infectious and parasitic diseases, NTDs account for 25% of DALYs and 10% of the deaths. In 2001, it was estimated that the burden of lymphatic filariasis alone was 4.7 million DALYS annually.

Many NTDs are treatable and preventable, and have thus been targeted for eradication or elimination. These include guinea-worm disease (dracunculiasis) and yaws, lymphatic filariasis, onchocerciasis, schistosomiasis, soil-transmitted helminthiasis and blinding trachoma. Leprosy and human African trypanosomiasis, which are treated using intensified case management, are also targeted for elimination as public health problems. Buruli ulcer and leishmaniasis are still targeted for control, not elimination, because of lack of simple diagnostic tools, and safe and affordable medicines.

What works?

The two most effective approaches for preventing and eliminating NTDs are:

- Mass administration of medicines (preventive chemotherapy) for diseases such as lymphatic filariasis, onchocerciasis, schistosomiasis, and soil-transmitted helminthiasis;
- Early case finding and decentralized case management for Buruli ulcer, dracunculiasis, human African trypanosomiasis, leprosy, leishmaniasis and yaws.

Elimination of blinding trachoma is managed effectively using the SAFE approach (Surgery, Antibiotics, Facial cleanliness, and Environmental changes).

Mass-administered preventive chemotherapy

The most effective intervention for the five commonly occurring NTDs is mass-administered preventive chemotherapy over several years. Although the cost of such treatment is low, it is still beyond the reach of many governments and individuals, and coverage levels remain too low. In 2006, WHO launched a preventive chemotherapy and transmission control strategy based on available, safe and effective drugs that can be administered to all at-risk populations. A variety of methods such as school health days, child health days, vaccination campaigns, community-directed treatment initiatives, and other proven mass drug administration activities are being used to deliver these treatments to communities at risk. For example, Togo successfully interrupted the transmission of lymphatic filariasis by conducting annual mass administration campaigns using ivermectin and albendazole, between 2000 and 2009 (Box 4.5). The success of the mass treatments was due to social mobilization and information, education, and communication campaigns, carried out before and during the medicine distribution and involvement of community health workers in the distribution of the medicines.

Box 4.5. Elimination of lymphatic filariasis in Togo: a success story

In 2010, Togo was the first country in the WHO African Region to eliminate lymphatic filariasis. The country conducted at least six consecutive rounds of mass treatments in targeted districts. These mass treatments, conducted door-to-door with the support of community health workers, led to the killing of the microfilaria and interrupted local transmission of the disease. The success of the mass treatments was due to social mobilization and information; education and communications campaigns, carried out before and during the medicine distribution; and involvement of community health workers in the distribution of the medicines.

Further to conducting assessment surveys in 2009 and 2010, the country was confirmed free of local transmission of lymphatic filariasis. Since then the country has been under post-mass drug administration surveillance, which is carried out nationwide through a network of district level laboratories and has confirmed the interruption of local transmission of the disease.
Early case findings and decentralized case management

Preventing blinding trachoma

Trachoma, an infection of the eye caused by *Chlamydia trachomatis*, is an important cause of blindness in the Region (Fig. 4.4). Active infection often begins during infancy or childhood and can become chronic. If left untreated, it ultimately leads to irreversible blindness, typically between 30 and 40 years of age. Infection spreads from person-to-person, and is frequently passed from child-to-child and from child to mother, especially where there is shortage of water, numerous flies and crowded living conditions. Treating and preventing trachoma requires implementation of the SAFE strategy. This involves providing surgery for those who already have complications, antibiotics to people in endemic communities, face washing, and environmental changes (improving personal hygiene and access to clean water).

Ghana eliminated blinding trachoma in 2013 (Box 4.6). Burkina Faso started mass drug administration of azithromycin in 2010 in 30 districts that had been confirmed as endemic for trachoma. An impact assessment conducted in 2013 showed significant reduction in trachoma prevalence, with only four districts remaining endemic.

Guinea-worm eradication

The success of efforts to eradicate guinea-worm disease is remarkable because there are no specific drugs or vaccines available to treat the disease. Preventive measures such as health educ-
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Box 4.6. Elimination of blinding trachoma in Ghana

Ghana, which eliminated blinding trachoma in 2013, began activities to control the disease in 2000, when 16% of children had trachomatous inflammation – follicular. The full SAFE (Surgery, Antibiotics, Face washing and Environmental changes) strategy was implemented from 2004 and by 2007–2008, the highest prevalence detected was 2.8%. By that time, 70% of households had access to potable water and 38% of households had access to household latrines.

The success of the SAFE programme has been linked to the strong collaboration between the Ministry of Health, other ministries and nongovernmental organizations. Many stakeholders from the health, education and water, sanitation and hygiene sectors were involved in initial planning and budgeting for implementation of the SAFE strategy, which was implemented in full in all endemic districts.

Active screening is carried out by ophthalmic nurses using a magnifying glass and flashlight. Passive screening is conducted by appropriately trained health workers, who submit a list of suspected cases to the subdistrict health authorities every 2 weeks. Active case-finding and treatment are performed by an ophthalmic nurse who visits the community and screens schoolchildren and the families of children with suspected cases. At the beginning of every academic year, five schools in every district undergo screening. Awareness of the health problem has been increased over the years by regularly broadcasting messages on local radio stations and via school health activities, provision of information materials and involvement of local chiefs and community leaders.

been certified by WHO as guinea-worm disease free. Four countries are non-endemic, although not yet WHO-certified (Fig. 4.5). The remaining four are still endemic but are making good progress to interrupt transmission.

Leprosy elimination

Leprosy has been eliminated as a national public health problem (a prevalence rate less than 1 case per 10 000 inhabitants) in all countries of the Region since 2007. It only remains highly endemic in localized areas in some districts of countries, for example in the Comoros (Island of Anjouan) and the Democratic Republic of the Congo (in the provinces of Bandundu, Equateur, Katanga and Province Orientale). The success of leprosy elimination is to be linked to simplified diagnosis and classification of cases into multibacillary and paucibacillary forms of the disease for treatment. This classification is based on counting the number of skin patches or leprosy lesions; multibacillary cases having more than five skin patches or lesions. WHO recommended multiple-drug chemotherapy composed of the administration of monthly blister packs of two antibiotics for 6 months or three antibiotics for 12 months, depending on the form of the disease. This multiple-drug chemotherapy has been key to successful elimination, along with integration into primary health care and decentralizing treatment to community level, with involvement of volunteers enabled to carry out early diagnosis and cure millions of cases of leprosy. As the example from Mozambique shows (Box 4.7), social mobilization and community participation was instrumental to eliminating leprosy.

Noncommunicable diseases

The Region has not escaped the global epidemic of NCDs. WHO estimates that deaths from NCDs are likely to increase globally by 17% over the next 10 years, and the Region will experience a 27% increase, that is 28 million additional
deaths from these conditions which are projected to exceed deaths due to communicable, maternal, perinatal and nutritional diseases combined by 2030. In some African countries, such as Mauritius, Namibia and Seychelles, NCDs cause over 50% of all reported adult deaths. This implies that NCDs will soon be a leading cause of ill health, disability and premature death in the Region, and will have an adverse impact on socioeconomic development.

The four main risk factors for major NCDs are tobacco use; physical inactivity; harmful use of alcohol; and unhealthy diet. These risk factors, acting singly or in combination, significantly contribute to common NCDs and related conditions. The risk factors for NCDs that influence individuals, households and communities are driven by social and economic determinants that exist outside the domain of the health sector. These include poverty, globalization, trade, education, urbanization, climate change, employment conditions and gender disparities among others (see Chapter 5 for further discussions on risk factors.).

The Region is still at an early stage of the NCD epidemic and if it is able to develop a response to this challenge using low-cost health solutions, particularly prevention and health promotion to the entire population, it may be able to stem the tide of NCDs. Legislation will be a key element and all government departments, nongovernmental organizations and the private sector

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Fig. 4.5. Dracunculiasis (guinea-worm disease) certification status of countries in the WHO African Region, beginning of 2013

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should work together to strengthen the proposed organization of care for NCDs at the primary, secondary and tertiary health care level and ensure a comprehensive approach to the problem.

**Cardiovascular diseases**

Cardiovascular diseases such as hypertension, stroke, heart failure and diseases of the coronary arteries are increasing rapidly in the Region and now represent a major public health problem. Cardiovascular diseases have a major impact on individuals, families and societies in terms of health-care costs, absenteeism and loss of productivity.

One reason for the recent rise in cardiovascular diseases is the ageing population in the Region. Behavioural and physiological risk factors (raised blood pressure, blood glucose and blood cholesterol, overweight and obesity) are responsible for 75% of cardiovascular diseases. An important phenomenon seen in Africa is a tendency for symptoms to appear at younger ages.

High blood pressure is a very common problem among adults in the Region, which reports the world’s highest prevalence of hypertension (38.1% among males, 35.5% among females) with some countries (e.g. Cabo Verde, Mozambique, Niger, Sao Tome and Principe) reporting prevalence rates of 50% or higher. The prevalence of hypertension has increased significantly over the past two to three decades. There were approximately 80 million adults with hypertension in sub-Saharan Africa in 2000 and projections based on current epidemiological data suggest that this figure will rise to 150 million by 2025. Furthermore, there is evidence indicating that complications of hypertension, particularly stroke and heart failure, are becoming increasingly common in sub-Saharan Africa.

High salt intakes are common in the Region, usually because salt is used to preserve food but also because it is added to make food tastier. Salt is also added to already-prepared food by the consumer, as processed food is rare. Studies have shown that decreased salt intake not only reduces blood pressure and related cardiovascular disease risk, but has other beneficial cardiovascular effects (see Chapter 5 for discussion of country efforts to reduce salt levels in food).

**Chronic respiratory diseases**

Chronic respiratory diseases such as asthma, chronic obstructive pulmonary disease, tuber-
Tuberculosis and lung cancer, are major causes of illness and death among Africans. These may start in childhood through exposure to infection, indoor air pollution and tobacco smoke and cause great disability and eventual death in older adults. Chronic respiratory diseases have received little attention in the Region but an emerging body of evidence suggests that the burden of disease attributable to them is substantial and underrecognized. Asthma prevalence is rising in Africa, possibly due to increased urbanization and air pollution. An asthma prevalence of 23% has been reported in urban South Africa.

A Global burden of disease study estimated the global prevalence of chronic obstructive pulmonary disease to be 9.33 per 1000 people for men and 7.33 per 1000 for women. In sub-Saharan Africa, the rates are 4.41 per 1000 for men and 2.49 per 1000 for women. As the world’s population ages, these estimates are projected to rise to alarming levels in the context of the continued exposure to potential risk factors such as tobacco smoke, biomass fuels and environmental dusts. It is important to note that infectious diseases prevalent in the Region, such as tuberculosis, have a powerful impact on respiratory disease. Studies in South Africa found that a history of tuberculosis infection was the commonest risk factor for chronic obstructive pulmonary disease. Infection with HIV has a very poor prognosis in people with chronic obstructive pulmonary disease, as it often leads to rapid decline in lung function.

Cancer

Cancer is on the rise in the Region, especially among women, who have the world’s highest rates of cervical cancer. Major causes of cancer in Africa are infectious agents, increasing tobacco and alcohol use, unhealthy diets, physical inactivity and environmental pollution. A greater proportion of cancers are caused by infectious agents (36%) than are seen in other parts of the world: such cancers include cervical, liver and stomach carcinomas, Kaposi’s sarcoma and Burkitt’s lymphoma. The most common cancers among women are breast, cervical, stomach, lung and colorectal cancer. Breast cancer incidence rates show marked inequalities between rich and poor countries. Although the highest incidence is seen in more developed regions, mortality rates are relatively much higher in less-developed countries due to late detection and poor access to treatment facilities. Among men, the most common cancers are prostate and liver cancers.

Estimates from 2008 show that cancer was responsible for 5% of deaths in the Region; ranging from 2% in countries such as Burkina Faso, the Democratic Republic of Congo, Mali, Niger, Sierra Leone and Zimbabwe, to 7% in Algeria. Projections for 2030 suggest there will be 1.3 million cases and about 1 million deaths from cancer in the Region, largely as a result of population growth and ageing. However, two of the most common cancers in the Region – cervical and liver cancer – are associated with vac-
cine-preventable infections. These cancers are more prominent in the Region than other parts of the world, suggesting that use of appropriate, currently available vaccines may reduce the incidence of these cancers in future generations.

**What works?**

Strong leadership to tackle the use of tobacco

Smoking tobacco is the strongest risk factor for chronic respiratory and cardiovascular diseases, including cancer. A combination of legislation and evidence-based advocacy for government intervention has been instrumental in the fight against tobacco. South Africa has shown that tobacco control works to prevent chronic lung disease. Initially, strong and consistent lobbying was needed to persuade the government to implement an effective tobacco control strategy. Country-specific research, drawn from a variety of disciplines, was used to provide a credible evidence base to back the lobbyists’ appeals. Once the South African Government decided to act, they used several strategies. Rapid increases in the excise tax on cigarettes, which increased the price, were particularly effective in reducing tobacco consumption. An increase of 10% in the real price of cigarettes decreased consumption by between 6% and 8% in South Africa. While an increase in the excise tax is generally regarded as the most effective tobacco control measure, tobacco control legislation also plays an important role in a comprehensive tobacco control strategy. Bans on tobacco advertising and bans on smoking in public and in workplaces, as introduced in South Africa, make other tobacco control interventions more effective. Tobacco control legislation, particularly laws banning smoking in indoor public places, is largely self-enforcing as it clarifies and explains that the rights of non-smokers to clean air supersede the right of smokers to smoke (see Chapter 5 for further discussions on risk factors).

**Visual cervical cancer screening and cryotherapy**

Pilot studies conducted in two areas (rural and urban) in Guinea over 4 years found that use of simple visual tests to screen the cervix detected 300 precancerous lesions and 100 invasive cervical cancers that were then treated. All women with cervical lesions received timely treatment, either cryotherapy (freezing off the lesion) for precancerous lesions or surgery and radiotherapy for invasive cancers. There is an urgent need to make these affordable and effective approaches available, not only throughout Guinea but also in other African countries.

**Sickle cell disease**

Sickle cell disease, a genetic condition where red blood cells are malformed into a crescent or sickle shape, is the most prevalent genetic disease in the Region. The misshapen cells can block small blood vessels, slowing blood flow, causing chronic pain, infection and even tissue death. The shape of the cells also means they are more easily destroyed, making someone with sickle cell disease likely to develop anaemia. Although more than 40 countries in the Region
have people with sickle cell disease, most of the information about prevalence comes from hospitals so may not give a complete picture of how many people are affected in the community. Most sickle cell disease complications are easily treated but these treatments are not accessed by most patients, specifically the vulnerable groups: children less than 5 years of age, adolescents and pregnant women. Laboratory facilities able to make an accurate diagnosis are also limited. People with sickle cell disease are often stigmatized, and recurrent sickle cell crises interfere with education, work and psychosocial development. In the Democratic Republic of Congo, 12% of children hospitalized in paediatric wards have sickle cell disease and the estimated annual cost for care is more than US$ 1000 per patient.

Despite logistic and economic constraints, neonatal sickle cell disease screening together with comprehensive health care management has been successfully practised in some parts of Africa. Comprehensive health care management consists of: parental and patient education; adequate nutrition; adequate hydration; use of prophylactic antibiotics and antimalarials; folic acid supplementation; use of specific vaccines; continuous medical follow up; and early detection and management of complications. Successful implementation of comprehensive health care management is possible with trained personnel, dedicated facilities, and tailoring the strategies to the local needs of each community. In Benin, where comprehensive health care management has been implemented, the mortality from sickle cell disease in children less than 5 years of age is 10 times lower than the overall local mortality rate for children less than 5 years of age.

**Noma**

Noma, often described as “the face of poverty”, affects children under the age of 6 years in sub-Saharan Africa. Most countries in the Region report cases of noma, with Burkina Faso, Ethiopia, Mali, Niger, Nigeria and Senegal recording the highest numbers; an estimated 100 000 cases. Noma is a severe type of gangrene that starts as a benign lesion of the gums or cheek before rapidly destroying both the soft and hard tissues of the mouth and face. In the absence of treatment, the disease is fatal in 70–90% of cases. Survivors are disfigured for life and the functional damage can leave them unable to speak or eat.

In recent years, several countries have built capacity by training health workers, especially in health posts and district clinics, to identify and manage noma. Equally important is ensuring that all health centres have the necessary antiseptics and drugs to treat the disease and nutritional supplements to treat malnutrition in these children. Informing at-risk groups, especially mothers, about what the disease is and how it can be prevented and cured is crucial. Early detection can be achieved simply by ensuring all children are examined for ulcerations of the mouth. Finally, awareness campaigns are essential to overcome discrimination and false myths, such as belief in the risk of contamination.

**Mental and neurological disorders**

Mental health services specifically catering for people with severe psychiatric illness remain very limited in the Region. Severe and untreated mental disorders are a major risk factor for permanent disability and premature death. According to the *Mental health atlas 2011*, 80% of people who suffer from severe mental, neurological and substance use disorders in the Region do not receive any form of standard treatment. This may be due to lack of information, lack of access to health care, stigmatization and discrimination but is most often due to a lack of qualified mental health-care workers able to provide appropriate services.
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What works?
Providing mental health services at primary health care level
Some countries in the Region, such as Botswana, Côte d’Ivoire, Ethiopia, Madagascar, Namibia, Nigeria, South Africa and Uganda, are reporting good results after the integration of mental health into primary and general health care. Countries such as Ethiopia, Ghana, Mauritius, Mozambique, Nigeria and Uganda are also applying the mental health Gap Action Programme (mhGAP) developed by WHO, which outlines ways to identify and care for people with mental health problems at primary health care level, particularly where specialized services are not available or difficult to access (Box 4.8). Other countries such as Benin, Burkina Faso, Burundi, Mauritius, Niger, Sierra Leone and Togo are using mhGAP modules for the treatment of mental, neurological and substance use disorders.

Road traffic injuries

Although the Region possesses only 2% of the world’s vehicles, it contributes 16% to global road traffic deaths and has the highest road fatality rate of all WHO regions.

Nigeria and South Africa have the highest fatality rates (33.7 and 31.9 deaths per 100,000 population per year, respectively) in the Region. More than one in four deaths in the Region occurs on Nigeria’s roads. Nigeria and six other countries (the Democratic Republic of the Congo, Ethiopia, Kenya, South Africa, Uganda and the United Republic of Tanzania), account for 64% of all road deaths in the Region. These seven countries must reduce their road deaths considerably if the Region is to achieve a significant reduction in deaths.

Vulnerable road users – pedestrians, cyclists and people riding motorized two- and three-wheelers – constitute more than half (52%) of road users killed on the Region’s roads. More than one third of people killed were pedestrians (37%). However, there are significant variations across countries. For instance, in Liberia and Mozambique being a pedestrian is particularly dangerous. In Mozambique, 55.5% of those killed on the road were pedestrians and in Liberia, 66.3% of road deaths were on foot. However, in the Democratic Republic of Congo, 5% of those killed were pedestrians.

Box 4.8. How the adapted mental health Gap Action Programme (mhGAP) is managing mental and neurological disorders in Mauritius

Under the WHO Biennium 2012–2013 Work Plan, the WHO mhGAP Intervention Guide was adapted to local settings and disseminated to medical and health officers and community physicians in the Ministry of Health of Mauritius. In the country there has been only partial decentralization of psychiatric services. Although the country has psychiatrists at the regional hospitals and they attend clinics at some of the area health centres, there are no such clinics at the community health centres. Psychiatric nurses in any of the five regional hospitals are limited and there are no community psychiatric nurses. The psychiatric disorders that were included in the adapted WHO mhGAP were depression, psychosis, bipolar disorders, dementia, alcohol use disorders and self-harm/suicide. A total of 110 nursing cadres from the regional hospitals were trained on the adapted mhGAP, which has definitely helped in the management of psychiatric patients both at the regional hospitals, and the area and community health centres where nursing staff work on a rotational basis. They are now in a better position to observe and manage the patients and counsel them.

About 20–25% of patients attending the outpatient clinics at the area and community health centres have psychiatric disorder comorbidity present with their physical illnesses. Dissemination of adapted mhGAP to the medical and health officers and the community physicians helps them to better manage the mental health problems of their patients and prevent the worsening of their conditions. The mhGAP has also helped them to identify those cases that need to be referred to specialists for treatment.
Most countries in the Region still lack policies for protecting vulnerable road users and have not yet enacted comprehensive laws concerning the major risk factors: speed control, driving under the influence of alcohol, helmet and seat-belt use, and use of child restraints. When laws are in place, poor enforcement renders them ineffective. Finally, post-crash care is inadequate or lacking in many countries.

While statistics clearly point to a high economic cost to the respective countries, only nine countries have calculated an estimate of the cost in terms of their gross domestic product. This ranged from 1% in six of the countries, to 9% in Angola.

Road safety management must encompass the following enforced laws to reduce road traffic injury risks: speed limits; prevention of driving under the influence of alcohol; wearing of motorcycle helmets and seatbelts; use of child restraints; and prohibition of mobile phone use while driving. Roads should be designed to ensure the safety of their users, and be subjected to safety audits performed by an independent agency. Lastly, efficient surveillance and post-crash care must be available, including communication (emergency numbers), and transportation to health facilities with trauma services.

Complex disease interactions

NCDs are complex, have shared risk factors and may develop as complications of communicable diseases and/or their treatment. Challenges for the Region include:

- the association between diabetes and tuberculosis;
- the effects of use of ART for HIV, which increases the risk of developing metabolic syndrome;
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- HIV infection itself, which has been linked to an increased risk of developing both diabetes and cardiovascular disease.

Where an individual has such complex illness, proper management of all conditions is necessary to ensure good outcomes. For instance, good tuberculosis management is necessary for good diabetes management and good diabetes management is necessary to ensure the success of tuberculosis treatment.

What works?

Patient-centred care

The health systems in the Region need to find ways to address these interplays between conditions and risk factors and move away from a disease focus to one more centred on the individual who may have one or more risk factors and/or diseases that cut across the traditional noncommunicable/communicable disease boundaries. In looking at the joint burden of diabetes and tuberculosis, experts have defined key areas that need to be addressed, namely screening of people with diabetes for tuberculosis (and vice versa), the impact of poor diabetes management on tuberculosis, the implementation of a DOTS model for diabetes management, and the development and evaluation of better point-of-care diagnostic and monitoring tests (Box 4.9).

The Region is still at an early stage of the NCD epidemic and if it is able to develop a response to this challenge using low-cost health solutions, particularly prevention and health promotion to the entire population, it may be able to stem the tide of NCDs. Legislation will be a key element and all government departments, nongovernmental organizations and the private sector should work together to ensure a comprehensive approach to the problem.

In conclusion, the diseases threatening the health of the people of the Region are many and varied. The Region has taken great strides in implementing cost-effective interventions to mitigate the impact of the various communicable diseases. Certain issues need to be addressed, such as sustainable funding, responsiveness to new evidence and the scaling up of a range of interventions. Success stories suggest that these interventions can work if fully implemented and sustained. Throughout this chapter we have looked at ongoing efforts or what has been shown to work for improving the health of the people in the Region, particularly reducing the communicable and noncommunicable disease burden. The outcomes and impact observed were the result of a full involvement of health facilities at all levels of the health system, community and a wide range of stakeholders at country and regional levels. Some of the best approaches

<table>
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<tr>
<th>Box 4.9. Proposed organization of care for noncommunicable diseases (NCDs)</th>
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<tr>
<td><strong>Primary health care level:</strong></td>
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<tr>
<td>- make presumptive diagnosis;</td>
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<tr>
<td>- refer to secondary level for initiation of treatment;</td>
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<tr>
<td>- routine care using adapted clinical guidelines as a basis;</td>
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<tr>
<td>- primary health-care worker’s role is to manage the person with diabetes – any abnormal results (e.g. elevated blood pressure, elevated blood glucose, etc.) or complications would mean the patient is referred to the secondary care level;</td>
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<tr>
<td>- patient education adapted to the individual and local context.</td>
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<tr>
<td><strong>Secondary health care level:</strong></td>
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<tr>
<td>- confirmation of diagnosis made at primary health care level;</td>
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<tr>
<td>- initiation of treatment and education;</td>
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<tr>
<td>- screening for complications;</td>
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<tr>
<td>- routine care, referral and support to primary level.</td>
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<tr>
<td><strong>Tertiary health care level:</strong></td>
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<tr>
<td>- establish NCD centres of excellence;</td>
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<tr>
<td>- diagnosis of complications;</td>
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<tr>
<td>- provision of care for complications;</td>
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<td>- routine care, referral and support to secondary and primary levels.</td>
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to prevent and treat many diseases include the strengthening of health systems, which will be discussed in Chapter 6, and managing risks, which will be the subject of Chapter 5.

**Bibliography**

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