Ending disease in Africa

Trends in communicable and noncommunicable disease burden and control in Africa

World Health Organization
African Region

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UHC/UCN Cluster
World Health Organization
Regional Office for Africa

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Foreword

To address the burden of disease in the WHO African Region we need to understand exactly where we are. This report highlights the status of the most significant infectious and noncommunicable diseases across the African region, with a focus on progress made towards elimination, eradication and control. It is the first report of its kind from the newly established Precision Public Health Metrics Unit of the Universal Health Coverage/Communicable and Noncommunicable Diseases Cluster, which has a focus on data science and analytics. As we evaluate these successes and understand how these were achieved, we need to use these lessons to inform future actions in order to regain the momentum that was lost during the COVID-19 pandemic. It is clear that there needs to be a common management strategy, allowing for the very different nature of each disease grouping. This should be grounded in equitable access to health and education, and safe, healthy and resilient ecosystems.

We cannot ignore the effects of climate change and political instability across our Region and their increasingly obvious significant adverse effects on our populations. This comes in the context of major geopolitical upheaval and change, widening the gap between the resources of the global north and the global south. This shift in focus is coming at a time of increasing ability to tailor public health interventions. This is seen in the technical support being provided to our Member States by the WHO Regional Office for Africa, as we harness technology to provide the means to better understand, and so respond to, the burden of disease across the region.

Building on the information and data management systems that the WHO Regional Office for Africa developed in the response to COVID-19, we can collect and analyse real-world data to inform evidence-driven interventions and policy response. The WHO Regional Office for Africa will continue and enhance its guidance to Member States to formulate and execute priority actions. We need to be agile in our use of resources, to do more with less and tailor our interventions to our specific situations. We need to devote time and resources to a greater understanding of the underlying determinants of health and disease across the region and ensure that we have the data that is needed to do this. This understanding is what will guide our future actions as we move towards achieving the 2030 goals. I remain committed to supporting Member States, through the work of the WHO Regional Office for Africa, to realize these goals.

Dr Matshidiso Moeti
WHO Regional Director for Africa

Acknowledgments

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Abbreviations

ACE	angiotensin-converting enzyme
ACT	artemisinin-based combination therapy
AIDS	acquired immunodeficiency syndrome
ALB	albendazole
An.	*An. Anopheles*
ANC	antenatal care
ARCC	Africa Regional Certification Commission for Polio Eradication
ARF	acute rheumatic fever
ART	antiretroviral therapy
ASCENT	Adherence Support Coalition to End TB
CDC	Centers For Disease Control and Prevention
CL	cutaneous leishmaniasis
CM-NTDs	case management-neglected tropical diseases
CoD	cause of death
COVID-19	coronavirus disease 2019
CRDs	chronic respiratory diseases
CRS	congenital rubella syndrome
cVDPV1/2	circulating vaccine-derived poliovirus type 1/2
CVDs	cardiovascular diseases
DALYs	disability-adjusted life years
DATs	digital adherence technologies
DDCC	digital documentation of COVID-19 certificate
DDCC: VS	digital documentation of COVID-19 certificate: vaccination status
DDM	death distribution methods
DEC	diethylcarbamazine citrate
DHIS2	District Health Information Software 2
DHS	demographic health surveys
DNDi	Drugs For Neglected Disease Initiative
DPT1	diphtheria, tetanus, and pertussis dose 1
DPT3	Diphtheria, Tetanus, and pertussis dose 3
E-2020	Malaria eliminating countries For 2020
EMMS	Electronic Medication Monitors
ESPEN	Expanded Special Project for Elimination of NTDs
FCTC	Framework For Convention on Tobacco Control
GHE	global health estimates
Global Fund	Global Fund To Fight Aids, Tuberculosis And Malaria
GTS	Global technical strategy for malaria 2016–2030
HAT	human African trypanosomiasis
HBHI	high burden to high impact
HCID	health certificate identifier
Hib	Haemophilus influenzae Type B
HIV	human immunodeficiency virus
HPV	human papillomavirus vaccine
HRP2	histidine-rich protein 2
HTH	hepatitis, tuberculosis and HIV
IA2030	Immunization Agenda 2030
ICCDE	International Commission for The Certification of the Eradication of Dracunculiasis
IDF	International Diabetes Federation
IPTp	intermittent preventive treatment in pregnancy
ITN	insecticide treated nets
IVM	ivermectin
LF	lymphatic filariasis
LLIN	long-lasting insecticide treated nets
Max-LEC	maximum-leprosy elimination campaigns
MCL	mucocutaneous leishmaniasis
MCV1	measles-containing-vaccine dose 1
MCV2	measles-containing-vaccine Dose 2
MDA	mass drug administration

MICS	multiple indicator cluster survey
Mini-LEC	mini-leprosy elimination campaigns
MIS	malaria indicator surveys
MNTE	maternal and neonatal tetanus elimination
NCC	neurocysticercosis
NCDs	noncommunicable diseases
Nm	Neisseria meningitidis
NTDs	Neglected Tropical Diseases
OECD	Organisation for Economic Co-Operation and Development
PBO	piperonyl butoxide
PC-NTDs	preventive chemotherapy-neglected tropical diseases
PCR	polymerase chain reaction
PCV3	pneumococcal conjugate vaccine dose 3
PEN	Package of Essential Noncommunicable Diseases
PHC	primary health care
PHEOC	public health emergency operations centre
PLHIV	people living with HIV
PMCTC	prevention of mother-to-child-transmission
PPH	precision public health
pre-SAC	pre-school aged children
RDT	rapid diagnostic test
RTS,S	RTS,S/AS01
SAC	school aged children
SARS-CoV-2	severe acute respiratory syndrome coronavirus 2
SBE	snake bite envenoming
SCD	sickle cell disease
SDG	Sustainable Development Goal
SMS	short message services
STH	soil-transmitted helminthiases
T1D	type 1 diabetes
TB	tuberculosis
TCT	total community treatment
TF	trachomatous inflammation—follicular
TF1-9	TF prevalence in children aged from 1 to 9 years
TT	trachomatous trichiasis
TTT	target total treatment
TVD	tropical and vector-borne diseases
UHC	universal health coverage
UCN	Universal Health Coverage/ Communicable and Noncommunicable Diseases
UN	United Nations
UNICEF	United Nations Children's Fund
USAID	United States Agency For International Development
VCP	vector control products
VL	visceral leishmaniasis
VST	video-supported treatment
WASH	water, sanitation and hygiene
WEUNIC	WHO and UNICEF Estimates of National Immunization Coverage
WHO	World Health Organization
WMR	World Malaria Report
YF	yellow fever

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Executive summary

This report is one of the first major products of the newly established Precision Public Health Metrics unit of the UCN cluster of the WHO Regional Office for Africa. The report presents national trends in communicable and non-communicable disease burden and control in the WHO AfricanRegion. It tracks progress made with respect to disease burden reduction, elimination and eradication. It also highlights major emerging threats, opportunities and priorities in the fight against communicable and noncommunicablediseases in the Region. It covers the period 2000-2022, but for some indicators, information is available only up to 2021.

The report shows the number of reported cases for malaria and vaccine-preventable diseases (meningitis, measles, yellow fever, pertussis, diphtheria, tetanus, and polio); disease incidence due to HIV, tuberculosis and four major noncommunicable diseases (cardiovascular diseases, cancers, diabetes and chronic respiratory diseases).

Progress and challenges in ending diseases

Since 2000, the WHO African Region has made significant progress in the control, elimination and eradication of many communicable diseases. The African continent was certified free of indigenous wild polio in August 2020. Algeria was the third African country to be officially certified as free of malaria in 2019, after Mauritius (1973) and Morocco (2019). Additionally, Botswana, Cabo Verde, Comoros, Eswatini and South Africa are on track to malaria elimination. A total of 42 countries have been certified free of Guinea worm disease, with only Angola, Chad, Ethiopia, Mali and South Sudan remaining. By March 2022, 30 African countries had been validated as achieving maternal and neonatal tetanus (MTN) elimination. By 2021, in the African Region, 88% of people living with HIV knew their status. Among people who knew their status, 89% were accessing treatment, and among people accessing treatment, 92% were virally suppressed. This marks significant progress toward the global target 95% target across all these three indicators.

However, despite these success stories, elimination challenges remain. Eight countries (Angola, Central African Republic, Guinea, Mali, Nigeria, Somalia, Sudan, and South Sudan) are yet to eliminate maternal and neonatal tetanus (MNT). In 2021, a total of 3825 new autochthonous visceral leishmaniasis cases were reported from 10 countries, with the African Region accounting for 33% of the global burden.

Nigeria, Democratic Republic of the Congo, Mozambique, United Republic of Tanzania, Angola, Ethiopia, Uganda, Côte d'Ivoire, Cameroon and Madagascar are the top 10 countries facing the highest disease burden in Africa, including malaria, HIV, and tuberculosis. Two of these countries, Nigeria and Ethiopia, make up 15.3% and 8.6% of the African population. In 2021, approximately 233.4 [210.3 – 262.2] million cases of malaria, predominantly due to *Plasmodium falciparum* (99.7%), and 593 470 [552 587 - 727 834] malaria-related deaths were reported in the African Region, representing 95% of the global malaria case burden.

Tuberculosis continues to be a significant public health problem. The incidence of the disease is estimated at 212 per 100 000 people in the sub-Saharan African Region. An estimated 501 000 [436 000 - 571 000] TB-related deaths were recorded in 2021. The African Region accounted for 24% of global cases and 32% of deaths.

Two thirds of the 25.6 million [23.4-28.6 million] people living with HIV ((PLHIV) globally live in the African Region, with the majority in East and Southern Africa [16.3 million]. The 10 countries with the highest combined burden of malaria, HIV and TB and HIV in 2021 were Angola, Central African Republic, Congo, Democratic Republic of the Congo, Liberia, Mozambique, Angola, South Africa, Uganda, Liberia, Zambia, and United Republic of Tanzania.

Neglected tropical diseases (NTDs) are also responsible for a high burden of disease in the Region. Of the 20 NTD groups globally, 19 of these (the exception is Chagas disease) are present in Africa, with two targeted for eradication (yaws and dracunculiasis), and nine targeted for elimination (human African trypanosomiasis (HAT), leprosy, lymphatic filariasis, onchocerciasis, trachoma, visceral leishmaniasis, schistosomiasis, soil-transmitted helminthiasis and rabies). The population at risk, requiring treatment for NTDs amenable to preventive chemotherapy (PC-NTDs), has increased to approximately 659 million people in 2021, compared to 555 million in 2014.

Vaccine-preventable diseases remain a challenge in the Region. The first dose of diphtheria, tetanus, and pertussis vaccine (DTP1) coverage was 80% across the region but varied subnationally and the drop-out rate between the first and third dose of a DTP-containing vaccine was 9% across all countries. Vaccination coverage for DTP3, the second dose of measles-containing vaccine (MCV2), the third dose of pneumococcal conjugate vaccine (PCV3) and the human papillomavirus vaccine (HPV) across the life course in children and adolescents fell short of the 90% global target in 2021. WHO and UNICEF estimate that 7.6 million children in the African Region missed out on vaccination in 2021 and a further 11 million children were under-immunized, making up over 40% of the under-immunized and missed children globally.

In 2021, there were 207 167 suspected meningitis cases across the Africa meningitis belt reported through case surveillance, with the highest burden in Nigeria (76 626) and Ghana (24 080). Laboratory testing through polymerase chain reaction (PCR) across these countries in the meningitis belt show a test positivity rate of 11%.

A total of 88 789 cases of measles were reported in at least 35 countries in 2021. Most measles outbreaks were reported from Chad (2577), Democratic Republic of Congo (54 471), Mali (2074), Niger (9271) and Nigeria (10 649). The national coverage of the first dose of measles-containing vaccine, using WHO and UNICEF estimates in these countries, was Chad (55%), Democratic Republic of Congo (55%), Mali (70%), Niger (80%) and Nigeria (59%). The WHO African Region missed its target to eliminate measles by 2020. In 2021, there were 89 606 cases of measles, with 80% occurring in the Democratic Republic of Congo (54 471), Nigeria (10 649) and Niger (9271). There were 99 cases of congenital rubella syndrome (CRS) reported in four countries; Democratic Republic of Congo (57), Uganda (33), South Africa (8) and Eswatini (1).

The WHO African Region experienced significant adverse effects from the COVID-19 pandemic. Approximately

8.9 million cases of SARS-COV-2 (COVID-19) had been reported by December 2022, representing approximately 1.3% of the global COVID-19 cases. A total of 173 988 COVID-19-related deaths were recorded in the region with an estimated case fatality ratio of 2%. COVID-19 continues to have a wide impact on health service care delivery. At the end of 2022, a WHO analysis reported that roughly a quarter of Africa's population had been fully vaccinated against COVID-19. This increased to 40.8% of the population recorded as being fully vaccinated. Although the Region was far from reaching the year-end global target of protecting 70% of its population, modest progress had been made in vaccinating high-risk population, particularly the elderly.

The African Region experiences an increasingly high burden of noncommunicable diseases (NCDs), mainly cardiovascular diseases (heart disease and stroke), cancer, diabetes, chronic respiratory diseases, and poor mental health. Currently, the proportion of mortality due to NCDs ranges from 36% to 88%. Cardiovascular diseases, cancers, diabetes mellitus and chronic respiratory diseases account for over 70% of NCD-related mortality.

Gaps in data for tracking key disease indicators

In developing the Disease Outlook Report (DOR), the goal was to help countries better assess and respond with evidence to the changing disease epidemiological profile. Looking forward, the DOR will permit us to track progress towards ending diseases in Africa. In compiling the DOR, data was drawn from various sources, particularly from Global Disease Reports, the Global Burden of Diseases, Injuries, and Risk Factors, from where those that pertain to the WHO African Region were extracted. We found that most global reports were not regularly collecting data for some of thecritical indicators that would guide regional strategies and priorities, and be pertinent to the transformation agenda at WHO Regional Office for Africa. We observed that the gaps in data availability for tracking progress on diseases' epidemiological profiles were much greater than are the gaps in policies and programmes for addressing the SDGs. This study has shown that similarly large gaps remain for other measures of health, including recent burden-of-disease estimates, or subnational estimates on the disease burden, as well as stratified disease burden by risk factors or social determinants.

A growing body of empirical evidence shows a shift towards tailored application of interventions, with micro-stratification informing disease programmes' strategic planning.

Moreover, increasingly, public health is tapping into new sources of data, such as wastewater and environmental data, use of big data and advanced data analytics that provide even more insights into what's happening with diseases. Further, disease elimination and eradication, or high-burden-high-impact strategies, will require fine-scale disease estimates for targeted interventions, yet reported data is hardly available at the sub-national level. This makes it difficult, using aggregated national level data, to make informed data-driven prioritization of interventions. This clearly demonstrates that gaps exist in tracking key disease indicators.

Looking at the broader picture, for example, what are the next steps for fighting NCDs in Nigeria? Or identifying zero-dose children in Ethiopia, or highlighting cholera hotspots in Malawi? How do you reach out to paediatric HIV epidemic zones in South Africa? How can data be used to inform an action plan for the regional strategy and priorities for the prevention and control of noncommunicable diseases, epidemic prone-diseases, accelerating the major catch-up required for immunization across Africa? Put differently, how do you make interventions people-centred, and community focused? Data at the correct level are required. Precision public health aims to provide the right interventions to the right people at the right place and at the right time. This demands a paradigm shift in disease control, moving from disease response to disease intelligence, a resilient health system built on data ecosystems, and including a data-driven decision support system that should be designed to strengthen all stages of disease control. Data-driven support to surveillance in practice will depend on having a modern data infrastructure at the regional level for better country support.

Making this possible may require a first and simple step such as assessing data availability for disease prevention and control. Mapping can help identify gaps and the need for new and/or complementary data sources to develop appropriate health indicators. If there is a paucity of data, then a second step is to develop a flowchart detailing the steps associated with data gathering, information sharing, data management, data technology and data analytics. This lends itself to multiple opportunities for surveillance and monitoring the disease epidemiological landscape. Of course, there are various challenges associated with each step. However, use of advanced data analytics such as geospatial analysis has helped to bridge data gaps by providing the necessary estimates at fine scale. This has been demonstrated in this report by estimating sub-national immunization coverage, as shown in Section 5.7.

To better improve data for tracking SDGs and ending disease, the following next steps are projected:

- Establish data systems: DHIS2 is a tool with the potential to improve availability of health information that is key to health systems, but this critically depends on
  - Improving data collection across the health care system:
    - Handling big data: make use of data from institutions, partners and stakeholders across the country and various other health applications to control the disease spread.
    - The role of data-driven artificial intelligence (AI) on disease: It is noticed that the data-driven AI implementations are subsequently making a paradigm shift in public health delivery.
    - Predictive analytics: From building models to predict diseases to building web apps that can forecast the future disease burden.

In the UCN Cluster, we will work towards providing a roadmap for better country support - from the access to epidemiological data sources to the control of epidemic phenomena. We aim to review the available methodologies and discuss the challenges in the development of data-driven strategies, channelled to combat the spreading of diseases, and enhance disease elimination and eradication.


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1.

Introduction

To address the burden of disease in the WHO African Region, the WHO Regional Office for Africa has implemented a Transformation Agenda to enhance accountability, value for money, and tracking for health interventions. WHO's priorities in the Region include accelerating universal health coverage (UHC), building responsive health systems, and reducing disease burden through inter-cluster communication and collaboration. The Universal Health Coverage / Communicable and Noncommunicable Diseases Cluster (UCN) was established in 2019 to integrate disease prevention and control programmes within a health system strengthening framework.

As part of the Transformation Agenda, the UCN cluster adopted an approach of disease control through Precision Public Health (PPH) in 2021. The transformation agenda was adopted in response to stalled momentum towards the region's 2030 disease burden reduction targets, to accelerate momentum towards these targets in the WHO African Region, and to align with the Sustainable Development Goals (SDG) agenda of ensuring that no one is left behind[1]. The African Region was already off track in the drive towards targets 3.3 and 3.4 of the UN SDGs, a trend that was exacerbated by the effects of the COVID-19 pandemic on health systems and service delivery[2,3,4]. The pandemic has dimmed the medium-term economic outlook both globally and within the region, along with investments in health[5,6], adversely affecting the small gains, or stalling progress, on disease morbidity and mortality[3,4].

This can be seen in various diseases control programmes such as malaria, HIV and routine immunization. A regional evaluation of the Global Technical Strategy (GTS) for Malaria[7] of case incidence and mortality suggests that the 2021 targets and milestones were reversed in at least 21 countries and are on track in only eight countries. The current burden of HIV in Africa stands at nearly one in every 25 adults (3.9%) living with HIV, which accounts for more than two-thirds of the people living with HIV worldwide[8,9.] Regionally, childhood vaccination for priority vaccine-preventable diseases had stagnated in the last decade and has declined since 2015. Approximately 7.6 million children under the age of 2 years missed out on vaccination and 11 million were estimated to have missed out on the third dose of a diphtheria, pertussis and tetanus-containing vaccine. Additionally, only 25.9 million children received a first dose of the measles vaccine in 2021, representing a coverage rate of 68%. While the DTP1 coverage was estimated as 80%, the 9% dropout rate between DTP1 and DTP3 indicated an increase in the number of under-immunized children in the region. In summary, vaccination coverage rates are still below the desired target of 90% for all antigens.

Similarly, the burden of NCDs in the African region remains high. Sixteen countries in the region account for 15.9% of global cervical cancer mortality. Only 3% of the world's cancer treatment facilities are available in 22 sub-Saharan African countries, resulting in poor survival rates. Approximately 1 in 22 (24 million) adults aged 20-79 are living with diabetes in the African Region in 2021. There is also limited access to essential medicines and technologies for NCDs in primary health care (PHC) facilities. In addition, neglected tropical diseases (NTDs) affect approximately 1 billion people in tropical and subtropical regions with affected communities often struggling to access basic healthcare services[10]. However, the global response to NTDs has led to near eradication and elimination of NTDs in parts of the region. Data remain scarce for many other NTDs, which require innovative and intensified surveillance.

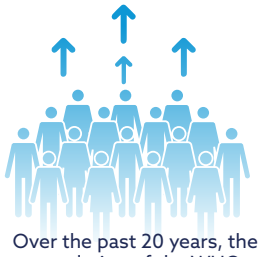
The purpose of this report is to collate and summarize the overall disease status and outlook across the WHO African Region looking at the years since 2015 and progress, or otherwise, towards the 2030 targets. The report is intended to be used by ministries of health, partners and donors when considering areas of focus in addressing the regional disease burden, as well as specific areas of disease elimination, eradication and control.

The report will discuss the population targeted for health interventions in the WHO African region, and the methods used to collect data. This will be followed by summaries of the major communicable and non-communicable diseases in the region. These sections will introduce each disease, progress and trends in disease control, elimination or eradication, as appropriate, and recommendations for possible future actions. Some determinants of health, such as access to health facilities, as well as the strategies being put in place by the WHO Regional Office for Africa to address the burden of disease in the Region will be discussed as cross-cutting issues for communicable and noncommunicable diseases.

2.

Methodology

2.1.
Context: Recent population changes in the WHO African Region

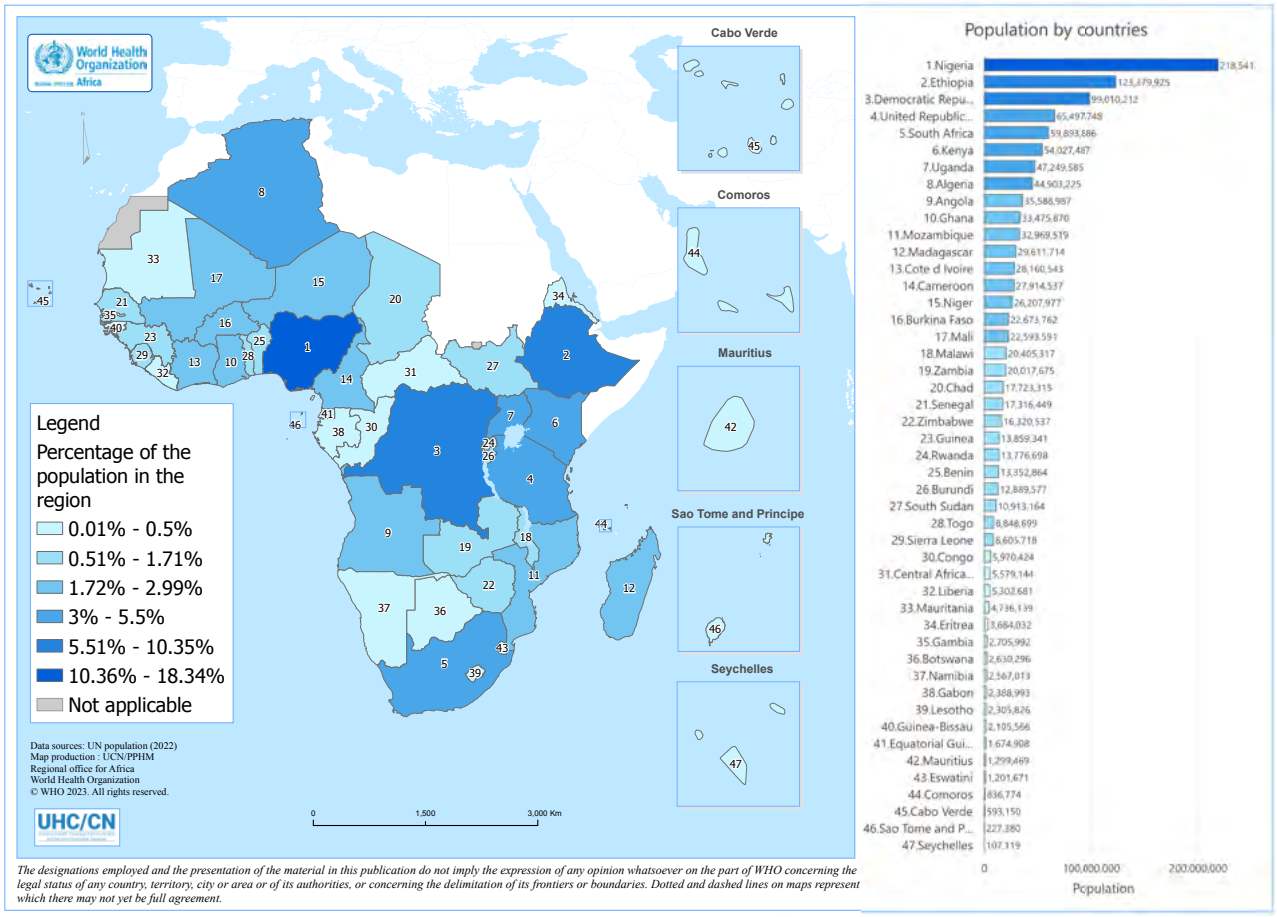


Over the past 20 years, the population of the WHO African Region has grown at an average annual rate of

2.7%

A starting point in addressing the disease burden across member states is understanding the population, given that the population is the denominator for many of the indicators. Over the past 20 years, the population of the WHO African Region has grown at an average annual rate of 2.7%. This growth is driven by high fertility rates and a decline in overall mortality[11]. This means that health programmes in the region have to reach a greater number of people to maintain the same coverage levels over time.

In 2021, approximately 1.1 billion people lived in the WHO African Region countries (47 member states) (Table 2.1). The population structure shows that the Region has a young population; 42% of its population are under 15 years and only 4.2% are over the age of 60. On average 14.3% of the population is under the age of 5 years, although this varies by country. The average number of children per woman of childbearing age (15-49 years) remains greater than or equal to 5.



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▲**Figure 2.1 Population distribution in the 47 countries of the WHO African region.**
Source: UN population division estimates at national level

▼**Table 2.1** UN population estimates for 2021 at the WHO Africa regional level

	Children < 2 years	Children under 5 years	Children (5-9 years)	Children (10-19 years)	Children <15 years	18+ years	Total all-age population
WHO African Region	74 523 352 (6.4%)	179 573 016 (15.4%)	233 041 645 (21.1%)	266 445 928 (22.9%)	679 060 589 (59.4%)	602 755 397 (51.8%)	1 162 657 992
West Africa including Algeria	29 984 259 (6.5%)	72 214 408 (15.6%)	86 269 294 (19.9%)	104 851 063 (22.7%)	269 334 765 (58.2%)	239 446 149 (51.7%)	462 716 902
Central Africa	14 130 682 (7.4%)	33 643 149 (17.7%)	25 981821 (13.6%)	44 090 252 (23.2%)	103 715 222 (54.5%)	91 318 109 (48.0%)	190 267 972
East and South	30 408 410 (6.0%)	73 715 458 (14.5%)	114 790 530 (22.4%)	117 504 613 (23.1%)	306 010 601 (60.0%)	271 991 139 (53.4%)	509 673 117

2.2. Data sources and statistical analysis

The data reported in this disease outlook report is compiled from a variety of sources, using data from surveys and modelling, as described in detail in Annex 1. In brief, the data were derived from re-analysis of global disease reports, programme-specific and country-specific reports. The re-analysis focused on disease burden indicators such as incidence, prevalence, mortality and disability-adjusted life years (DALYs). In general, standard indicator definitions were adopted (see Annex 1). The results of this analysis, displayed using summaries (in form of graphs, charts, tables and maps), shows patterns and trends in disease and interventions, up to 2021. These displayed variations between countries, within countries, and across implementing regions (West Africa including Algeria, Central Africa, East and Southern Africa) within the WHO African region.

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3.

Major communicable diseases in the WHO African Region

3.1.
Human Immunodeficiency virus (HIV) and acquired immunodeficiency syndrome (AIDs)

Four decades on, the HIV/AIDS pandemic remains a global health concern despite major advances in treatment and prevention[12,13]. The availability and scale up of antiretroviral therapy (ART) transformed the response on the continent and has led to marked reductions in morbidity and mortality, although inequalities exist at sub-national levels[14]. In addition, prevention strategies, including the prevention of mother-to-child-transmission (PMCTC), voluntary male medical circumcision and pre- and post-exposure prophylaxis have been instrumental in the response.

In 2021, there were an estimated 38.4 million [33.9–43.8 million] people living with HIV worldwide, of whom 36.7 million were adults (15 years or older) and 1.7 million were children under 15 years[18]. Two thirds of people living with HIV globally 25.6 million [23.4-28.6 million] live in the African region, with the majority in East and Southern Africa [16.3 million][19]. Five countries account for over half of the people living with HIV: Kenya, Nigeria, South Africa, Uganda, and the United Republic of Tanzania. An estimated 650 000 [510 000–860 000] people died from AIDS-related causes globally in 2021, with 420 000 [340 000–530 000] deaths occurring in the African region. The highest number of deaths estimated in the region occurred in Nigeria 51 000 [44 000–60 000], South Africa 51 000 [44 000 - 63 000], United Republic of Tanzania 29 000 [26 000–34 000], Kenya 22 000 [16 000–35 000] and Zimbabwe 20 000 [17 000–24 000]. The lowest number of deaths in the region were recorded in Mauritania 500 [100–650] and Niger 910 [780–1100].

By the end of 2021, 1.5 million [1.1–2 million] new infections were reported worldwide, of which about 60%, 860 000 [660 000–1 200 000] were reported in the African Region. There have been an estimated 1 363 559 HIV infections averted in the region since 2015, most of which occur in the Eastern and Southern Africa subregion. Table 3.1 shows the number of people living with HIV and the number of cases averted in the Region since 2015.

▼Table 3.1 Number of people living with HIV and number of cases prevented in the African Region

Source: UNAIDS, 2022

Region	Number of People Living with HIV (2015)	Number of People Living with HIV (2021)	Number of cases averted since 2015
West Africa, including Algeria	3 296 300	3 376 000	450 159
Central Africa	1 829 000	1 876 000	290 970
East and Southern Africa	16 317 200	17 804 200	621 429
WHO African region	**23 400 000**	**25 600 000**	**1 362 559**

3.1.1.
Progress in the African Region

in 2020

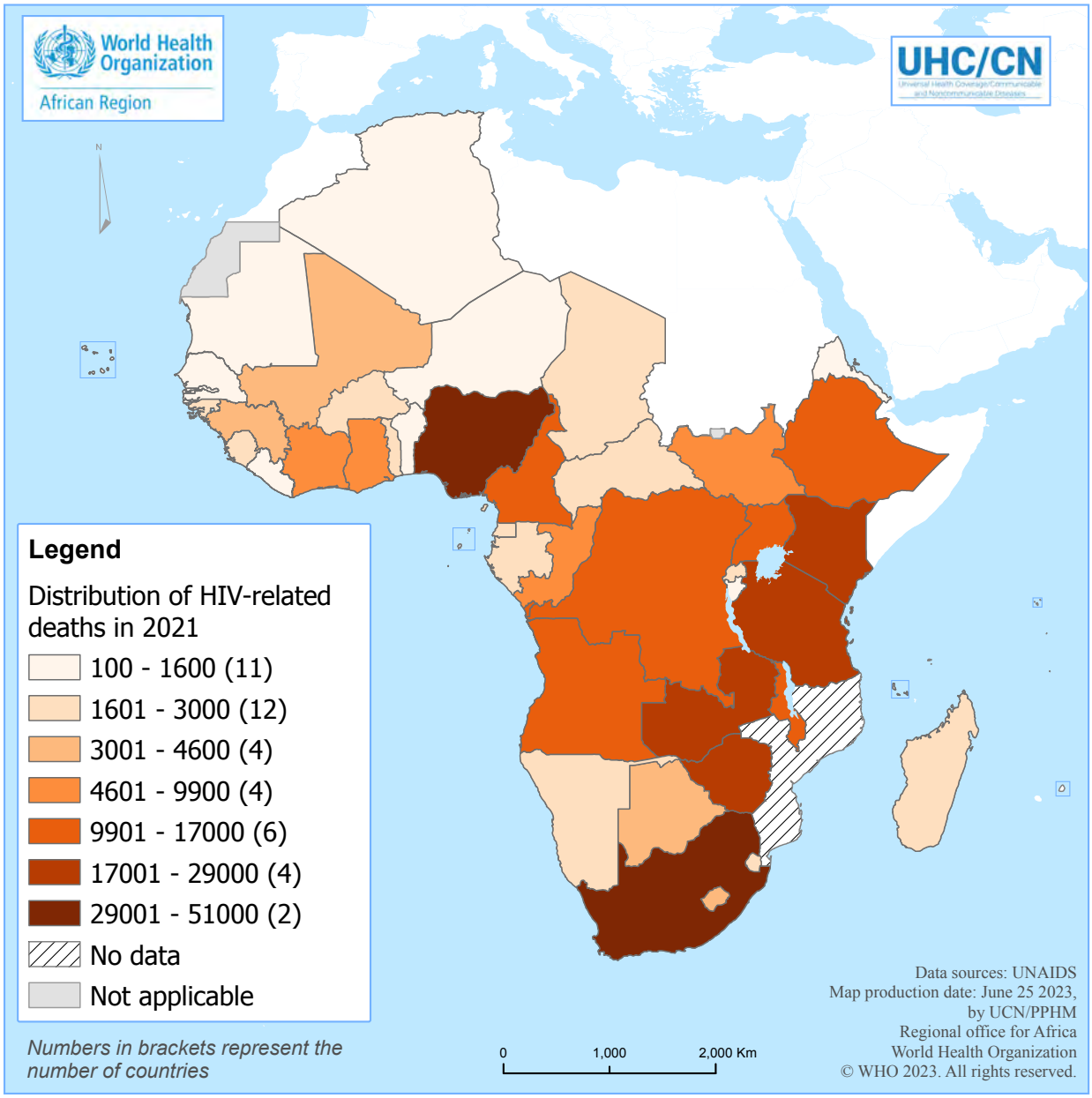
the African Region aimed to reduce to under HIV-related deaths below

287,000

The *HIV/AIDS framework for action in the WHO African region, 2016 – 2020*, aimed to reduce new HIV infections to under 420 000 and HIV-related deaths below 287 000 by 2020[15]. Despite marked progress in reducing new infections and HIV related deaths, the African Region has yet to attain the 2020 targets. Figure 3.1 shows the distribution and trend in recent new infections and deaths related to HIV since 2015.

New HIV infections declined in the Region from approximately 1.2 million [950 000–1 700 000 in 2015 to 860 000 [660 000–1 200 000] in 2021 (Figure 3.1B). Seventy percent of countries in the region reported a reduction in new HIV infections compared to 2015, and four countries reported declines of over 50% compared to 2015: Lesotho (50.1%), Madagascar (69.6%), Zimbabwe (53.1%) and Côte d'Ivoire (60.7%). Six countries in the region reported an increase in new cases in the same period: South Sudan (13.3%), Senegal (23.1%), Mauritania (3.8%), Equatorial Guinea (10.6%), Congo (39.7%) and Algeria (11.1%).

HIV-attributable deaths declined by 45% from 610 000 [500 000–780 000] in 2015 to an estimated 420 000 [340 000 – 530 000] deaths in 2021. This decline was greatest in Burundi (56%), Côte d'Ivoire (58%), Democratic Republic of the Congo (60%), Liberia (54%) and Senegal (60%). Figure 3.1C shows a 28% reduction in new infections in the region since 2015.



The designations employed and the presentation of the material in this publication do not imply the expression of any opinion whatsoever on the part of WHO concerning the legal status of any country, territory, city or area or of its authorities, or concerning the delimitation of its frontiers or boundaries. Dotted and dashed lines on maps represent approximate border lines for which there may not yet be full agreement.

▲Figure 3.1 The estimated number of HIV-related deaths

Source: UNAIDS Global AIDS update 2023. Geneva: Joint United Nations Programme on HIV/AIDS; 2023

The Joint United Nations Programme on HIV/AIDS (UNAIDS) launched the 95-95-95 targets, which aimed to diagnose 95% of all HIV-positive individuals, provide antiretroviral therapy (ART) for 95% of those diagnosed, and achieve viral load suppression for 95% of those treated by 2030[16].

Table 3.2 and Figure 3.2 show the 95-95-95 targets by sub region. In 2021, in the African Region, 88% of people living with HIV (PLHIV) knew their HIV status. Among people who knew their status, 89% were accessing treatment, and among people accessing treatment, 92% were virally suppressed. Sub-regionally, West and Central Africa attained one target: 98% of people who know their status who are on treatment. Data from the WHO African region show that three countries in the region have attained the first 95 target: Cabo Verde (98%), Sao Tome and Principe (98%) and Zimbabwe (96%). Twenty-seven countries in the region attained the second 95% target (Benin, Botswana, Burkina Faso, Burundi, Cabo Verde, Cameroon, Central African Republic, Chad, Côte d'Ivoire, Democratic Republic of the Congo, Eswatini, Ghana, Madagascar, Malawi, Mauritania, Namibia, Niger, Nigeria, Rwanda, Sao Tome and Principe, Senegal and Sierra Leone, Togo, United Republic of Tanzania, Zambia, Zimbabwe) and nine countries attained the third 95% target (Botswana, Eswatini, Ethiopia, Lesotho, Nigeria, Rwanda, Uganda, United Republic of Tanzania and Zambia).

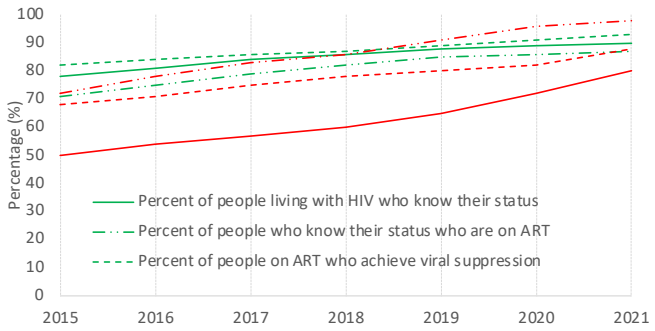
In addition, the HIV treatment catch up and fast track plan has achieved its target of the west and central African region coverage catching up to the eastern and southern African region coverage of 78% in 2021, albeit beyond the 2020 target timeframe. An improvement of 33% was achieved in west and central Africa, compared to 21% in east and southern Africa between 2015-2020.

Impact surveys conducted in Botswana show they exceeded the 95-95-95 targets. Among adults (those 15-64 years) living with HIV, 95.1% were aware of their status, 98% of those familiar with their status were on ART, and 97.9% of those on ART achieved viral load suppression[17]. Countries should continue strengthening their strategic information programmes to maximize their response to the HIV epidemic.

▼Table 3.2 95-95-95 HIV targets in the African Region

Source: UNAIDS, 2022

Region	Percentage of people living with HIV who know their status	Percentage of people who know their status who are on treatment	Percentage of people living with HIV on treatment who are virally suppressed
East and Southern Africa	90.0	87.0	93.0
West and Central Africa	80.0	98.0	88.0
WHO African region	**88.0**	**89.0**	**92.0**



▲Figure 3.2 Regional trends on 2025 95-95-95 AIDS treatment targets.

The red lines represent the Central and West African regions while the green lines are for East and Southern African Region.

The 2022 UNAIDS report highlighted key inequalities in the AIDS response, which include gender, discrimination against key populations, and disparities between children and adults[18]. Of the 1.7 million [1.3–2.1 million] children worldwide needing antiretroviral therapy in 2021, 1.5 million [1.2–1.8 million] were in the African region and only 740 000 children were on treatment, representing a 52% [42–65] ART coverage among children. Eswatini (98%) and Cabo Verde (98%) were the only two countries attaining the 95% treatment target. Ten countries had fewer than a third of children on treatment: Guinea-Bissau (25%), Gabon (23%), Guinea (22%), Mauritania (21%), Angola (19%), South Sudan (15%), Sierra Leone (13%), Congo Republic(12%) and Madagascar (7%).

The elimination of mother-to-child transmission of HIV by 2030 is a global priority[19]. WHO has set an elimination validation criterion for vertical transmission through certification at three levels: bronze, silver, and gold[20]. Botswana was the only country to achieve the silver tier status in 2021 and this can partly be attributed to the fact that more than 95% of pregnant women living with HIV receive antiretroviral therapy in Botswana.

More efforts are needed to eliminate mother-to-child transmission (or vertical transmission), and late diagnosis in children who will require lifelong antiretroviral therapy.

3.1.2. Emerging issues

Advanced HIV in adults and adolescents is defined as CD4 cell count <200 cells/mm^3 or WHO stage 3 or 4[21]. Studies have shown that despite successes in ARV therapy, people in the region arrive at health facilities with advanced HIV disease, leading to higher morbidity and mortality[22-24]. In addition, patients presenting with advanced HIV are at an increased risk of onward disease transmission leading to increased healthcare costs. Targeted interventions are required to prevent, diagnose and treat advanced HIV disease earlier, as recommended by WHO[21].

The availability and access to ART has led to increased life expectancy among people living with HIV and as a result they are disproportionally at risk of noncommunicable diseases (NCDs) due to age and prolonged use of ART. Studies conducted in the Region have shown hypertension, diabetes, mental health conditions (such as depression), and cancers are prevalent among people living with HIV[25]. Infection with HIV and the use of ARTs often leads to the development of NCDs. As a result, integrated service delivery is required to provide those living with HIV easy access to single health facilities for these co-morbidities. Studies are ongoing in the region on how to better integrate service delivery for these conditions[26,27].

3.1.3. Challenges and opportunities

Key populations are "populations who are at higher risk for HIV irrespective of the epidemic type or local context, and who face social and legal challenges that increase their vulnerability"[28]. They include sex workers, men who have sex with men, transgender people, people who inject drugs, and prisoners. Findings from the WHO-commissioned review of the most recent national strategic plans of the 47 countries in the WHO African Region revealed that few countries provide comprehensive routine or service delivery data on these key population groups[29].

Data on key populations and gender disparities are obtained mainly through surveys and studies that occur every 3-5 years. Further disaggregated data is needed in the region to address these inequalities.

Financing for HIV globally has slowed in the past decade with external resources available for HIV estimated at 6% lower than in 2010. Furthermore, because of global economic conditions and the COVID-19 pandemic, domestic funding also fell by 2% in 2021, further reducing resources available to respond to HIV[8].

3.1.4. Priorities and recommendations for HIV

- Technical support for development, dissemination and implementation of guidelines for HIV treatment and care, which will allow rapid absorption of new guidance at country level.
- Promote differentiated service delivery packages, which will lead to person-centred approaches to care.
- The subnational mapping of micro-epidemics and tailoring of HIV/AIDS interventions will facilitate reaching marginalized communities, along with expansion of best service delivery models for reaching adolescent girls and young women, young men and key populations with HIV combination therapy, that includes pre-exposure prophylaxis, voluntary male circumcision and condom programming.
- WHO and partners need to lead consultations and support countries in the region in the emerging areas of integrated care and advanced HIV, incorporating the adoption and implementation of the WHO Tuberculosis Preventive Treatment along with the WHO advanced HIV disease package.
- Support for the transition to dolutegravir as the preferred first line option for HIV treatment, including introduction of paediatric formulations.
- Support for the development of funding requests, peer review processes and Global Fund grant implementation.

3.2. Malaria

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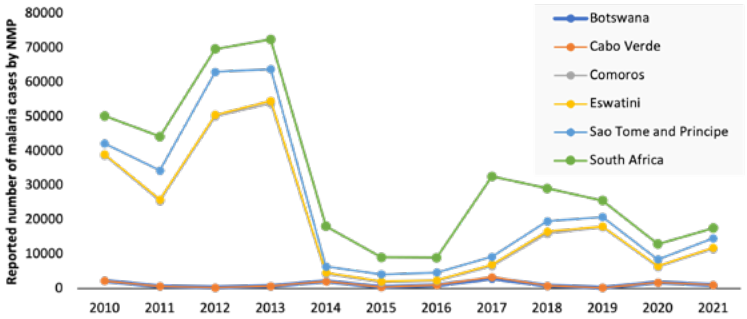
Malaria is a mosquito-borne infectious disease caused by protozoan parasites belonging to the genus *Plasmodium*. Five species account for almost all human infections, with *P. falciparum* being the most severe. Mosquitoes from the genus *Anopheles* carry malaria in the African Region.

In 2021, 234 million cases are malaria were reported from Africa, 95% of the global burden of disease. The Region also accounted for 96% (593 000) of malaria deaths in 2021. Children under the age of five years are disproportionately affected; 78.9% of the deaths in 2021 were in this group.

The WHO Global Technical Strategy for Malaria 2016-2030 (GTS) aims to reduce the malaria burden (case incidence and malaria deaths) by at least 75% in 2025 and by at least 90% by 2030 compared to the baseline in 2015[30]. This required a reduction by 48% in 2021 compared to the baseline incidence and mortality rate. However, in 2021, WHO estimated a case incidence of 229.4 per 1000 population in the African region compared to case incidence of 243.5 per 1000 population in 2015 and this corresponded to a reduction of only 5.8% (Figure 3.3). The mortality rate was estimated at 58.2 per 100 000 population in 2021 compared to a baseline mortality-rate of 62.5 per 100 000 population in 2015, suggesting a reduction in mortality rate by 6.8% since 2015.

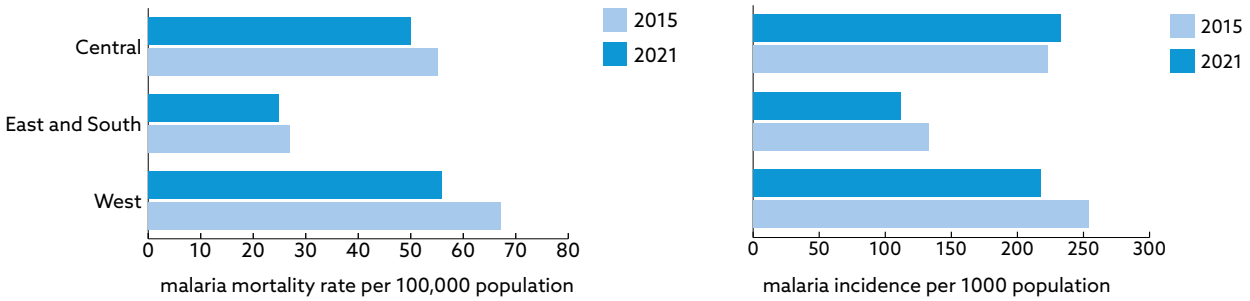
WHO recommends post-discharge malaria chemoprevention among children with severe anaemia in areas of moderate to high transmission. Anaemia in children is caused by a combination of nutritional (mostly iron deficiency) and non-nutritional factors (e.g., malaria, helminth infection) driven by social-economic and environmental factors. Anaemia is classified as mild if the level of haemoglobin concentration is 10.0-10.9 g/dl for pregnant women and children under the age of five years and 10.0-11.9 g/dl for non-pregnant women. A haemoglobin concentration of 7.0-9.9 g/dl is usually classified as moderate anaemia, while severe anaemia corresponds to a level less than 7.0 g/dl [31].

3.2.1. Progress in the African Region



▲**Figure 3.3** Number of reported malaria cases in E2020 and E2025 countries within the WHO African Region since 2010. Data from the most recent WMR 2021

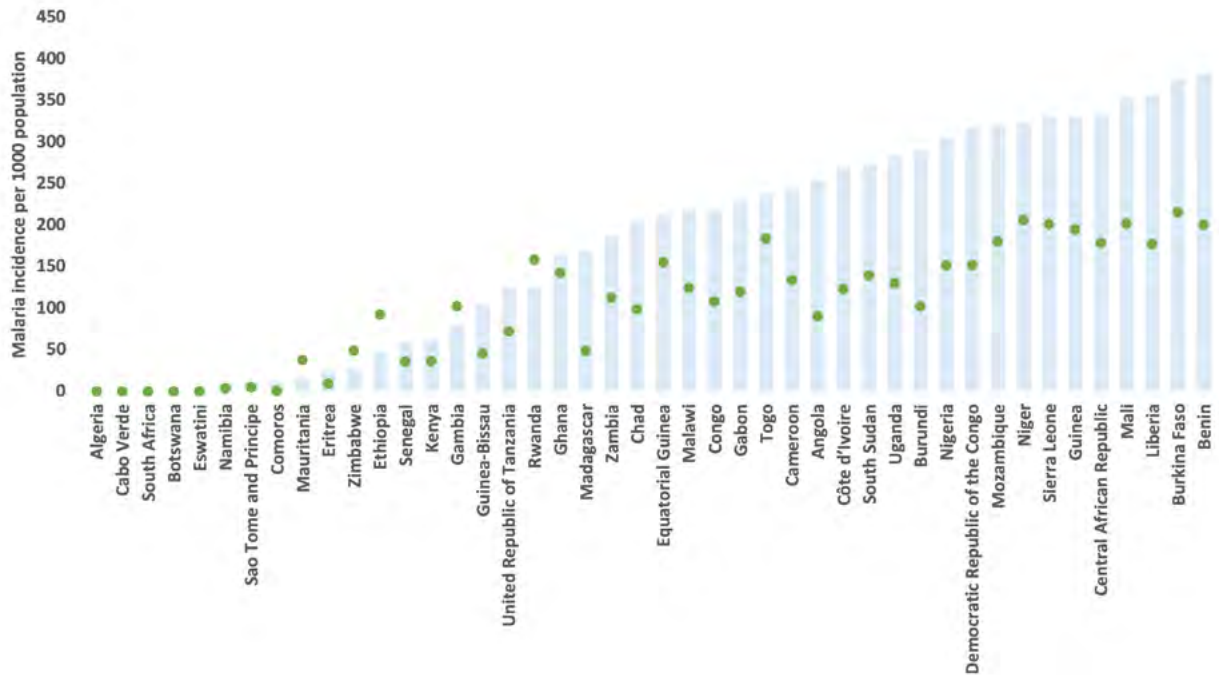
The largest decrease in mortality rate in 2021was in the West African region; approximately 17% compared to Central Africa (9.3%) or East and Southern Africa (7.7%).



▲**Figure 3.4** Comparison of 2021 malaria incidence and mortality rate, compared to 2015 baseline, by region

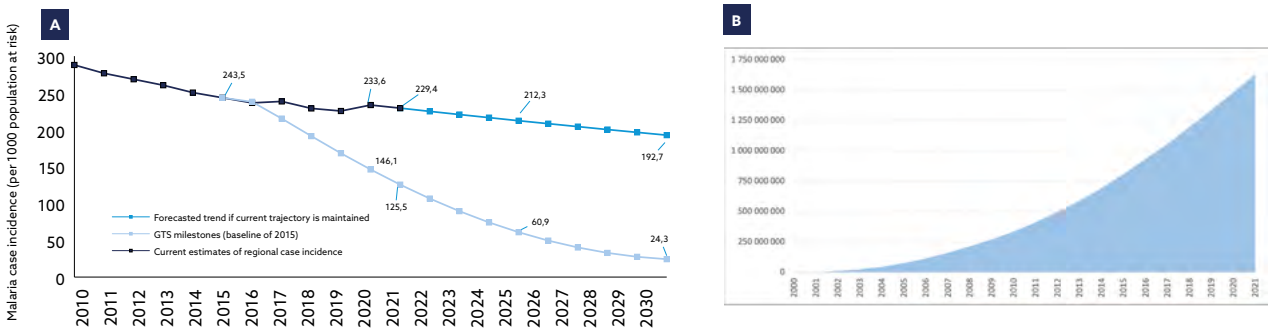
Algeria and Cabo Verde recorded zero malaria cases in 2021. Furthermore, Cabo Verde's application for malaria-free certification is still pending or under evaluation. Other countries within the African Region on track for GTS targets include Ethiopia, The Gambia, Mauritania, Rwanda and Zimbabwe. GTS targets were reversed in at least 17 countries (Angola, Burundi, Chad, Côte d'Ivoire, The Democratic Republic of the Congo, Congo Republic, Comoros, Eritrea, Guinea-Bissau, Liberia, Madagascar, Namibia, Nigeria, South Sudan, Sao Tome and Principe, and Uganda). In three countries (Benin, Central African Republic and Gabon) there was no change in malaria incidence or mortality rate (Figure 3.4). South Africa and Ghana reduced malaria incidence by more than 40% compared to baseline incidence.

Togo and Equatorial Guinea had a decline in malaria incidence of between 25% and 40%. In the remaining countries, there was a decline of between 5% and 25% in malaria incidence. Nigeria and the Democratic Republic of the Congo accounted for 41% of malaria cases in 2021 in the African Region. An additional 35.9% of cases were from Uganda, Mozambique, Burkina Faso, United Republic of Tanzania, Cameroon, Angola, Niger, Mali, and Côte d'Ivoire. Within the WHO African region, 10 countries constitute the high burden to high impact (HBHI) countries, carrying 70% of the global malaria burden; namely Burkina Faso, Cameroon, the Democratic Republic of the Congo, Ghana, Mali, Mozambique, Niger, Nigeria, Uganda and the United Republic of Tanzania.



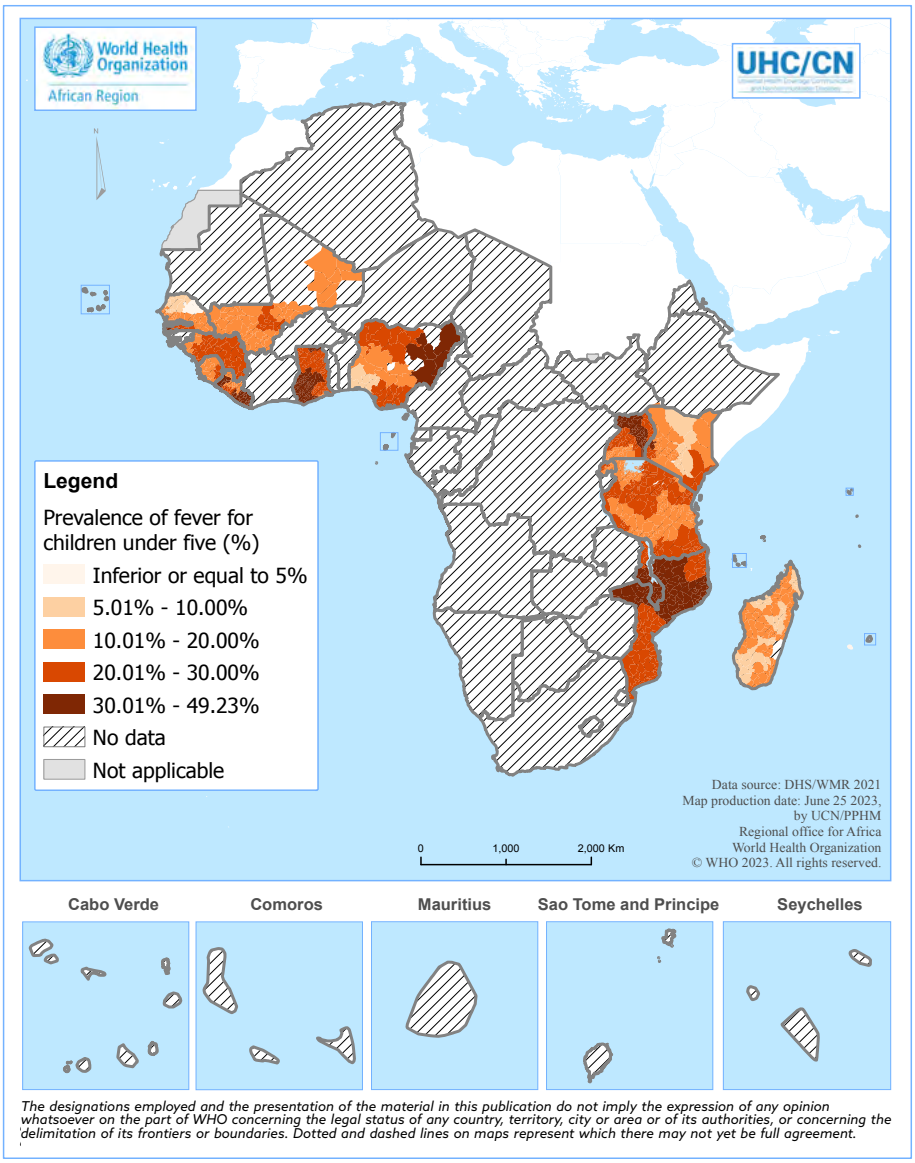
▲Figure 3.5 Malaria incidence in 2021 (blue bars) against the expected GTS targets for malaria (green dot) in Africancountries.

While the region has missed out on GTS targets for 2021, malaria control efforts across the region have nonetheless prevented a staggering 919,380 deaths and averted 145 million cases in 2021 alone. Since 2000, malaria control has prevented 1.5 billion malaria cases (Figure 3.5).



▲Figure 3.6 Estimates of malaria incidence per 1000 population in the African Region.
Data were obtained from the recent World Malaria Report (WMR) in 47 countries[11]

Data from the most recent household surveys conducted in sub-Saharan Africa between 2015 and 2021 in 25 countries were used to analyse access to health facilities, coverage of treatment-seeking behaviour for fever, diagnosis and use of artemisinin-based combination therapy (ACTs) in children aged under 5 years. Fever prevalence and treatment seeking behaviour vary at subnational levels (Figure 3.6). The percentage of children with fever within the two weeks preceding the surveys was 22.7% and treatment seeking for fever varied at country level regionally but was on average high at 66.3%. The average rate of malaria diagnosis across the 25 countries was 51.5%. Additionally, data from household surveys in sub-Saharan countries since 2015 suggest that insecticide-treated bed nets (ITNs) use was 57.2% in 2021 in children under the age of 5 years and 58.2% for pregnant women. Lastly, the rate of intermittent presumptive treatment in pregnant women attending antenatal clinics (IPTp) was 57% for one dose of IPTp, 46% for two doses and 32% for three doses (WMR, 2021).

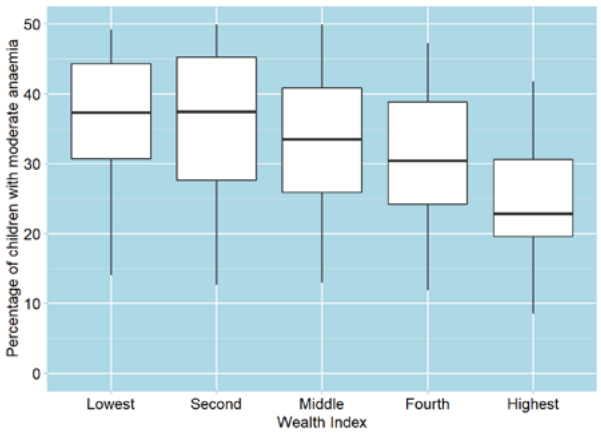


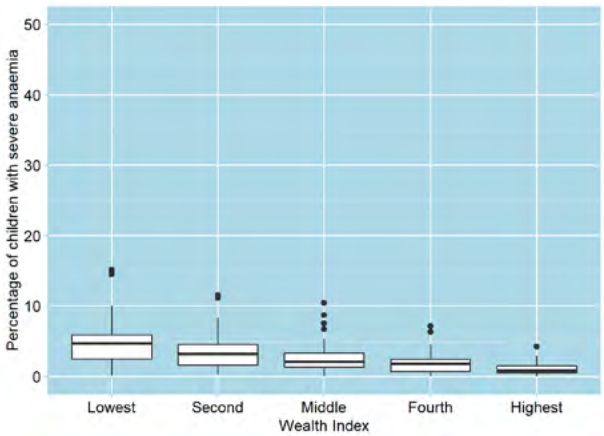
A

Figure 3.7 Prevalence of fever in children under 5 years (%)

A) Distribution of all cause fever (prevalence) at health district levels within the African Region summarised from most recent community-cluster surveys B) prevalence of anaemia by wealth quintiles derived from recent survey data in 21 countries.

B





Epidemiological studies show a complex relationship between anaemia and malaria in young children across the sub-Saharan African countries. WHO recommends post-discharge malaria chemoprevention among children with severe anaemia in areas of moderate to high transmission. In the African Region, the most recent surveys since 2015 suggest a 32.3% [10.2% – 34.6%] average prevalence of moderate anaemia. Severe anaemia was on average 2.7% [2.3% - 3.2%] but this varied by country. Combined moderate and severe anaemia prevalence was highest in Mozambique and Burkina Faso, and lowest in Rwanda and Zimbabwe (Table 3.3).

▼Table 3.3 Summary of moderate and severe anaemia prevalence estimates in the African Region and malaria interventions from the most recent survey data

Country	Latest survey	Children with moderate anaemia	Children with severe anaemia	Malaria diagnosis among those with fever and for whom care was sought	Percentage of households with at least 1 ITNs	Use of ITN in children under 5 years
Angola	DHS 2015	31.8 [30.7, 32.9]	2.2 [1.8, 2.6]	34.3 [31.13 , 37.62]	17.65 [16.42 , 18.95]	30.89 [29.04 , 32.81]
Benin	DHS 2017	40.6 [39.4, 41.8]	3.2 [2.8, 3.6]	17.82 [15.99 , 19.82]	71.12 [69.95 , 72.26]	91.49 [90.76 , 92.16]
Burkina Faso	MIS 2017	46.4 [45.1, 47.7]	3.7 [3.2, 4.2]	49.12 [45.06 , 53.2]	44.07 [42.49 , 45.65]	75.32 [73.48 , 77.08]
Burundi	DHS 2016	32.7 [31.5, 33.9]	3.6 [3.1, 4.1]	66.39 [64.47 , 68.26]	34.72 [33.37 , 36.08]	46.17 [44.71 , 47.64]
Cameroon	DHS 2018	29.1 [27.8, 30.4]	1.9 [1.5, 2.3]	21.43 [18.1 , 25.19]	53.86 [52.21 , 55.5]	73.39 [72.09 , 74.66]
Ethiopia	DHS 2019	28.9 [28, 29.8]	3.1 [2.7, 3.5]	0 [0 , 0]	0 [0 , 0]	0 [0 , 0]
Ghana	MIS 2019	26.5 [24.8, 28.2]	1.4 [1, 1.8]	34.41 [30.28 , 38.79]	43.21 [40.54 , 45.92]	73.73 [71.97 , 75.43]
Guinea	MIS 2021	42.5 [41, 44]	3 [2.5, 3.5]	28.12 [24.51 , 32.03]	33.4 [30.43 , 36.5]	63.27 [60.22 , 66.23]
Kenya	MIS 2020	19.9 [19.1, 20.7]	1.4 [1.2, 1.6]	35.57 [29.76 , 41.84]	34.88 [32.2 , 37.66]	49.03 [45.3 , 52.77]
Liberia	DHS 2019	38.2 [36.3, 40.1]	3.4 [2.7, 4.1]	49.15 [44.77 , 53.53]	38.99 [36.81 , 41.22]	54.74 [52.32 , 57.13]
Madagascar	DHS 2021	19.5 [18.5, 20.5]	0.7 [0.5, 0.9]	19.9 [17.36 , 22.72]	48.76 [47.32 , 50.2]	69.15 [67.48 , 70.76]
Malawi	MIS 2017	34.5 [32.6, 36.4]	2.6 [2, 3.2]	37.69 [33.07 , 42.55]	55.43 [52.92 , 57.92]	82.08 [79.89 , 84.08]
Mali	DHS 2018	45.9 [44.9, 46.9]	2.8 [2.5, 3.1]	16.42 [13.85 , 19.36]	72.94 [71.58 , 74.27]	89.77 [88.59 , 90.84]
Mauritania	DHS 2020	45.7 [44.7, 46.7]	9.2 [8.6, 9.8]	5.82 [4.67 , 7.22]	10.87 [9.98 , 11.83]	32.17 [30.82 , 33.56]
Mozambique	MIS 2018	49 [47.5, 50.5]	6.2 [5.5, 6.9]	48.02 [42.72 , 53.37]	68.41 [65.7 , 70.99]	82.2 [79.69 , 84.47]
Nigeria	DHS 2018	38.1 [37.2, 39]	3 [2.7, 3.3]	13.79 [12.64 , 15.02]	43.25 [42.24 , 44.26]	60.64 [59.43 , 61.82]
Rwanda	DHS 2019	14.9 [13.8, 16]	0.3 [0.1, 0.5]	40.69 [37.82 , 43.63]	47.72 [46.11 , 49.35]	66.36 [64.77 , 67.92]
Senegal	DHS 2019	39 [37.9, 40.1]	2.8 [2.4, 3.2]	15.83 [12.71 , 19.53]	62.52 [58.06 , 66.78]	80.98 [77.31 , 84.17]
Sierra Leone	DHS 2019	35.2 [33.8, 36.6]	2.7 [2.2, 3.2]	61.27 [57.84 , 64.6]	50.62 [49.1 , 52.14]	67.87 [66.28 , 69.42]
South Africa	DHS 2016	34.6 [31.8, 37.4]	2.4 [1.5, 3.3]	0 [0 , 0]	0 [0 , 0]	0 [0 , 0]
Togo	MIS 2017	43.8 [42, 45.6]	4 [3.3, 4.7]	29.3 [25.35 , 33.59]	62.47 [59.66 , 65.2]	85.2 [82.99 , 87.17]
Uganda	MIS 2018	23.5 [22.4, 24.6]	1.5 [1.2, 1.8]	51.56 [47.42 , 55.67]	59.22 [57.5 , 60.93]	82.7 [80.15 , 84.98]
United Republic of Tanzania	MIS 2017	29.1 [28, 30.2]	1.4 [1.1, 1.7]	43.28 [39.23 , 47.42]	52.16 [50.09 , 54.22]	77.93 [76.39 , 79.39]
Zambia	DHS 2016	28 [27.1, 28.9]	1.5 [1.2, 1.8]	63.23 [59.39 , 66.92]	46.43 [44.85 , 48.02]	78.27 [77.06 , 79.45]
Zimbabwe	DHS 2015	14.5 [13.6, 15.4]	0.4 [0.2, 0.6]	12.73 [10.26 , 15.69]	8.53 [7.54 , 9.64]	47.9 [45.33 , 50.47]

3.2.2. Challenges and opportunities

THE GLOBAL FUNDING GAP TO COMBAT MALARIA CONTINUES TO WIDEN AND REACHED US$ 3.8 BILLION IN 2021

Before the pandemic, the stalling of progress since 2015 in the WHO African region was the main reason why the global milestones for 2020 were off track. The COVID-19 pandemic has increased the cost of commodities and shrunk resources for malaria, impacting on the delivery of essential malaria services, despite impressive efforts by countries and partners to maintain them[3,4,11]. The shrinking of national economies during the pandemic and the constrained global investment landscape will continue to assert considerable pressure in ensuring progress against malaria. The global funding gap to combat malaria continues to widen and reached US$ 3.8 billion in 2021.

This funding gap is unlikely to shrink, resulting in a need to achieve more with constrained resources. As a response to the stalling progress the WHO and RBM Partnership to End Malaria launched the high burden to high impact (HBHI) approach in 2018, focusing on the 11 highest burden countries, 10 of which are in the WHO African Region. The HBHI was designed around response elements: i) translate political commitment into tangible actions; ii) use strategic information to drive impact; iii) implement the best global guidance; and iv) improve coordination of the national response.

To support countries to use data to guide investment and increase the impact of malaria control[32], WHO has provided guidance to countries such as on the use of DHIS2 to improve routine health information systems, establish integrated malaria data repositories, and use data for decision on sub-national tailoring of malaria interventions[33,34]. WHO, through the Global Malaria Programme, has launched a malaria surveillance assessment toolkit to identify malaria priorities at country level.

The WHO African region faces several important threats against preventive and curative malaria interventions. ITNs are the most widely used malaria vector control tool at national levels. The currently distributed ITNs have a lifespan of approximately three years after which efficacy starts to decline[35-37]. Moreover, there are other factors that impact ITN use and retention at household level[36,37]. The main challenge at country level is in identifying populations most in need of ITNs in moderate to high transmission areas, to avoid wasted distributions and promote equitable access at community levels.

In addition, there are several biological threats stemming from malaria vector resistance to insecticides, the genetic mutation of parasites to avoid detection using routinely available diagnostic tools (HPR2 deletions)[38-40], and resistance of the malaria parasite to artemisinin. With regards to ITNs, evidence suggests that pyrethroid-only ITNs are less effective in vector control compared to ITNs with combination active compounds (pyrethroid and piperonyl butoxide (PBO))[41,42]. The recent global malaria report shows increasing distribution of PBO nets in 2021 but these require further scaling up in areas with resistance and in moderate to high transmission areas in the African Region. There is limited granular data on the true extent of artemisinin resistance in African settings.

There is an increasing threat of an urban invasive malaria vector namely *Anopheles stephensi* detected in Djibouti, Ethiopia, Sudan, Somalia and Nigeria. This malaria vector poses a threat to malaria transmission in urban environments. Countries in the African Region face challenges in detecting this vector species, and effective control as part of response to malaria in urban environments.

3.2.3. Priorities and recommendations for malaria

Few countries in the African Region are on track to achieve the 2030 GTS targets. To accelerate attainment of the GTS goals, investments in well-functioning, equitable and resilient health systems built on a foundation of primary health care are critical to a successful malaria response. The following priority recommendations are re-emphasized:

- HBHI-related activities should continue to be implemented in the 11 HBHI countries where malaria burden in the region is still substantial.
- Malaria surveillance should be a hallmark in all malaria-free countries and must be instituted as part of the malaria elimination drive, for example in E8 malaria countries. Adopting the WHO malaria surveillance assessment toolkit would provide a systematic and standardized way of assessing the performance of surveillance systems.
- Investment in malaria interventions for prevention such as ITN and IPTp, IRS and SMC must be continued and sustained. Presently in WHO African Region other interventions are low, for example IPTP uptake among pregnant women.
- Scale up the malaria vaccine (RTS,S/AS01) in moderate to high transmission areas leveraging on the use of strategic information for impact,
- Further strengthen primary health care systems to strengthen case management, ensuring service availability and readiness to offer malaria service.

3.3. Tuberculosis (TB)

Tuberculosis is a leading public health challenge in the African region. Ending the tuberculosis epidemic by 2030 is one of the SDG targets. WHO's *End TB Strategy* aims to reduce TB deaths by 90% and incidence by 80% in 2030, and ensure that no family is burdened with catastrophic costs due to TB[43]. According to the global TB report, the African region accounted for 23% of the incidence cases in 2021, second only to the Southeast Asia region[44].

3.3.1. Progress in the African Region

In 2021, a total of 1 479 535 new case notifications were reported in the African Region, representing an increase of 182 805 (14.1%) compared to the baseline in 2015. There has been a gradual increase in TB case notifications since 2015, except for 2020, and this could reflect improved reporting. Compared to 2015, case notifications increased by over 50% in the Democratic Republic of Congo (80%), Mozambique (68%), South Sudan (81%), Uganda (78%) and a marked increase was reported in Nigeria (135%).

In 2021, the WHO African Region passed the first (2020) milestone of the End TB Strategy, with a reduction of 22% since 2015. By 2021, seven high TB burden countries had reached or passed the first milestone of a 20% reduction in the TB incidence rate compared with 2015 (Ethiopia, Kenya, Lesotho, Namibia, South Africa, the United Republic of Tanzania and Zambia).

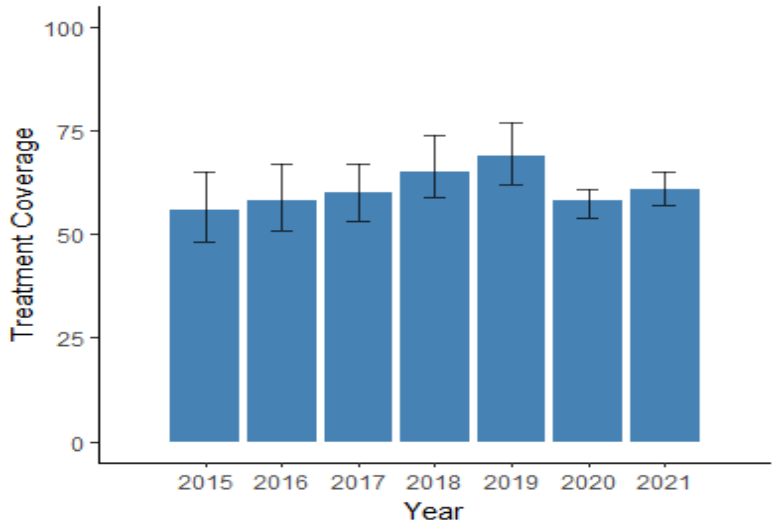
Of the estimated TB incidence cases in the region (i.e., 86 cases per 100 000 population), 13% were children aged less than 15 years. Countries in the region that have reached the 2020 incidence target include Algeria, Botswana, Cabo Verde, Cameroon, Eritrea, Eswatini, Ethiopia, Lesotho, Malawi, Mauritania, Namibia, Sao Tome and Principe, South Africa, Togo, United Republic of Tanzania, Zambia and Zimbabwe.

While there has been a 26% reduction in TB deaths from 2015, the region is yet to attain the 35% reduction target for 2020. An estimated 501 000 [436 000 - 571 000] TB-related deaths were recorded in 2021, of which 365 000 [307 000 - 428 000] deaths occurred among HIV negative people and 136 000 [108 000 - 167 000] deaths were among people living with HIV. Eswatini, Kenya, United Republic of Tanzania, Togo and Zambia have met the 2020 reduction targets by 35%.

▼Table 3.4 Summary of TB related health goals with a vision of achieving a world free of TB with zero deaths

Indicators	Milestone 2025	Target 2030
Percentage reduction in the absolute number of TB deaths	75%	90%
Percentage reduction in the TB incidence rate	50%	80%

TB treatment success is a good indicator of national TB programme efforts. It is based on the proportion of cases started on first-line TB treatment each year where treatment was successfully completed. Treatment success has improved over the years and currently 86% of those started on first-line TB treatment in the region in 2020 had a successful outcome. Only Gabon (53%) and Angola (63%) had a treatment success rate of less than 70%.



TB treatment coverage represents the number of new and relapse TB cases that were notified and treated each year (the numerator), divided by the estimated number of incident TB cases in the same year (the denominator).

▲**Figure 3.8** Trends in tuberculosis treatment coverage in the African Region.

3.3.2. Challenges and opportunities

Of the 2.46 million estimated TB infections in 2021, 1.48 million were identified and reported to national TB programmes in the region leaving a gap of 980 000 (39.8%) unnotified cases. Assuming all the notified case were treated, this a probable treatment coverage of 60% [54% - 68%] in the region. A larger gap was observed in drug-resistant TB with 19 996confirmed cases out of an estimated 77 000 [55 000 – 99 000] case reported. Efforts are needed to identify the distribution of missed cases to reduce TB transmission and deaths. This includes, but is not limited to, the identification of high-risk populations, improved diagnostics, access to TB diagnosis and care, prevention of loss to treatment and adherence, improved advocacy, and community engagement[45]. Figure 3.7 shows estimated treatment coverage in the region between 2015 and 2021, suggesting a drop in treatment in recent years.

Non-adherence to TB medication has been linked with low treatment success and poor treatment outcomes leading to poor TB control. The WHO Global TB Programme has been working with partners and Member States to engage more comprehensively and promote the use of digital technologies (eHealth and mHealth) to achieve targets set in the 2015 End TB Strategy[46]. This digital strategy is underpinned by four main functions around patient care, programme management, surveillance and monitoring, and e-learning.

In 2017, guidance was produced on the use of digital technologies to support treatment adherence for TB patients, alongside other support strategies like material, educational and psychological support[47]. These guidelines included a variety of technologies, such as electronic medication monitors (EMMs) that measure the time between opening a pill box and emit audio alerts or mobile Short Message Services (SMS) to inform patients and caregivers when medication is due. Other recommendations included the use of video-supported treatment (VST) to replace in-person support.

Implementation of digital adherence technologies has been trialled in several research projects notably TB REACH[48] and the ASCENT project[49]. The ASCENT project, funded by UNITAID, has been running in five countries and will end in mid-2023. However, provisional results were made available in November 2022. Further, evidence reviews of the effectiveness and cost of Digital Adherence Technologies (DATs) are expected to be updated in 2023 and result from a major trial of EMMs[50].

Alongside DATs, several other technologies are now in use in the national TB response, such as digital surveillance. In 2020, A DHIS2 TB package for case-based data, which enables the digital management of a core set of data items for both individuals with drug-susceptible and drug-resistant TB disease in a single system, was made available[51]. This also includes the PREVENT TB digital platform designed to generate indicators for TB preventive treatment and screening[52]. Other applications of digital health for TB include connected diagnostics and laboratory information systems, telemedicine, and e-learning. Overall, there are two main areas for countries to consider, namely for DATs (i) programme management in real-time and (ii) programme planning. These areas encompass, but are not limited to, surveillance and case management, diagnostics, and decision-making support systems for patient care and management. Implementation at the country level remains a challenge, especially in the post-pandemic era with gaps in the choice of suitable technologies and wider stakeholder engagement.

3.3.3. Priorities and recommendations for TB

Progress towards global TB targets has been achieved in a number of countries in the African Region. Despite recent achievement in driving down incidence and deaths, and in closing gaps in access to prevention and care, concerted efforts are required to sustain gains and maintain progress. The following priority recommendations, derived from the Global TB programme and the End TB strategy, are re-emphasized for member countries in the African region:

- Scaling-up screening for active TB and prioritizing of risk groups
- Advancing universal health care that ensures that all people with active TB should receive TB diagnosis, treatment and care according to WHO guidelines and international standards of care
- Addressing drug-resistant TB and close the persistent gaps in care
- Combating stigma and discrimination that would encourage early diagnosis and resolve under-reporting challenges
- Strengthen monitoring and evaluation through national TB prevalence surveys and other TB impact measurements.

4.

Neglected tropical diseases (NTDs)

The global response to the prevention, control and (where possible) elimination and eradication of neglected tropical diseases (NTDs) has led to 600 million fewer people requiring NTD treatment than in 2010 [10,53]. In the African Region, however, there was still an increase in the last decade as the number requiring treatment was approximately 659 million people in 2021, compared to 555 million in 2014. Of the 20 diseases and disease groups designated globally as NTDs, 19 (the exception being Chagas disease) are endemic in Africa, with two targeted for eradication (yaws and dracunculiasis), nine targeted for elimination or elimination as a public health problem (human African trypanosomiasis (HAT), leprosy, lymphatic filariasis, onchocerciasis, rabies, schistosomiasis, soil-transmitted helminthiasis (STH), trachoma and visceral leishmaniasis), and three for control (Buruli ulcer, cutaneous leishmaniasis and dengue fever). Three diseases initially excluded from the NTD roadmap 2012-2020 were added to the WHO NTD portfolio between 2016 and 2018 (mycetoma and other deep mycoses, scabies and other ectoparasites, and snake bite envenoming (SBE)). These additional diseases have minimal control interventions, inadequate or absent mapping data, lack of tools and insufficient funding. The epidemiological status of echinococcosis, foodborne trematodiases, taeniasis and cysticercosis is unclear[10].

The African Region accounts for

40%

of the global burden of disability adjusted life years (DALYs) lost to NTDs

At least five NTDs are amenable to preventive chemotherapy (PC-NTDs), while the rest are managed via active case finding and treatment (CM-NTDs). These NTDs afflict approximately one billion people in tropical and subtropical regions globally[10]. The affected communities often face underlying challenges of access to basic healthcare services, with the African Region bearing a disproportionately high proportion of the global burden of disease, accounting for 40% of cases worldwide[54].

The African Region also accounts for 40% of the global burden of disability adjusted life years (DALYs) lost to NTDs, significant morbidity due to physical and visual impairments, chronic and debilitating pain, gross disfiguration and in many cases, death[10]. NTDs contribute to lost productivity and negative economic consequences at national levels. All 47 countries in the Region are endemic for at least one NTD, and nearly 80% are co-endemic for at least five[55].

The NTD diseases and disease groups disproportionately affect women and children, resulting in lifelong impairments and disabilities, and threaten human capital development[10]. The historical neglect in terms of research and development investments and political visibility further threatens the achievement of the first five SDGs, and the attainment of universal health coverage, and equity. The NTDs are thus an important tracker of socioeconomic disparities and standards of healthcare services. Additionally, they demand multisectoral collaboration and action as the elimination of diseases affecting the most marginalised communities must be combined with education, empowerment, and environmental action for long term sustainability, considering the added challenge of disease manifestation in non-human mammals.

The first WHO NTD Roadmap (2012 – 2020) focused on accelerating interventions and widening access to treatment via five key focus areas: preventive chemotherapy, intensified disease management, vector and intermediate host control, control at the human-animal interface within agriculture and provision of safe drinking water, sanitation, and hygiene services. Concurrently in 2012, the London Declaration on Neglected Tropical Diseases was signed by stakeholders at global levels, the pharmaceutical industry, non-profit organisations, and academia and government representatives from the UK, the US, United Arab Emirates, Bangladesh, Brazil, Mozambique and Tanzania, increasing funding, donation of medicines, research, and support of implementing partners.

The WHO NTD Roadmap 2021 to 2030 was launched in 2021, with an emphasis on moving from disease-specific to integrated approaches in order to foster country ownership and leadership. The 2030 roadmap outlines disease-specific and cross-cutting targets and strategies. Evidence shows that, as a whole, the African Region had not made significant progress since 2012. This current new roadmap thus identifies critical gaps and actions required to attain the 2030 milestones and interim targets; emphasizing sustainability with three key pillars on: accelerating programmatic action, intensifying cross-cutting approaches, and changing operating/funding models and engagement to facilitate country ownership.

4.1.
NTDs amenable to preventive chemotherapy (PC-NTDs)

The PC-NTDs are all targeted for elimination or elimination as a public health problem, and include lymphatic filariasis, onchocerciasis (targeted for elimination of transmission), schistosomiasis, soil-transmitted helminthiases (STH) and trachoma. Up to 44 countries in the African Region are endemic for at least one PC-NTD, 42 for at least two PC-NTDs and 17 for all five PC-NTDs. There are an estimated 38 million lymphatic filariasis cases, 15 million onchocerciasis cases and 12 million schistosomiasis cases. Furthermore, in 2021, 342.3 million people in the African region require preventive treatment for lymphatic filariasis[56], 243.7 million for onchocerciasis[57], 233.7 million for STH[58] and 227.7 million for schistosomiasis[58]; approximately 100 million people in the African Region need antibiotic mass drug administration for trachoma elimination purposes[59]. Furthermore, preventive chemotherapy approaches are a strategic component of WHO-recommended strategies against leprosy, scabies, taeniasis, yaws and for controlling morbidity due to foodborne trematode infections.

NTD interventions are one of the best buys in global public health, leading to a net benefit for individuals of up to US$ 25 for every US$ 1 invested in preventive chemotherapy in out-of-pocket payments and lost productivity[60].

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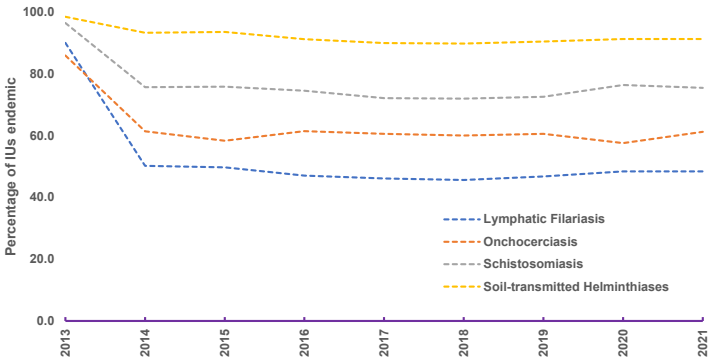
4.1.1. Progress in PC-NTDs in the African Region

The Expanded Special Project for Elimination of NTDs (ESPEN) programme was launched to focus on the NTDs amenable to preventive chemotherapy, and so far, has seen a significant increase in data reporting and availability for use from 28 countries submitting disease data in 2014 to 40 countries in 2021. ESPEN supports the integration of PC-NTD elimination into mainstream public health activities, in line with the WHO NTD road map. There have also been significant endemicity changes within this time frame, impacting populations requiring treatment (Figure 4.1).



▲**Figure 4.1 Percentage of implementation units (IUs) that are endemic for four PC-NTDs**

4.1.2. Trachoma

99,6 million

people living in endemic districts and at risk of trachoma

This constituted

86%

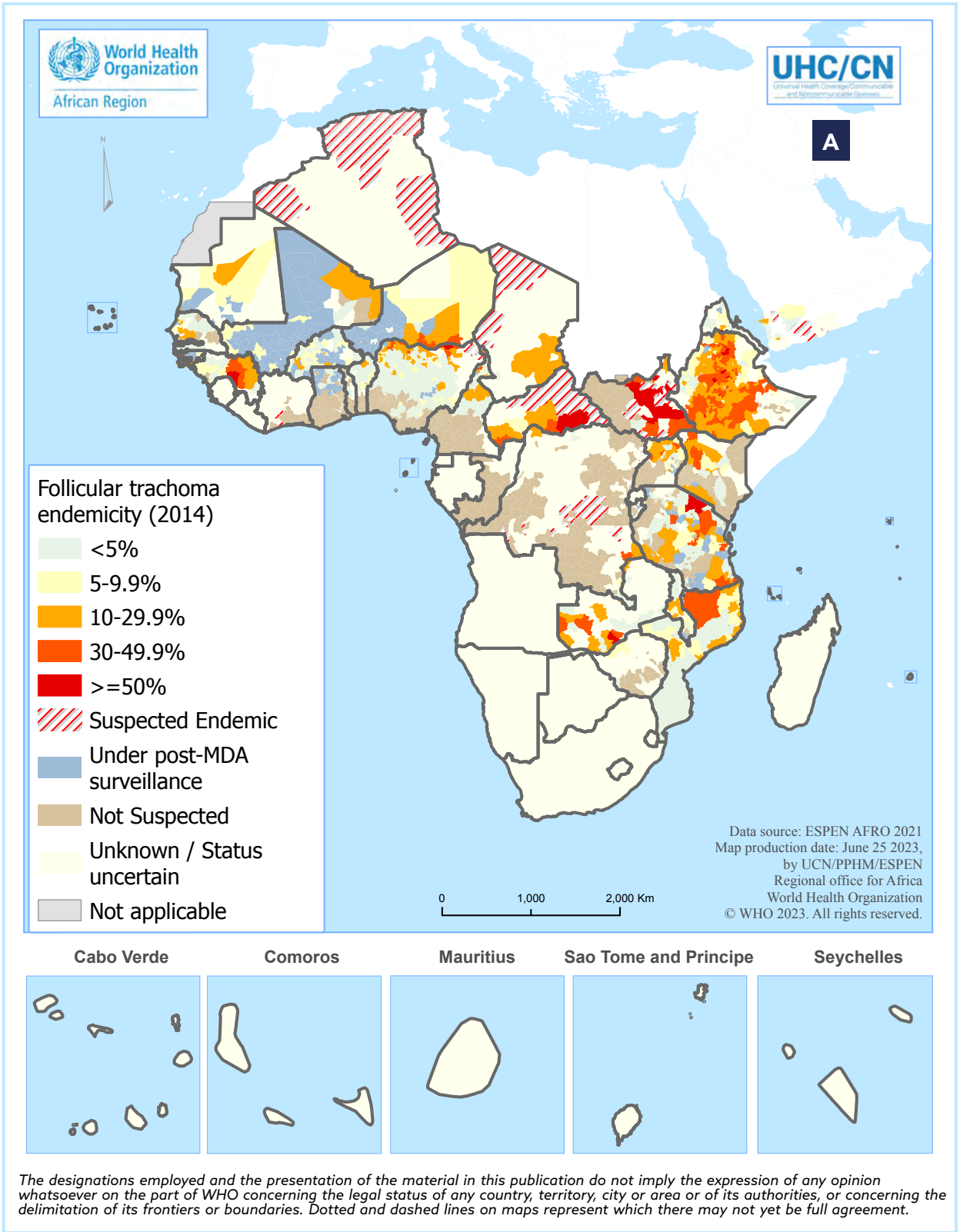
of the global burden of trachoma in June 2022

Trachoma is the world's leading infectious cause of irreversible blindness, causing 1.4% of global blindness[61]. The African Region bears a disproportionately large burden of trachoma with (as of April 2023) an estimated 99.6 million people living in endemic districts and at risk of trachoma. This constituted 86% of the global burden of trachoma in April 2023. Moreover, 1.7 million (61%) of the estimated global total of 2.8 million trachomatous trichiasis (TT) cases in 2016 were recorded in the region. Trachoma is prioritized for elimination[1] as a public health problem worldwide by the year 2030, using WHO's SAFE[2] strategy[62].

Figure 4.2 shows endemicity at the implementation unit (IUs) level with Ethiopia, Democratic Republic of the Congo and Nigeria exhibiting the highest prevalence. In Ethiopia, an estimated 64 million people live in trachoma-endemic districts and are at risk of trachoma. This represents approximately 55% of the global burden and 64% of the burden in the African Region[63]. Ethiopia has the highest number of cases of TT in the world[64,65]. Of the 1 709 995 TT cases estimated for the African Region in 2016, an estimated 693 037 (41%) were in Ethiopia.

1 Elimination of trachoma as a public health problem is defined as: (i) a prevalence of trachomatous trichiasis "unknown to the health system" of <0.2% in adults aged ≥15 years (approximately 1 case per 1000 total population), and (ii) a prevalence of trachomatous inflammation—follicular in children aged 1–9 years of <5%, sustained for at least two years in the absence of ongoing antibiotic mass treatment, in each formerly endemic district; plus (iii) the existence of a system able to identify and manage incident trachomatous trichiasis cases, using defined strategies, with evidence of appropriate financial resources to implement those strategies.

2 The SAFE strategy consists of surgery to treat the late complication (trachomatous trichiasis); antibiotics to clear the infection, particularly mass drug administration of the antibiotic azithromycin, which is donated by the manufacturer, Pfizer, to elimination programmes through the International Trachoma Initiative; and Facial cleanliness and Environmental improvement, with a focus on improved access to water and sanitation, to reduce transmission.



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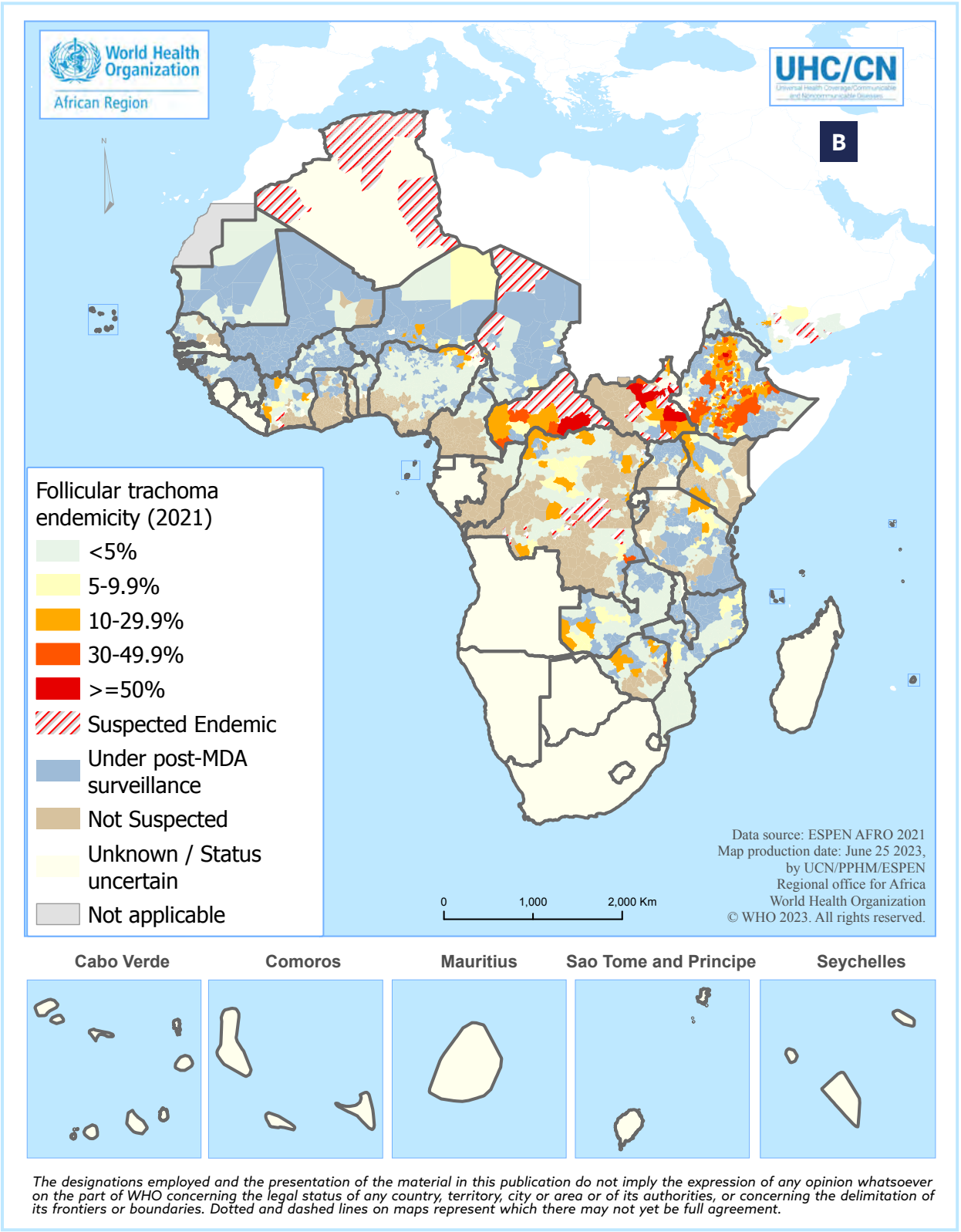


▲**Figure 4.2** Active trachoma endemicity (determined by prevalence of the sign trachomatous inflammation – follicular in 1-9-year-olds) by implementation unit in 2014 (A) and 2021 (B)

Trachoma does not only cause pain and suffering for affected individuals and communities but also has enormous economic consequences. The economic cost in terms of lost productivity from blindness and visual impairment is estimated at US$ 2.9–5.3 billion annually, increasing to US$ 8 billion when trichiasis is included[66].

After marked scaling-up of trachoma elimination activities in the last decade, there have been significant achievements in disease burden reduction with more and more endemic countries reaching the elimination thresholds. By July 2022, of the 47 countries in the African Region, 25 are endemic for trachoma and are known to require interventions, whereas 15 countries are believed to be non-endemic. A further three countries (Angola, Botswana, and Namibia) may require intervention and investigations. WHO has conducted preliminary investigations in these three countries to establish transmission thresholds in collaboration with the respective health ministries. Among the 25 countries known to require interventions against trachoma, 20 have completed the mapping of all endemic districts, while mapping is incomplete in Central African Republic, Chad, Democratic Republic of the Congo, Nigeria, and South Sudan. Burundi and Mauritania reached the elimination targets and are preparing to submit the trachoma elimination dossiers[67]. A further four – Ghana, The Gambia, Togo and Malawi – were validated to have eliminated trachoma as a public health problem in 2018, 2021 and 2022[68-71]. Although trachoma remains endemic in 25[3] countries in the WHO African region, eight countries have reached the elimination threshold for active trachoma and no longer required MDA in 2020. The environmental risk factors for trachoma transmission include poor hygiene, overcrowded households, inadequate access to water and inadequate access or use of proper sanitation facilities.

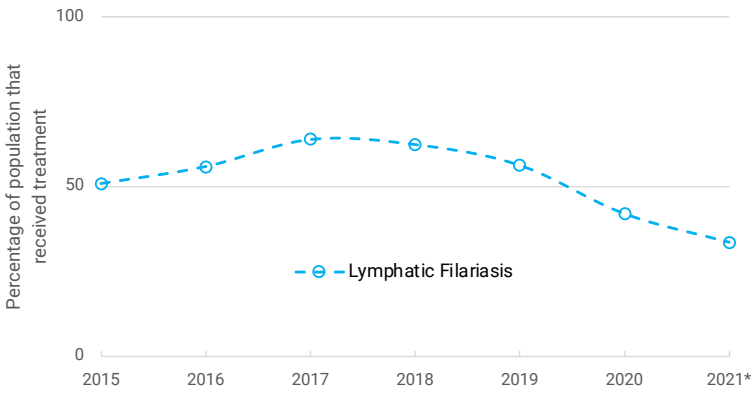
Success factors for the progress made include country ownership of trachoma elimination programmes, including the establishment of national trachoma taskforces to implement the WHO-recommended SAFE strategy, leveraging partnerships with WHO and other organizations, medicine donations from Pfizer via the International Trachoma Initiative to roll out antibiotic mass drug administration (MDA) at district level, generous financial support from a range of donors, and partnering with a range of stakeholders to improve access to WASH. WHO provides leadership through the WHO Alliance for the Global Elimination of Trachoma by the year 2020 (GET2020), which was established in 1996[62]. With other partners in the Alliance, WHO supports country implementation of the SAFE strategy and strengthening of national capacity through epidemiological assessment, monitoring, surveillance, project evaluation and resource mobilization contributing towards the elimination of trachoma as a public health problem. End-game challenges in trachoma control include the emergence of persistent and recrudescent active trachoma in some districts. In December 2021, 176 districts worldwide, or 8% of all districts that had ever been observed to have a threshold of TF1–9 ≥ 5%, met the criteria for persistent active trachoma. Most of these districts (145/176, 82%) were in Ethiopia. Of 774 districts worldwide that had conducted at least one surveillance survey, 123 (16%) turned out to have recrudescent active trachoma, of which 57 (46%) were in Ethiopia.

Strategic priorities for trachoma control in the WHO African region include ensuring 100% geographic coverage of SAFE implementation in already identified trachoma endemic countries. There are issues that prevent programmes from addressing gaps in mapping, including the security situation in Central African Republic, Chad, Democratic Republic of Congo, Nigeria, and South Sudan.

3 Algeria, Angola, Benin, Burkina Faso, Cameroon, Central Africa Republic, Chad, Côte d'Ivoire, Democratic Republic of the Congo, Eritrea, Ethiopia, Guinea, Guinea-Bissau, Kenya, Mali, Mauritania, Mozambique, Niger, Nigeria, Senegal, South Sudan, United Republic of Tanzania, Uganda, Zambia and Zimbabwe

4.1.2.1. Lymphatic filariasis

Lymphatic filariasis is a mosquito-borne disease of the lymphatic system, causing the swelling and painful disfigurement that is commonly known as elephantiasis. Mass drug administration is the primary tool used for control along with mosquito-vector control. In the region, MDA has been implemented in 30 countries to scale, and has begun in a further 10 countries, with only two countries yet to implement the intervention. There was an increase of 15 million in the population under surveillance that no longer required treatment for lymphatic filariasis, from 152.8 million in 2020 to 177.3 million in 2021. The population requiring treatment in lymphatic filariasis endemic areas across the region was estimated at 342.3 million[56], a reduction of nearly 3.2 million compared to 2020). Figure 4.3 shows the treatment coverage since 2015, showing a decline in 2019-2021. In 2021, ESPEN supported MDA in seven countries (Comoros, Congo, Democratic Republic of the Congo, Equatorial Guinea, Madagascar, Nigeria, and São Tomé and Príncipe).



▲**Figure 4.3 Lymphatic filariasis treatment coverage across the region, 2015-2021**

As of today, Togo and Malawi have eliminated lymphatic filariasis as a public health problem. Some emerging challenges that deterred some countries from implementing MDA and reducing transmission include insecurity, and supply-chain delays due to worldwide shipping challenges driven by the COVID-19 pandemic. In 2021, 551 implementation units received treatment with albendazole (ALB) + ivermectin (IVM), 37 with albendazole (ALB) + diethylcarbamazine citrate (DEC), 99 ALBx2 and seven implemented the triple therapy of IVM+DEC+ALB.

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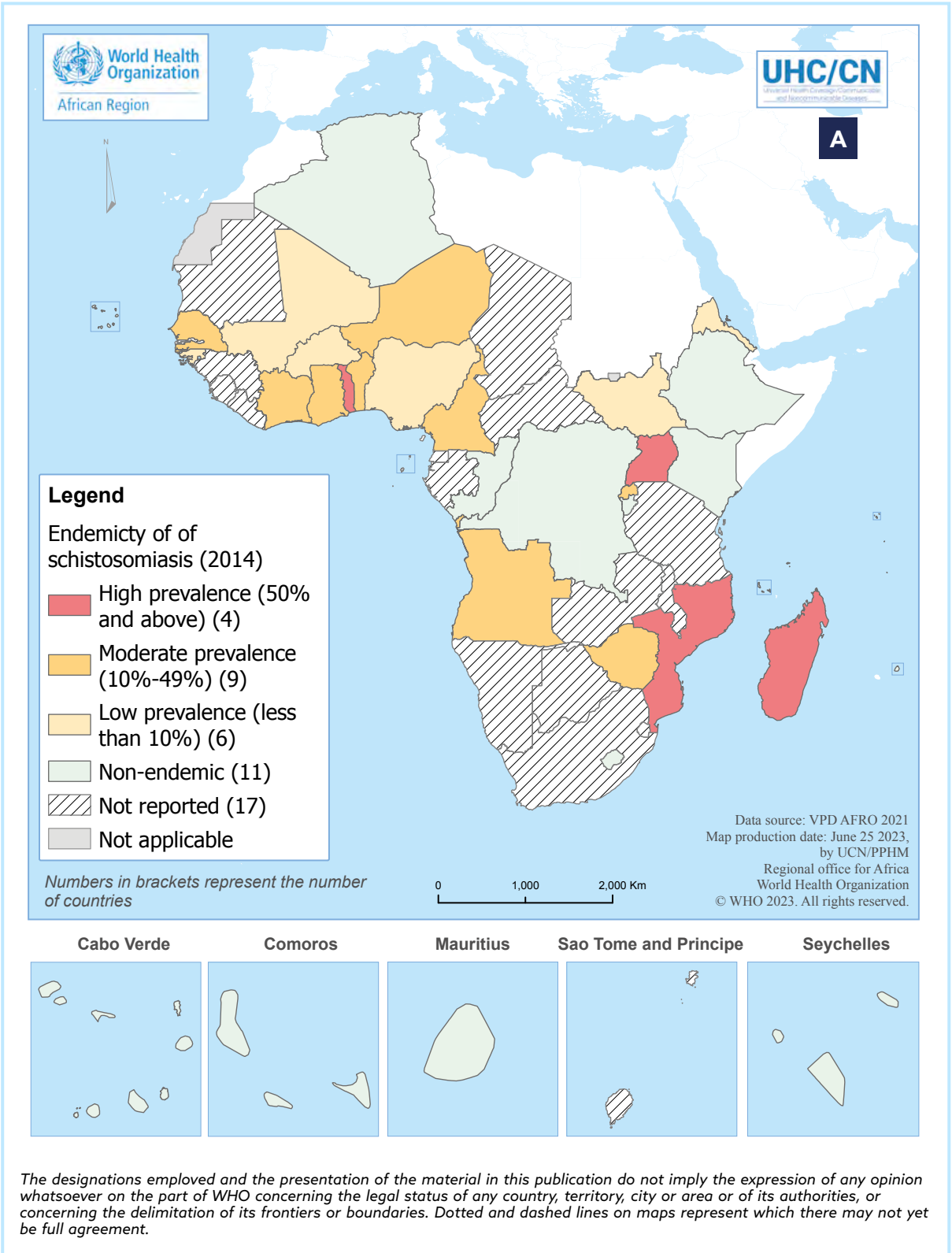
4.1.2.2. Schistosomiasis

In 2021, 90.6% of the people who require PC for schistosomiasis globally live in 41 countries in the African Region. Large parts of Africa exhibit prevalence greater than 50% (Figure 4.4). In highly endemic areas, severe morbidity due to schistosomiasis can be prevented by regular treatment of at-risk groups with praziquantel, based on community diagnosis.



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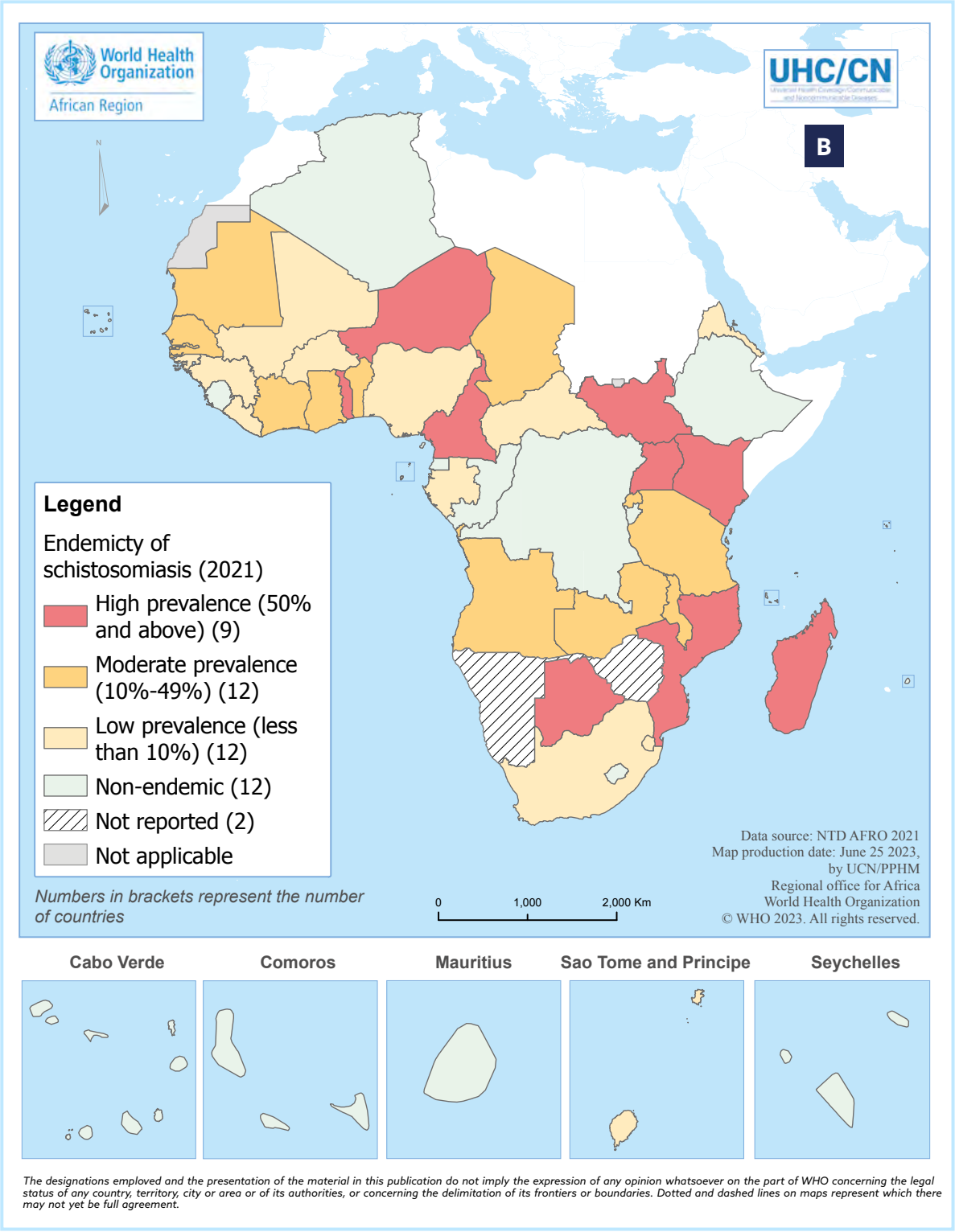


▲Figure 4.4 Prevalence of schistosomiasis at IU level in the African Region in in the African Region in A) 2014 and B) 2021

Of the 41 endemic countries requiring PC, 15 (Benin, Chad, Democratic Republic of the Congo, Gabon, Liberia, Kenya Mali, Senegal, South Sudan, Togo, United Republic of Tanzania, Uganda, Zambia and Zanzibar, Nigeria,) made significant progress in implementing elimination strategies including the large-scale treatment of at-risk population groups, access to safe water, improved sanitation and hygiene education. At community level, poor hygienic environments, low socio-economic status of communities, absence of clean water, low coverage of prevention services and weak surveillance systems that prevent the detection of transmission foci prevent effective achievement of targets. The ESPEN programme within WHO promotes community-level surveillance, mapping and data analysis, which reveals over 21 million children are missing treatment due to inadequate data and over 26 million unnecessarily treated before community data analysis. In 2021, 32 countries in the region implemented PC for schistosomiasis and covered 55.1 million school-age children and 13.9 million adults.

4.1.2.3. Soil-transmitted helminthiases (STH)

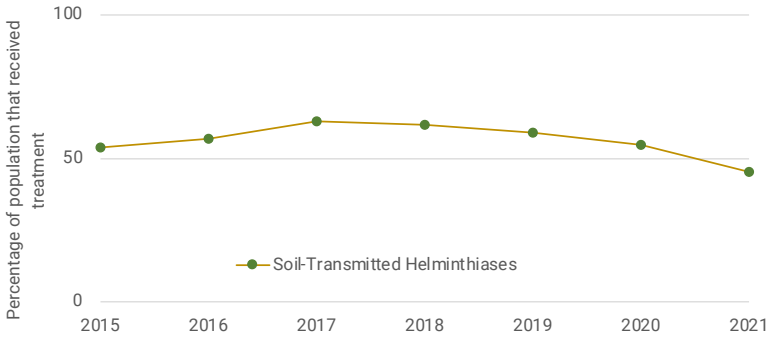
There are

39

countries

in the African Region endemic for STH and in need of PC interventions

Soil-transmitted helminth infections are among the most common infections affecting the poorest and most deprived communities with poor sanitation. There are 39 countries in the African Region endemic for STH and in need of PC interventions (WER 2021). Figure 4.5 shows treatment coverage representing total population covered out of the estimated total population requiring treatment. In 2021, 73 million school aged children (45.9%) and 5.6 million pre-school aged children (7.5%) were treated in 29 countries with PC. WHO is in the process of finalizing guidance and tools for use to verify elimination as a public health problem in countries that have made significant progress and have likely achieved this milestone.



▲**Figure 4.5** Regional STH preventive chemotherapy coverage in WHO African region, 2015-2021

4.1.2.4. Onchocerciasis

more than

99%

of infected people globally live in 26 African countries

MDA with ivermectin is the current core strategy to eliminate onchocerciasis, with a minimum requirement of 80% therapeutic coverage. It is estimated that at least 12-15 years of annual treatment are required in hyper- and meso-endemic areas to eliminate transmission, corresponding to the lifespan of the adult *Onchocerca volvulus*. Some of measures used in control include the mapping of endemic communities using serological and molecular tests, once-to-twice yearly ivermectin mass drug administration, and combined treatment in areas of co-endemicity with loaiasis.

In 2021, 26[57] countries of the African Region were endemic for onchocerciasis, representing more than 99% of infected people globally[57]. The population requiring treatment for onchocerciasis across Africa increased from 239.2 million in 2020 to 243.7 million in 2021[57,59]. Compared to 2020, there has been an increase in the population targeted and treated for onchocerciasis in the African region, namely 141.5 million and 112 million respectively[57,59]. Therefore, there is an improvement in the coverage of treatment activities that were impacted by the COVID-19 pandemic in 2020. While the geographical coverage in the African region in 2019 was 86.6%, this declined to 60% in 2020, and slightly increased to 66% in 2021[57,59,72]. In 2021, 397 implementation units received treatment with ALB+IVM and 788 were covered only with IVM. Treatment is stopped in endemic communities in the transmission zone when the OV-16 prevalence in children aged between 5 to 9 years and the blackfly infectivity rate decreases below 0.01% and 0.05% respectively, at which level transmission is very low.

A major success in 2021 was the confirmation of the interruption and elimination of transmission in Niger, which is preparing its dossier to be verified by WHO as having eliminated the transmission of onchocerciasis.

4.2.
Case Management NTDs (CM-NTDs)

4.2.1.
Progress in CM-NTDs targeted for eradication in the African Region

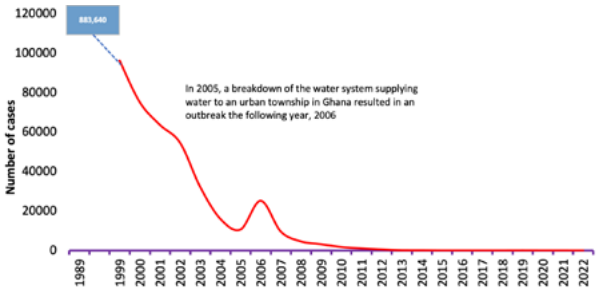
4.2.1.1.
Dracunculiasis or Guinea worm disease

Guinea worm disease (dracunculiasis) and yaws are the only two NTDs targeted for eradication by WHO. Africa is the only region where Guinea worm disease is yet to be eliminated. Although 42 countries have officially been certified free of dracunculiasis transmission, there is a recent manifestation of the disease in non-human mammals, which threatens the last mile of eradication. This highlights the importance of consistent multisectoral collaboration and cross-cutting action for at least three consecutive years to cover all life cycles and halt the cycle of disease transmission.

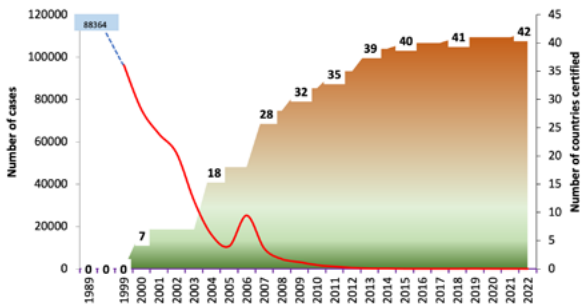
Angola, Chad, Ethiopia, Mali, and South Sudan, which have indigenous transmission, are yet to eliminate the disease. When the global eradication campaign was launched in the 1980s, the disease was endemic in 16 countrie in the Region countries[73] out of 20 countries globally. Through the collective effort of affected countries, WHO and other global partners (The Carter Center, UNICEF and the WHO Collaborating Centre for Dracunculiasis Eradication at the United States Centers for Disease Control and Prevention), the number of cases reported annually declined by over 99.99% from nearly 900 000 in 1989 to 15 in 2021 (Figure 4.6). The 15 cases were reported in four countries (Chad (8), South Sudan (4), Mali (2) and Ethiopia (1)) compared to 27 cases in 2020. In 2022, a total of 13 human cases were reported, the lowest ever reported in a single year[58]. From January to June 2023, only one human case has been reported worldwide, and that in Chad.[63]. To date, following the recommendations of the International Commission for the Certification of Dracunculiasis Eradication (ICCDE), WHO has certified a total of 42 countries in the WHO African region, the most recent being the Democratic Republic of Congo in December 2022 (Figure 4.7).

The emergence of infection among domestic animals (dogs and cats) and baboons (in Gog and Abobo districts of Ethiopia) not only remains the greatest challenge to interrupting transmission in the remaining endemic countries, but also poses a high-risk of re-introduction of the disease in certified countries.

Interim targets for 2025 include certification of transmission-free status in two countries, and in the final three countries by 2030. The eradication of Guinea worm would be an unprecedented attainment of this milestone without vaccines or treatment, and simply via community engagement and behavioural change.



▲Figure 4.6 Number of Guinea worm cases reported in the African Region since 1986



▲**Figure 4.7** Number of countries certified free of Guinea worm and the number of Guinea worm cases reported in the African Region

An assessment of diagnostic gaps and priorities for Guinea worm include developing a field test to detect pre-patent infection[4] in humans, dogs and other animals and field pond-side tests for detecting *Dracunculus medinensis* DNA in copepods.

Scientific and operational protocols are required for the elimination of infections in animals, case surveillance and investigation in outbreaks, sustained funding to eliminate disease in the last remaining districts, improved case management (including integrated referral management), a post treatment tracking system to identify secondary or other forms, and multisectoral coordination.

4 Pre-patent infection – the parasite has invaded the human/other mammal host but has not yet caused pathological changes that cause symptoms, so it is not detectable clinically.

4.2.1.2. Yaws

Yaws occurs only in humans and can be treated with readily available drugs that have the potential to accelerate interruption of its transmission.

APPROXIMATELY 1.4 MILLION PEOPLE AT RISK OF YAWS IN THE THREE COUNTRIES HAVE RECEIVED TREATMENT

The eradication approach consists of mass treatment (also called total community treatment, TCT) with azithromycin administered to the entire population with a minimum 90% coverage in endemic areas. No country in the region has been certified free of transmission of yaws, although there are only nine confirmed endemic countries (Benin, Cameroon, CAR, Congo, Cote d'Ivoire, Democratic Republic of the Congo, Ghana, Liberia and Togo).

Of the nine countries, Cameroon, Central African Republic, and Congo have been implementing TCT with azithromycin since 2020. Overall, approximately 1.4 million people at risk of yaws in the three countries have received treatment in the initial round of a large-scale administration. Total targeted treatment (TTT) has been implemented in the six other endemic countries (Benin, Côte d'Ivoire, Democratic Republic of the Congo, Ghana, Liberia, and Togo). The major challenges to attaining eradication of yaws remain insufficient funding to support yaws eradication and weak active surveillance for yaws in countries. Promoting integrated approaches is an opportunity to address these challenges. Consequently, WHO is supporting the elaboration of country integrated NTD master plans that identify key priorities to be implemented by each country to achieve the roadmap target for the eradication of yaws.

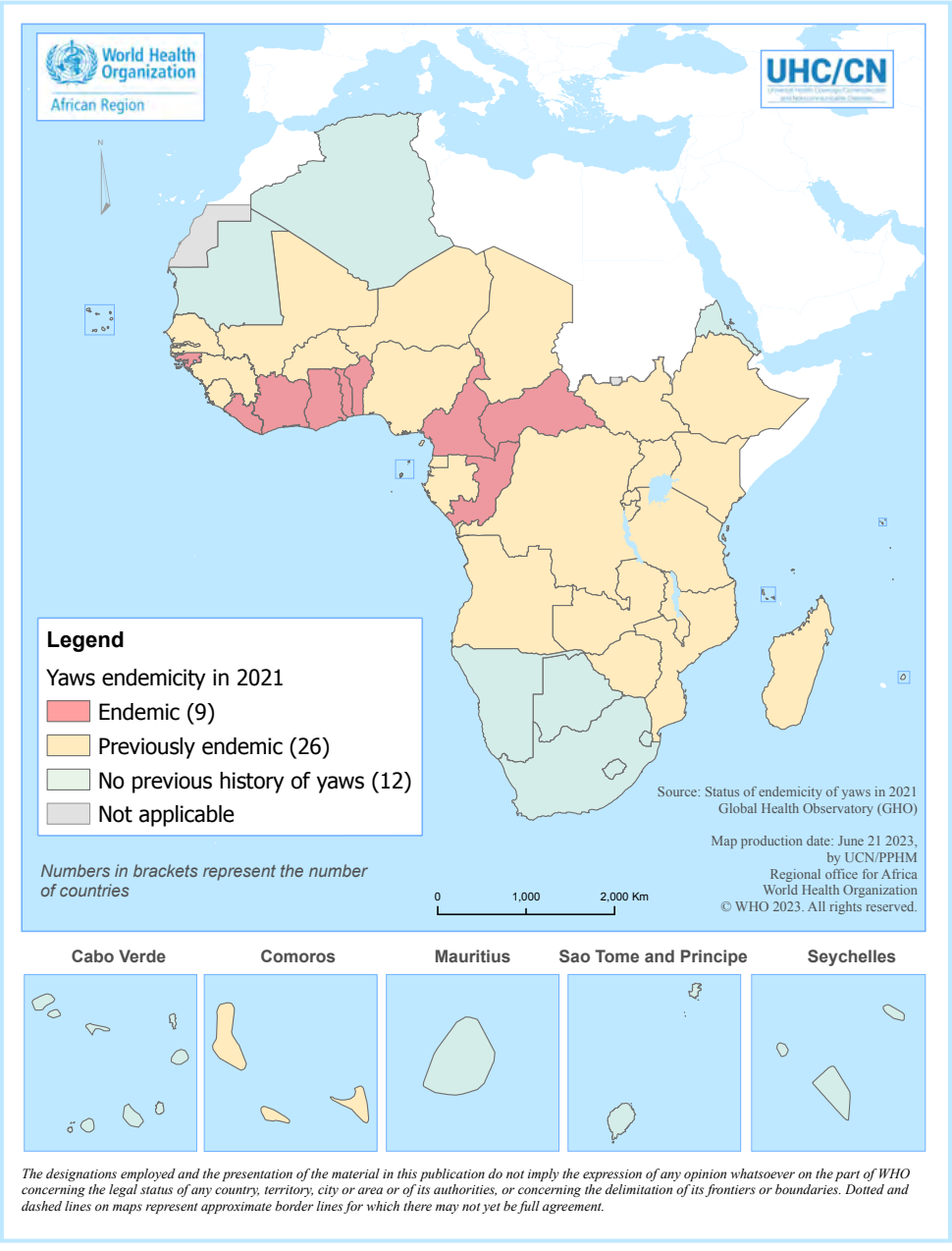


Figure 4.8 Regional yaws endemicity status

4.2.2. CM-NTDs targeted for elimination

Leprosy, *gambiense* human African trypanosomiasis and onchocerciasis are targeted for interruption of transmission; seven other NTDs (*rhodesiense* human African trypanosomiasis, visceral leishmaniasis, lymphatic filariasis, rabies, schistosomiasis[5], soil-transmitted helminthiases, and trachoma) are targeted for elimination as a public health problem. These diseases, although classified as PC-NTDs, cause pathology that often requires individual patients management, as so are included again in this section.

The global road map for NTDs set out a target of elimination of at least one NTD in at least 50–60% of Member States that were NTD-endemic in 2020. Ten countries in the region have been officially validated for the elimination of at least one NTD as a public health problem: human African trypanosomiasis (Benin, Côte d'Ivoire, Equatorial Guinea, Rwanda, Togo, and Uganda), trachoma (The Gambia, Ghana, Mali, Malawi, and Togo), and lymphatic filariasis (Malawi and Togo).

5 A limited number of countries are targeted for transmission elimination of schistosomiasis, including Mauritius.

4.2.2.1. Leprosy

Leprosy is a chronic infectious disease that mainly affects the skin, the peripheral nerves, mucosa of the upper respiratory tract, and the eyes caused by a bacillus, *Mycobacterium leprae*. The incubation period of the disease, on average, is five years but symptoms may occur at any time within 20 years of infection.

To achieve the objectives of elimination, WHO is supporting countries to map endemic communities, scale up prevention and case management by mobilizing more resources for disease programmes and strengthening health systems, including community engagement.

Various interventions were implemented in countries to progress towards elimination of leprosy transmission in the African region. These interventions included:

- Implementation of Bangkok Declaration Special Fund (BDSF) Projects in seven Member States (Côte d'Ivoire, Democratic Republic of the Congo, Ethiopia, Madagascar, Mozambique, Nigeria and United Republic of Tanzania).
- Mini-leprosy elimination campaigns (Mini-LECs) and Maxi-leprosy Elimination Campaign (Maxi-LEC).
- Updating of leprosy registers combined with joint active case-finding of leprosy and other CM-NTDs.
- Capacity building, followed by rapid assessment of the leprosy burden and other CM-NTDs.
- Integrated active leprosy case finding with contact tracing in leprosy low-burden countries.
- Pilot implementation of joint active case-finding of leprosy and other skin NTDs combined with mass medicine administration for yaws eradication in three countries in the context of the COVID-19 pandemic (Cameroon, Central Africa Republic and the Congo Republic).
- Pilot implementation of joint active case-finding of leprosy and other skin NTDs, combined with mass medicine administration for PC-NTDs in three districts of the Forest Region of Guinea in 2019, while implementing COVID-19 preventive measures.
- Programme monitoring and evaluation.
- Evaluation of post-exposure prophylaxis for leprosy in the Comoros and Madagascar.
- Evaluation of Bangkok Declaration Special Fund (BDSF) Projects.

The number of new leprosy cases detected each year reduced from 22 400 in 2012 (detection rate of 24.7 cases per million population) to 21 201 in 2021 (detection rate of 18.2 cases per million population) and grade-2 disability rate per million population decreased from 3.38 to 2.78 during the same period. The leprosy prevalence rate decreased from 21.58 to 18.01 cases per million inhabitants between 2012 and 2021. The major challenges are weak health systems (resulting in delayed diagnosis), highly endemic pockets, e.g., island of Anjouan in the Comoros, dwindling expertise and capacity for leprosy diagnosis at primary care facilities, and reduced domestic financial support, as well as from non-governmental organizations.

4.2.2.2. Leishmaniasis

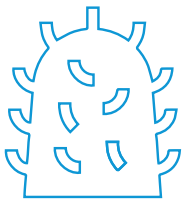
Leishmaniases are a group of diseases caused by protozoan parasites from more than 20 *Leishmania* species. These parasites are transmitted to humans by the bite of an infected female phlebotomine sandfly vector. There are three main forms of the disease: cutaneous leishmaniasis (CL), visceral leishmaniasis (VL), and mucocutaneous (MCL). Visceral leishmaniasis (VL), also called kala-azar, is fatal if untreated.

The prevention and control strategies for leishmaniasis include prompt diagnosis and treatment, integrated vector control, effective disease surveillance, and social mobilization and partnership. VL remains one of the top parasitic diseases with reported outbreaks and mortality. Recently reported outbreaks occurred in Chad and Kenya in 2020. Globally, in 2020, more than 90% of new VL cases reported to WHO occurred in 10 countries of which six are from East African foci (Ethiopia, Eritrea, Kenya, Somalia, South Sudan, Sudan and Yemen). In 2021, a total of 3,825 new autochthonous VL cases were reported from 10 countries[74] with the African Region accounting for 33% of the global burden.

VL endemic countries in East Africa (extending to the Horn of Africa) share significant disease burdens. Ethiopia, Kenya, South Sudan and Uganda are identified as high-burden countries. The East African VL foci comprising Eritrea, Ethiopia, Kenya, Somalia, South Sudan, Sudan, and Uganda accounted for 66% of all cases reported in 2021 worldwide. The VL case fatality rate reported from some of the countries in the region is above the 1% threshold for VL elimination (2.8% for Ethiopia, 3% for South Sudan) as compared to 0.6% and 0.8% for Kenya and Uganda respectively.

WHO and Gilead Sciences Inc. signed an agreement (2011-2016) for the donation of AmBisome, a key drug in the treatment of VL. The other major partners involved in the VL programme include END Fund, Médecins Sans Frontières, Drugs for Neglected Disease initiative (DNDi). The major challenges for the control of VL in the region include weak health systems, insecurity and displacement, lack of tools (suboptimal point of care diagnostics and suboptimal efficacy of available antileishmanial medicines and lack of effective vector control strategy), and HIV co-infection, resulting in repeated relapses and disease transmission. Hence, improved country ownership, strengthening disease surveillance, capacity building and improved tools through research and development are key to achieving the global target for leishmaniasis.

4.2.2.3. Rabies



Rabies is a viral zoonotic disease that causes progressive and fatal inflammation of the brain and spinal cord. It is endemic in almost all countries in the Region posing a high burden on affected communities. Up to 99% of the cases are transmitted through scratches, bites or contamination of mucous membranes with infectious saliva from dogs. Yet, rabies is entirely preventable through timely post-exposure prophylaxis (PEP) consisting of thorough wound washing with water and soap for at least 15 minutes, a series of rabies vaccination and administration of rabies immunoglobulin or monoclonal antibodies (if indicated). However, to prevent human rabies deaths, dog vaccinations, including puppies, are the most cost-effective strategy as it stops disease transmission at its source.

Other essential preventive measures include community engagement, awareness raising across population, increasing treatment-seeking behaviour after exposures to rabies susceptible animals, education on dog behaviour and bite prevention, responsible dog ownership, and waste management.

To eliminate dog-mediated rabies, a cross-sectoral approach is needed and rabies control can significantly contribute to building One Health workforce capacity. In 2020, WHO, Food and Agriculture Organization (FAO) and World Organisation for Animal Health (WOAH, founded as OIE) have launched the United Against Rabies (UAR) Forum[75], a multi-stakeholder platform to advocate for action and investment in rabies control. This Forum aims to accelerate progress towards the global goal of "zero human deaths from dog-mediated rabies by 2030[76]". Adequate and sustainable investment and engagement of multiple sectors including local communities using a One Health approach are critical to achieve elimination of rabies as a public health problem.

Despite efforts to control rabies and inclusion of the disease in most national NTD strategic plans, it remains endemic in many countries, with recurrent outbreaks being reported (more than 10 outbreaks in the last five years). However, rabies surveillance is very limited and the available data is weak. Information is often not shared across different sectors and levels, follow-up after exposures is missing and rabies cases tend to be vastly underreported and prone to misdiagnosis.

Rabies elimination is possible and within reach. We have all tools and effective vaccines available. Country ownership is critical for the development, implementation and scale up of rabies control activities.

4.2.3.
Control of CM-NTDs

4.2.3.1.
Buruli ulcer

Buruli ulcer (BU) is a chronic debilitating disease that mainly affects the skin and sometimes bones, caused by *Mycobacterium ulcerans*. The number of Buruli ulcer cases reported in the region reduced by 36.1% from approximately 2143 cases in 2014 to 1370 in 2021. To ensure efficiency, sustainability and scale up interventions, BU control should be integrated within skin-related NTDs such as scabies in line with recommendations outlined in the strategic framework for integrated control and management of skin-related NTDs.

4.2.3.2.
Cutaneous leishmaniasis

2021
9,165 NEW CL CASES WERE REPORTED FROM 10 COUNTRIES

Control strategies include early case detection and treatment, integrated vector management, strengthening of integrated disease surveillance with other skin NTDs and conditions, country ownership and reservoir host control where zoonotic transmission is established. Outside the African Region, countries with a high burden the disease include Afghanistan, Brazil, Colombia, Islamic Republic of Iran, Iraq, Pakistan, Peru and the Syrian Arab Republic. In 2021, there was a sharp decrease in the number of cases in the WHO African Region, from 13,889 in 2020 to 9,165 cases.

The 9165 new CL cases were reported from 10 countries (Algeria, Burkina Faso, Cameroon, Chad, Ethiopia, Ghana, Guinea, Kenya, Nigeria, Senegal) in the WHO African Region. The largest burden is in Algeria, which accounted for 83% of the cases between 2013–2021 and 77% of the reported cases for 2021 alone.

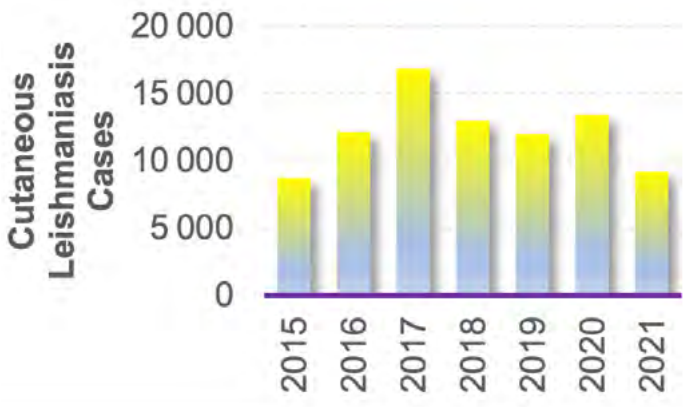


Figure 4.9 Reported cases of cutaneous leishmaniasis in the WHO African Region, 2015 – 2021

4.2.3.3. Taenia infections

Taeniasis intestinal parasitic infection (tapeworm) is prevalent in 27 countries in the WHO African region and suspected to be endemic in 11 others. Pigs are the intermediate host for the parasite, which can cause two distinct diseases in humans: taeniasis and cysticercosis.

Neurocysticercosis (NCC) refers to the development of larval cysts in the central nervous system of humans, causing seizures and epilepsy among other neurological symptoms. NCC is one of the leading causes of preventable epilepsy and in the communities where it is present, it can contribute to up to 70% of the epilepsy cases. Epilepsy in vulnerable populations is difficult to treat and causes stigma affecting people's lives and livelihoods. This infection, when co-endemic with schistosomiasis, impacts the success of treatment for schistosomiasis with praziquantel (PZQ), due to the different dosing with PZQ and handling needed for cysticercosis, and the increased risk of adverse events in patients with cysticercosis.

WHO has launched a new set of tools to assist with the control of this parasitic infection starting with the identification of high-risk areas, guidelines for preventive chemotherapy for the control of taeniasis and the guidelines for the clinical management of NCC. WHO is also promoting the implementation of these tools in several African countries, facilitating the donation of drugs for control of taeniasis, promoting water, sanitation and hygiene (WASH) measures, and supporting One-Health control projects. The endemicity has so far been determined at country level, but further work is needed to identify target communities. Thus, community mapping is urgently needed to best estimate the burden of disease in the region. In 2021, ESPEN supported countries to estimate their treatment needs, and conducted preliminary discussions with some NTD programmes on piloting MDA using praziquantel or niclosamide in selected prioritized areas, and development of mapping protocols using WHO tools. These activities are ongoing in Angola, Cameroon, Madagascar, Namibia, and Rwanda, and will be scaled up in coming years. ESPEN continues to advocate with partners to leverage the existing expertise on *Taenia solium* in countries, and the opportunity to collaborate with other programmes, such as schistosomiasis and STH, and to utilise the new tools and medicines available through WHO to support sub-national mapping and implementation of interventions.

4.2.3.4. Dengue

The spread of dengue on the African continent is an emerging public health problem. The disease was known to be prevalent in the region but masked by other co-morbidities. Dengue fever is transmitted to humans through the bite of infected *Aedes* mosquitoes, and its prevalence has increased significantly with multiple outbreaks in the region between 2011 and 2021 in 12 countries, including in Kenya, Benin, Cape Verde, Angola, United Republic of Tanzania, Somalia, Ethiopia, Sao Tome and Principe and the Comoros[77]. New problems continue to emerge that complicate the public health response to dengue. First, is the issue of resources dedicated towards dengue control. Many sub-Saharan African countries are severely resource-constrained and may face issues with sustainable diagnostic testing, vector control, and case management of dengue. Second, the general epidemiology of dengue in Africa has changed over time, and it is likely that the burden of this disease is grossly underestimated. Climate change, movement of people / goods and increasing urbanization are other factors favouring the spread of this disease.

Dengue is a climate-sensitive disease, and models show that climate can predict mosquito-borne disease dynamics in Africa. Dengue control focuses on active surveillance, prompt diagnosis and vector control. However, prevention and control strategies for dengue may have similarities to malaria, the vector is significantly different in its bionomics. *Aedes* mosquitoes that transmit dengue bite during the day, breeds in and around houses and can cause clusters of infections.

Therefore, understanding the relationship and seasonal variation between malaria and dengue prevalence in Africa, taking into account the potential for misdiagnosis of febrile illnesses as well as co-infection, is critical for integrated coordinated surveillance and management.

4.2.4. Additional NTDs

Mycetoma, chromoblastomycosis and other deep mycoses (2016, 2017), scabies and other ectoparasites (2017) and snake bite envenoming (SBE) (2018) were recently added to the WHO NTD portfolio, building on the previous 17 NTDs already included in the WHO portfolio.

The regional snakebite envenoming programme was launched in 2022 during the Strategic and Technical Planning meetings, along with data management portals for SBE. Training on SBE data and information management was provided to four pilot countries, Benin, Ghana, Nigeria, and Togo. This data is managed through the SBE data portal and information management based on WDP-DHIS2 platform has been launched[78]. Efforts are on-going to pilot an SBE antivenom stocking-piling project in eight countries in West and Central Africa[78].

4.3. Challenges and opportunities

- The COVID-19 pandemic has contributed to increased funding gaps for NTDs and health in general. Therefore, scaling up funding to include all Implementation Units (IUs) and NTDs is critical. ESPEN-supported IUs should ideally be all IUs as diseases do not recognise geographical or ethnic borders.
- Country ownership: Sustainable solutions are best achieved by countries defining their own priorities, leading the promotion and implementation of these priorities and demonstrating financial commitment to these.
- Cross-sectoral collaboration: Coordinated action is needed across sectors within and beyond the healthcare sector particularly for, but not limited to NTDs[79].

4.4.
Key recommendations for implementing the NTD roadmap

To achieve the targets set out in the roadmap and sustain the progress made, global, regional, and national efforts are needed. While aligned with the Global Plan, these recommendations will be tailored to the unique challenges and characteristics of the African Region.

4.4.4.1. Regional recommendations

- **Coordinating the development of regional strategies.** The African Regional Office should build on the WHO NTD Roadmap by developing and coordinating region-specific strategies to reach set goals by 2030.
- **Providing technical support.** The Regional Office should continue to provide technical support and guidance to countries. This would aid country ownership as a core pillar for sustainability in efforts against NTDs.
- **Promoting use of data for decision making and strengthening regional monitoring and evaluation activities.** The WHO Division of Data, Analytics and Delivery for Impact (DDI) is leading and fostering a corporative effort, which is providing opportunities for strengthening data management practices, integrating monitoring and evaluation systems, and mainstreaming NTD data management into national health information systems. The Regional Office should harness institutional synergies in order to champion the integration, mainstreaming and expansion of NTD monitoring and evaluation databases to incorporate on all diseases in the road map[80].
- Creating opportunities for sharing lessons learned through regional learning networks and the NTD modelling consortium. The Regional Office will need to play a greater role in coordinating the generation and dissemination of key lessons learned across countries to optimize programme implementation.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5.

Vaccination

5.1.
Introduction

Vaccination is one of the most cost-effective public health interventions and disease prevention strategies, yet inequalities persist and result in disparities in vaccination coverage at national and sub-national levels[81]. Between 2000 and 2019, it was estimated that vaccination against 10 pathogens averted approximated 37 million deaths among children in low- and middle-income countries and could potentially avert a further 32 million in the next seven years[82]. The WHO launched the Immunization Agenda 2021-2030 (IA2030), a strategy to leave no one behind, after the Global Vaccine Action Plan ended in 2020[83]. It is underpinned by four core principles of a people-centred approach to immunisation, country-ownership, implemented through broad partnerships, and use of data to drive vaccination. The IA2030 states global targets of 90% coverage for essential childhood and adolescence vaccination, 50% reduction in the number of children missing out on vaccination and completing national or subnational introductions of new or under-utilized vaccines, e.g., COVID-19, rotavirus, or human papillomavirus (HPV). Measuring and tracking these targets at national and sub-national levels is essential for disease control planning and implementation within the African Region.

5.2.
Control of vaccine preventable diseases

Control of vaccine-preventable disease is defined as the reduction of disease and death to low levels locally. In this report we review progress made and challenges to the control of three VPD diseases, namely meningitis, yellow fever, and hepatitis B.

5.2.1.
Meningitis

Meningitis is the inflammation of the tissues surrounding the brain and spinal cord. It is usually caused by infection. Meningitis can be caused by many different pathogens, which include bacteria, viruses, and fungi. However, the highest global burden stems from bacterial meningitis. The predominant pathogens are *Neisseria meningitidis* (Nm), *Streptococcus pneumoniae (S. pneumo), haemophilus influenzae* type b (Hib) and group B *streptococcus* (GBS)[84]. Meningococcal meningitis is associated with high fatality rates, with more than 10% of patients developing severe long-term effects, which include mental retardation, hearing loss and paralysis of the limbs[85].

Despite significant progress made in combating meningitis over the past 20 years, bacterial meningitis remains a major global public health challenge, with over 1.2 million cases occurring each year. Meningitis causes 300 000 deaths a year globally and carries a high risk of epidemics.

The incidence and case fatality rates for bacterial meningitis vary by region, country, pathogen, and age group[86].

Before 2010, *Neisseria meningitidis* A (NmA) was the leading cause of meningitis epidemics, accounting for almost 90% of epidemics. The introduction of MenAfriVac resulted in a significant reduction in the incidence of *NmA* cases and a change in the bacterial profile of meningitis, leading to a predominance of meningococcal serogroups C, W, X and *S. pneumo* as a result of the drop in NmA cases[87-89].

In 2021, the landscape meningitis risk analysis of WHO African Member States resulted in the categorization of Member States with 13 assigned at high risk, 25 at medium risk and nine at lower risk (see Box: Country categorization of meningitis risk in the African region).

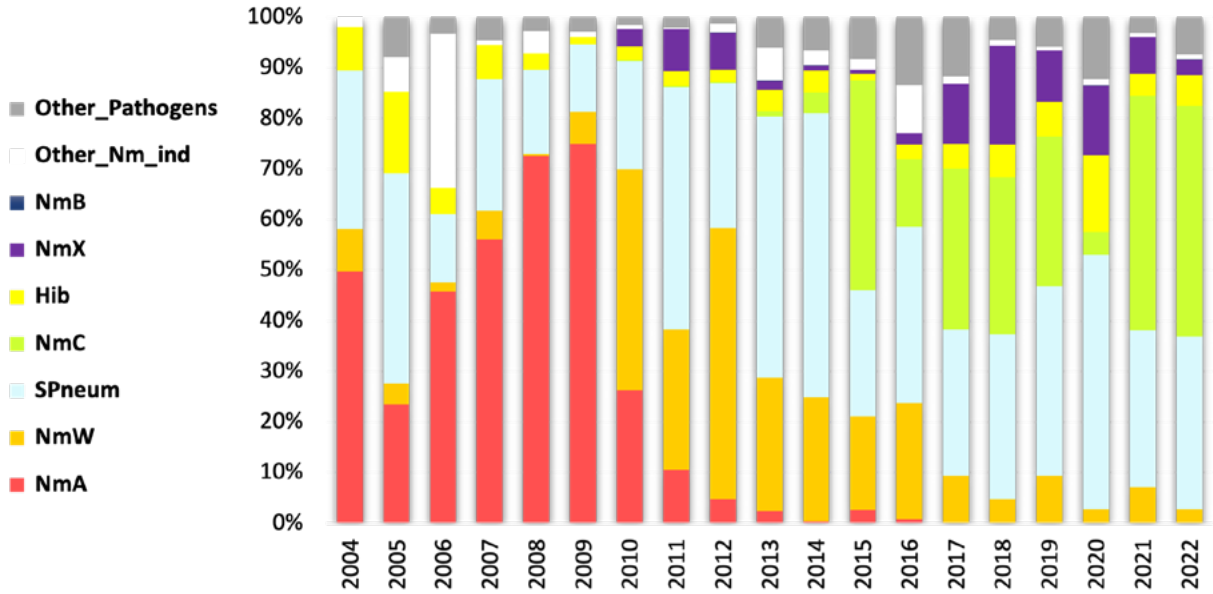
Country categorization of meningitis risk in the African region

High risk: Nigeria, Chad, Niger, South Sudan, Cameroon, Mali, Benin, Democratic Republic of the Congo, Ghana, Central African Republic, Guinea, Angola, Ethiopia,

Medium risk: Burkina Faso, Togo, Uganda, South Africa, Sierra Leone, Zambia, Malawi, Guinea-Bissau, Burundi, Kenya, United Republic of Tanzania, Eritrea, Mauritania, Namibia, Senegal, Cabo Verde, Equatorial Guinea, Gabon, Lesotho, Liberia, Madagascar, Mozambique, Congo Republic, Côte d'Ivoire, Comoros.

Lower risk: Gambia, Botswana, Algeria, Eswatini, Zimbabwe, Sao Tome and Principe, Rwanda, Mauritius, Seychelles.

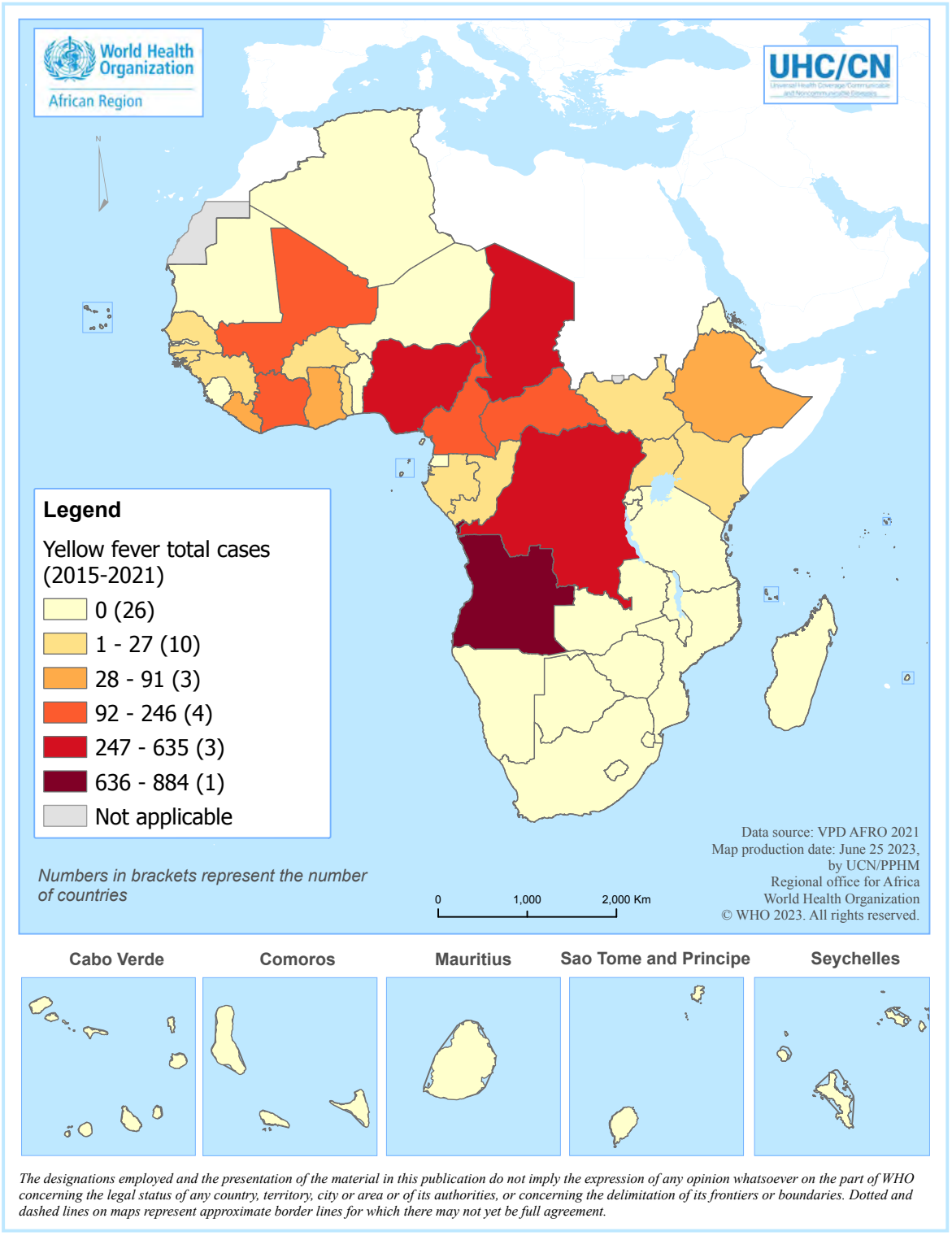
The global burden of disease study estimated 2.5 million cases and 236 000 deaths globally in 2019[90]. Approximately 22 414 new cases and 1,261 deaths occurred in the African meningitis belt[91]. The incidence of meningitis is greatest in the African meningitis belt. Member States within the African meningitis belt have recorded an annual average of 24 000 suspected cases, including 1800 deaths, and a case fatality rate (CFR) ranging from 5% to 14% since 2010 (see Figure 5.1). In 2021, a total of 207 167 meningitis cases were reported in the whole of the African Region, based on WHO and UNICEF Estimates of National Immunization Coverage (WUENIC). The focal enhanced surveillance at country level identified 13 532 new cases and 653 deaths (CFR 4.8%) in the African meningitis belt in 2021, with the predominant pathogens being NmC (44.6%); *S. pneumo* (29.7%); NmX (6.9%); NmW (6.8%) and Hib (4.2%) (Figure 5.1). NmC pathogens were found in Niger (90.5%), Benin (8.3%) and Burkina Faso (1.2%).



▲Figure 5.1 Meningitis pathogen profile in Africa 2004-2022

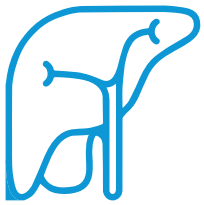
5.2.2. Yellow fever

Yellow fever (YF) is a vaccine preventable disease endemic in Africa and South America. The disease is primarily transmitted by mosquitoes belonging to the *Aedes* and *Haemogogus* species and caused by a Flavivirus[92]. YF has been one of most common infectious disease outbreaks in Africa since 2015 and is preventable through vaccination in children above nine months, health workers, and people who are traveling to or living in YF endemic countries. The African Region reported 256 cases in 2021, with Ghana (55 cases), Nigeria (54) and Cameroon (44) reporting over half the cases. Figure 5.2 shows the total number of reported cases of YF by country since 2015. The burden of YF in the region is thought to be underestimated. In 2018, a global study estimated 109 000 [67 000 - 173 000] severe infections and 51 000 [31 000 - 82 000] deaths due to YF, with the majority of cases occurring in Africa with 100 952 severe infections [63 001 - 158 362] and 47 318 deaths [29 162 - 74 981][93].



▲**Figure 5.2** Total confirmed cases on yellow fever since 2015
Data collected by WHO Africa Regional Office.

5.2.3. Hepatitis B



Viral hepatitis is a major contributor to global disease burden, with hepatitis B and hepatitis C accounting for most of the morbidity and mortality. Chronic infection with the hepatitis B virus is established as a risk factor for cirrhosis, liver cancer and liver failure[94]. In 2019, 1.5 million [1.1–2.6] new cases of chronic hepatitis B infection were estimated globally, of which 990 000 [660 000–1.6 million] occurred in the African region[9]. Vaccination remains one of the most effective methods to prevent and control the spread of hepatitis B[95].

The WHO recommends Hepatitis B Birth Dose (HepB-BD) be given within 24 hours of birth, followed by at least two subsequent doses[96]. All countries in the WHO African region have introduced hepatitis B vaccine into the routine immunisation schedule. However, only nine countries (Algeria, Benin, Cabo Verde, Côte d'Ivoire, Gambia, Namibia, Nigeria, Sao Tome and Principe, Senegal) have introduced the hepatitis B birth dose vaccine. In 2021, regional coverage of the third dose of the hepatitis B vaccine (HEPB3) was 71%, lower than the 80% global coverage. 16 countries in the WHO African region had HEPB3 coverage above 90% (Algeria, Burkina Faso, Botswana, Burundi, Cabo Verde, Eritrea, Ghana, Kenya, Malawi, Mauritius, Namibia, Sao Tome and Principe, Seychelles, Sierra Leone, Uganda, Zambia). Table 2.0 in the annex shows hepatitis B third dose and birth dose coverage across the WHO African Region.

5.3. Diseases targeted for elimination through vaccine scale-up

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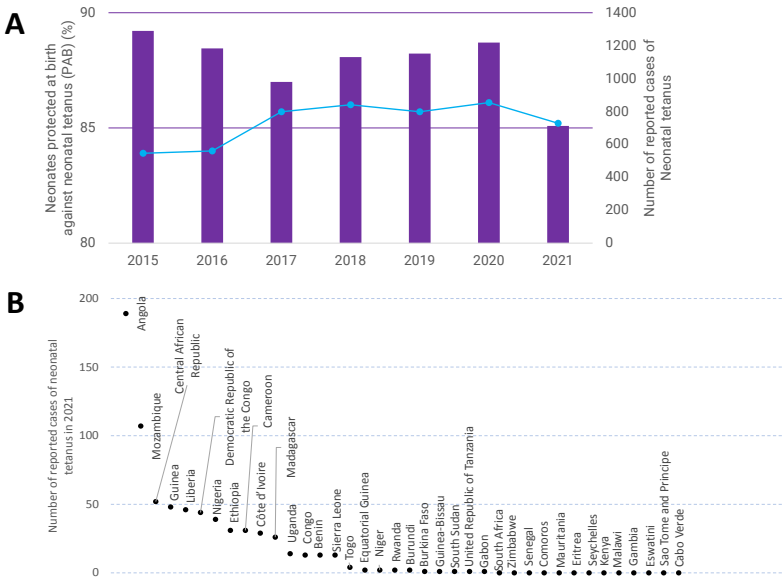
Elimination of disease is categorized into two types[6]: (i) Elimination of VPD transmission is defined as the absence of a disease or infection caused by a specific agent (virus, bacterium) in a defined geographic area. Deliberate public health interventions, including vaccinations, must be continued to prevent the re-emergence of these diseases; (ii) Elimination of a VPD as a public health problem is defined as an intensive intervention measure with a specific disease reduction target. When elimination is achieved, continued actions through disease detection and vaccination are required to maintain the target and to advance the interruption of transmission of these diseases. WHO works at both streams of elimination.

6 CDC Global Immunization Strategic Framework (See Annex F – Living Annex of CDC Disease-Specific Activities Across the Immunization Program Impact Continuum)

5.3.1. Maternal and neonatal tetanus

Tetanus is a vaccine preventable disease that remains a significant public health problem despite efforts to eliminate the disease. The WHO defines neonatal tetanus elimination as less than one case of neonatal tetanus per 1000 live births annually in every district or similar administrative unit in a country each year. Both maternal and neonatal tetanus elimination (MNTE) are considered once neonatal tetanus elimination has been achieved[97]. Since 2015, 7,662 cases of neonatal tetanus were reported across the region. Figure 5.3A shows the reported proportion of children protected at birth since 2015, while Figure 5.3B shows cases reported in 2021 by country. Angola, Central African Republic and Mozambique recorded more than 50 cases. Six countries in the WHO African region (Angola, Central African Republic, Guinea, Mali, Nigeria and South Sudan) are yet to achieve MNTE[98]. Efforts are needed to sustain MNTE in countries in the region by maintaining high coverage of routine tetanus vaccination in infancy, introductions of booster doses in childhood and adolescence, and strengthening tetanus immunisation programmes for pregnant women.



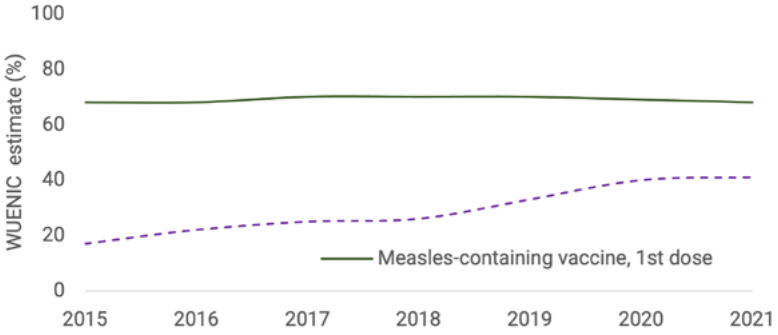
▲Figure 5.3. Overview of neonatal tetanus in Africa

(A) Cases of neonatal tetanus (purple bars) and percentage of neonates protected at birth against neonatal tetanus (blue line), 2015-2021 (B) Cases of neonatal tetanus reported by country in 2021.

Data collected by WHO Regional Office for Africa.

5.3.2. Measles, rubella and congenital rubella syndrome

Measles and rubella are vaccine-preventable viral diseases. Measles infections cause severe morbidity and can be fatal. Rubella infection is less serious than measles infection, but rubella infection during early pregnancy can contribute to birth defects, seen in congenital rubella syndrome (CRS)[99]. The WHO African region missed its target to eliminate measles by 2020[100]. Coverage of measles-containing vaccine remains sub-optimal across the region (Figure 5.4). In 2021, there were 124 041 cases of measles reported globally and 89 606 cases in the African Region[101]. Over 80% of cases in the region were reported in three countries: the Democratic Republic of Congo (54 471), Nigeria (10 649) and Niger (9271). The number of rubella cases reported worldwide in 2021 was 10 798, of which 43% occurred in the African Region. There were only 714 cases of CRS reported worldwide of which 99 were in the African Region. Only four countries in the region reported CRS cases, Democratic Republic of Congo (57 cases), Uganda (33), South Africa (8) and Eswatini (1). Strengthening surveillance in countries and setting regional elimination targets for these diseases remains a priority to achieve elimination in the region.



▲Figure 5.4 Trends in measles coverage in the African Region based on WHO and UNICEF combined estimates (WUENIC)

5.4.
Diseases targeted for eradication through vaccine scale-up

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Eradication is defined as the worldwide absence of a specific disease-causing agent in nature. Concerted public health efforts need to be in place for targeted interventions. WHO is working towards enhancing VPD programmes that would rid the African Region of all forms of polio, including the rare vaccine-derived version of polio that affects countries with low immunization coverage.

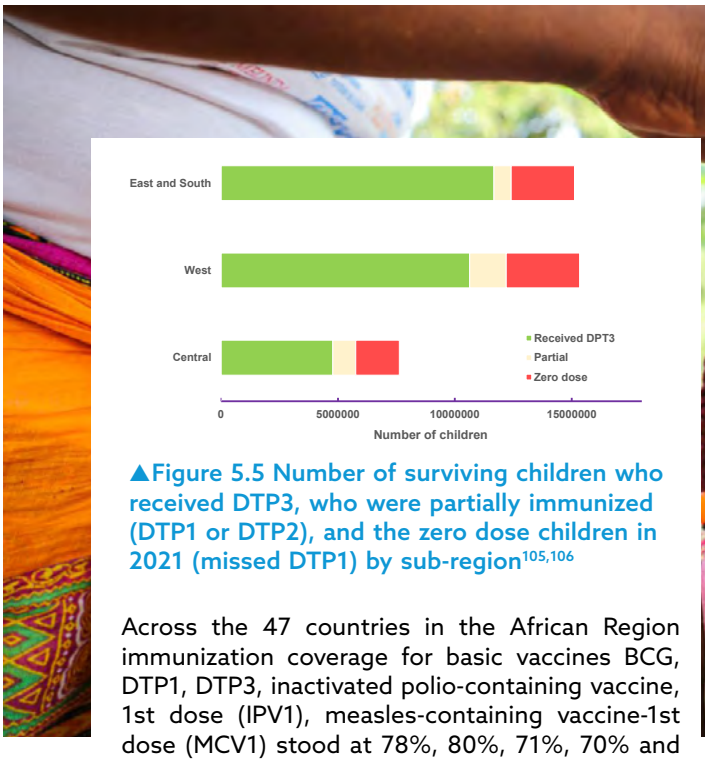
5.4.1.
Polio

On 25 August 2020, the independent Africa Regional Commission for the Certification (ARCC) of Poliomyelitis eradication certified Africa free from the indigenous wild poliovirus after Nigeria, the last country targeted for elimination, recorded no new cases in three consecutive years[102,103]. The last cases of wild poliovirus had been reported in Nigeria in 2016, and by 2020, and all the three strains of the wild poliovirus (type 1, type 2, and type 3) were reported to have been eliminated on the continent. However, in February 2021, the first case of wild polio virus type 1 was reported in Malawi following paralysis in a young child in November 2021. Viral sequencing linked the strain to that detected in Pakistan, thereby not affecting the African Region's wild poliovirus-free certification status[104]. A further eight cases of wild poliovirus type 1 were reported in Mozambique in 2022, bringing the total number of cases in the region to nine in 2021-2022.

Circulating vaccine-derived poliovirus type 1 (cVDPV1) and type 2 (cVDPV2) continued to affect countries in the region. There were 10 cases of cVDPV1 and 576 cases of cVDPV2 in 2021, with the majority of cases occurring in West Africa. Nigeria accounted for 54% of the cVDPV2 cases in the African Region.

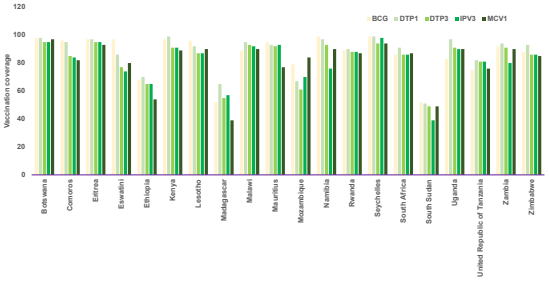
5.5.
Missed opportunities for childhood immunisation in the African Region

The latest WHO and UNICEF Estimates of National Immunization Coverage (WUENIC) revealed that there were an estimated 18 million children globally that missed a third dose of diphtheria, tetanus, and pertussis vaccine (DTP3)[105]. WUENIC data for the African Region and sub-regions estimated that 7.6 million children missed out on vaccination in 2021 and 11 million children were under immunized, making up over 40% of the under immunized and missed children globally. Figure 5.5 shows the number of surviving children who either received three DTP doses, were partially vaccinated, or missed out on DTP vaccination in 2021. There were an estimated 3.1 million zero-dose children in West Africa, 2.7 million in East and Southern Africa and 1.9 million in Central Africa. Seven countries (Nigeria, Ethiopia, Democratic Republic of the Congo, Angola, United Republic of Tanzania, Mozambique and Madagascar) account for three quarters of the zero-dose children in the region.

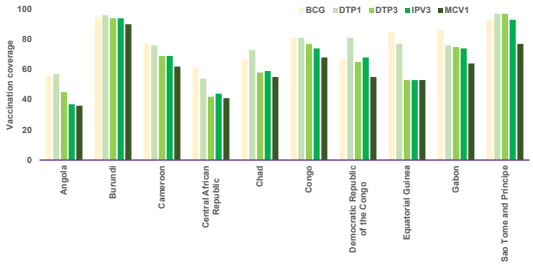


▲Figure 5.5 Number of surviving children who received DTP3, who were partially immunized (DTP1 or DTP2), and the zero dose children in 2021 (missed DTP1) by sub-region[105,106]

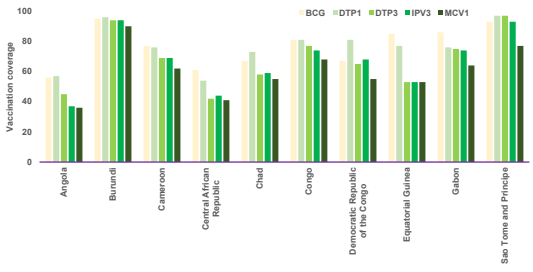
Across the 47 countries in the African Region immunization coverage for basic vaccines BCG, DTP1, DTP3, inactivated polio-containing vaccine, 1st dose (IPV1), measles-containing vaccine-1st dose (MCV1) stood at 78%, 80%, 71%, 70% and 68% respectively in 2021. Angola, Madagascar, Central African Republic, Guinea, South Sudan, Equatorial Guinea, Ethiopia, Chad, Democratic Republic of the Congo, Liberia, and Nigeria reported less than 60% coverage in one or more of the basic vaccines in the first year of life. Lower vaccine coverage was observed in countries in the Central Africa sub region compared to countries in West Africa, and the East and Southern African sub regions (Figure 5.6, Figure 5.7, Figure 5.8).



▲Figure 5.6 Estimates of national vaccination coverage of select antigens among countries in the Eastern and Southern African sub-region in 2021



▲Figure 5.7 Estimates of national vaccination coverage of select antigens among countries in the Central African Sub-Region



▲Figure 5.8 Estimates of national vaccination coverage of select antigens among countries in the West African sub-region

5.6.
Targets for vaccination coverage

The IA2030 impact goal 3.1 outlines the need to monitor coverage for DTP3, MCV2, third dose of Pneumococcal Conjugate Vaccine (PCV) and HPV vaccine across the life course in children and adolescents. While the global targets for vaccination in children for these four vaccines is 90%, all the antigens fell short of this target in 2021 in the WHO African region. The regional DTP3 coverage in 2021 stood at 75%, a modest 4%-point increase since 2015. Only nine countries in the region reported an increase in DTP3 coverage in 2021, namely Niger, Benin, Ghana, Malawi, Kenya, Lesotho, Liberia, Mali, Equatorial Guinea and Chad. Regional PCV3 coverage was 59% in 2015, increased by 11%-points in 2019 but decreased to 66% in 2021. The drop was reported in 18 countries (Democratic Republic of the Congo, Zimbabwe, Botswana, Namibia, Senegal, Central African Republic, Congo, Mauritania, Madagascar, Cameroon, Mozambique, Rwanda, United Republic of Tanzania, Côte d'Ivoire, Gambia, Angola, Burkina Faso, and Eswatini). Regional MCV2 coverage was 17% in 2015 but increased to 41% in 2021. Most countries in the region reported an increase in coverage due to recent introductions. However, reductions in coverage were seen in Rwanda, Eritrea, Sao Tome and Principe, Cabo Verde, Botswana, Seychelles, Eswatini, Gambia and Mauritius. HPVc coverage in the African Region increased from 4% in 2019 to 21% in 2021.

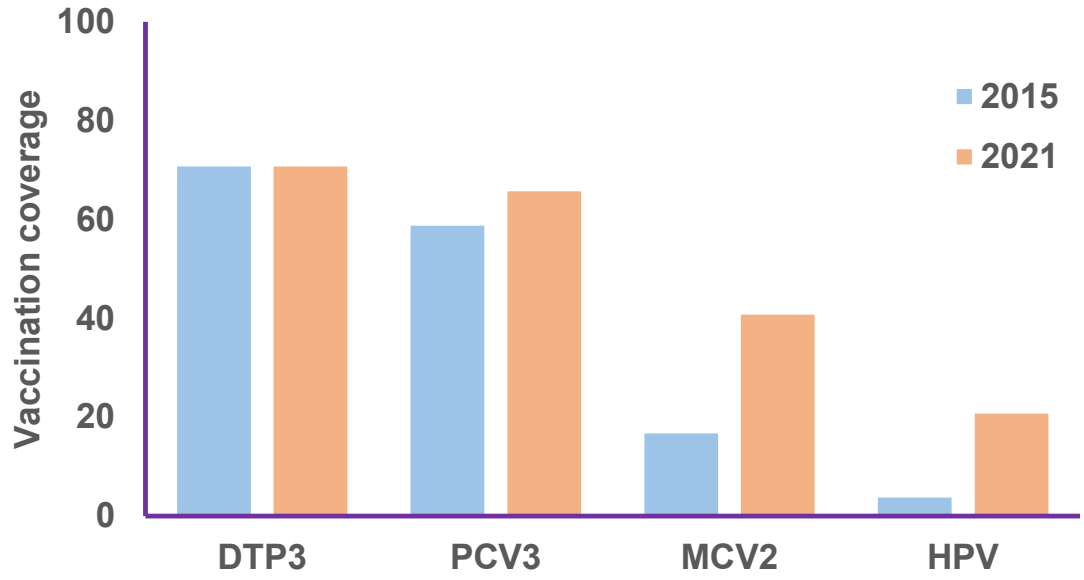
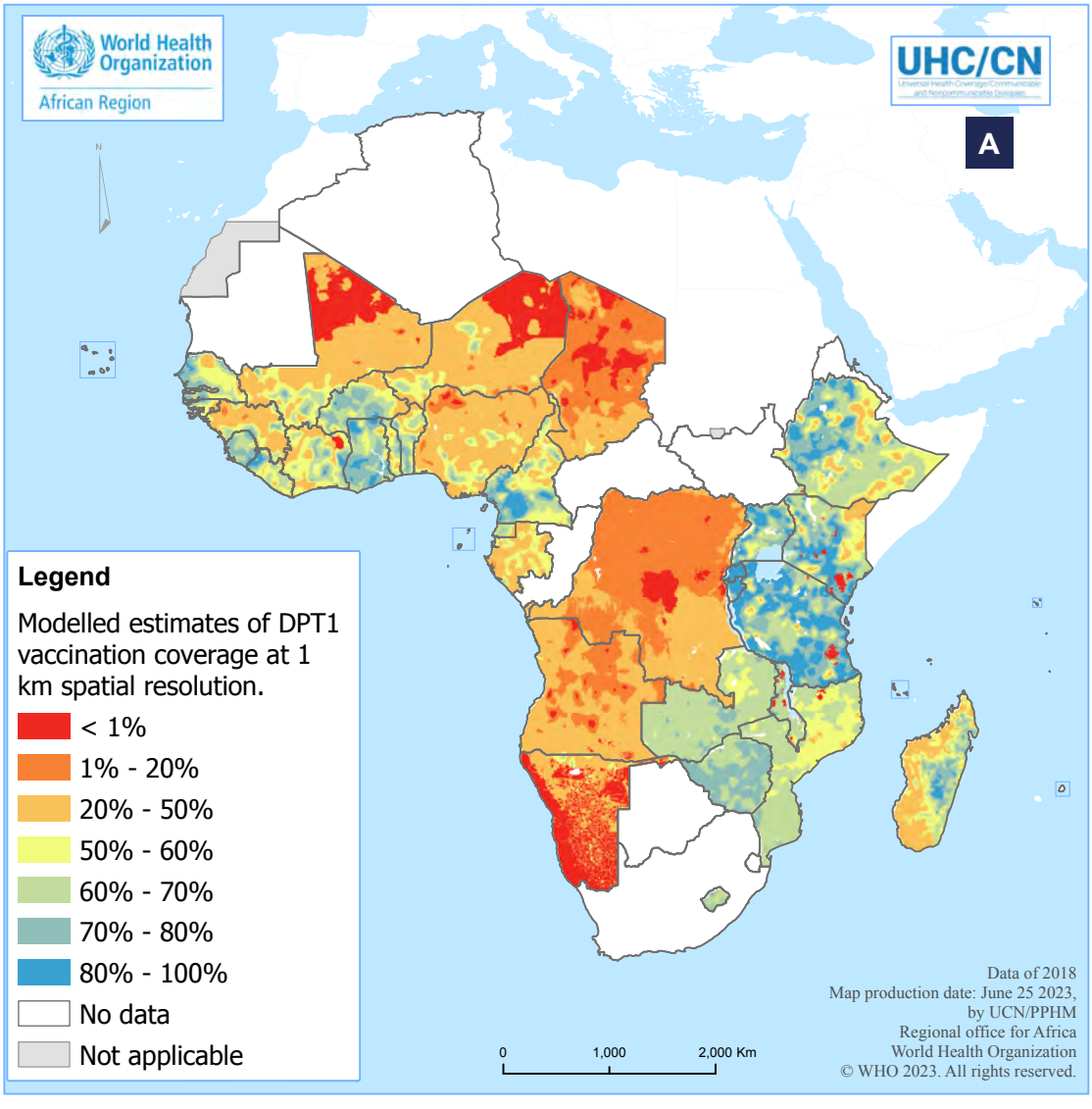


Figure 5.9 Immunization coverage in the African Region of selected antigens in 2021 compared to 2015

5.7.
Sub-national estimates of vaccination coverage

The WUENIC national estimates of immunization coverage are produced annually based on administrative data, household surveys and data from grey and published literature[107]. While the estimates are country-specific, they are not geo-located in space and therefore cannot be used for fine scale estimation to target interventions with precision. It is important to understand vaccination at lower-level sub-national scales or at finer spatial resolution to target vaccination in physically marginalised communities and in areas where children are under-vaccinated. Since 2010, 35 countries in the region have conducted at least one geo-located nationally representative demographic health cluster survey and 28 countries have conducted Multiple Indicator Cluster Surveys (MICS). Using the cluster location, detailed information of de-facto household population and suitable environmental drivers of vaccination[108,109], fine scale estimates of basic vaccination (BCG, DPT3, MCV1 and Polio 1) were produced. The methodology employed used robust statistical modelling at 1 km by 1 km (Annex 1). Figure 5.10 shows the modelled estimates of these antigen at 1 km by 1 km based on only the geo-located community cluster surveys and demonstrates the sub-national variation in vaccination coverage rates in the region.



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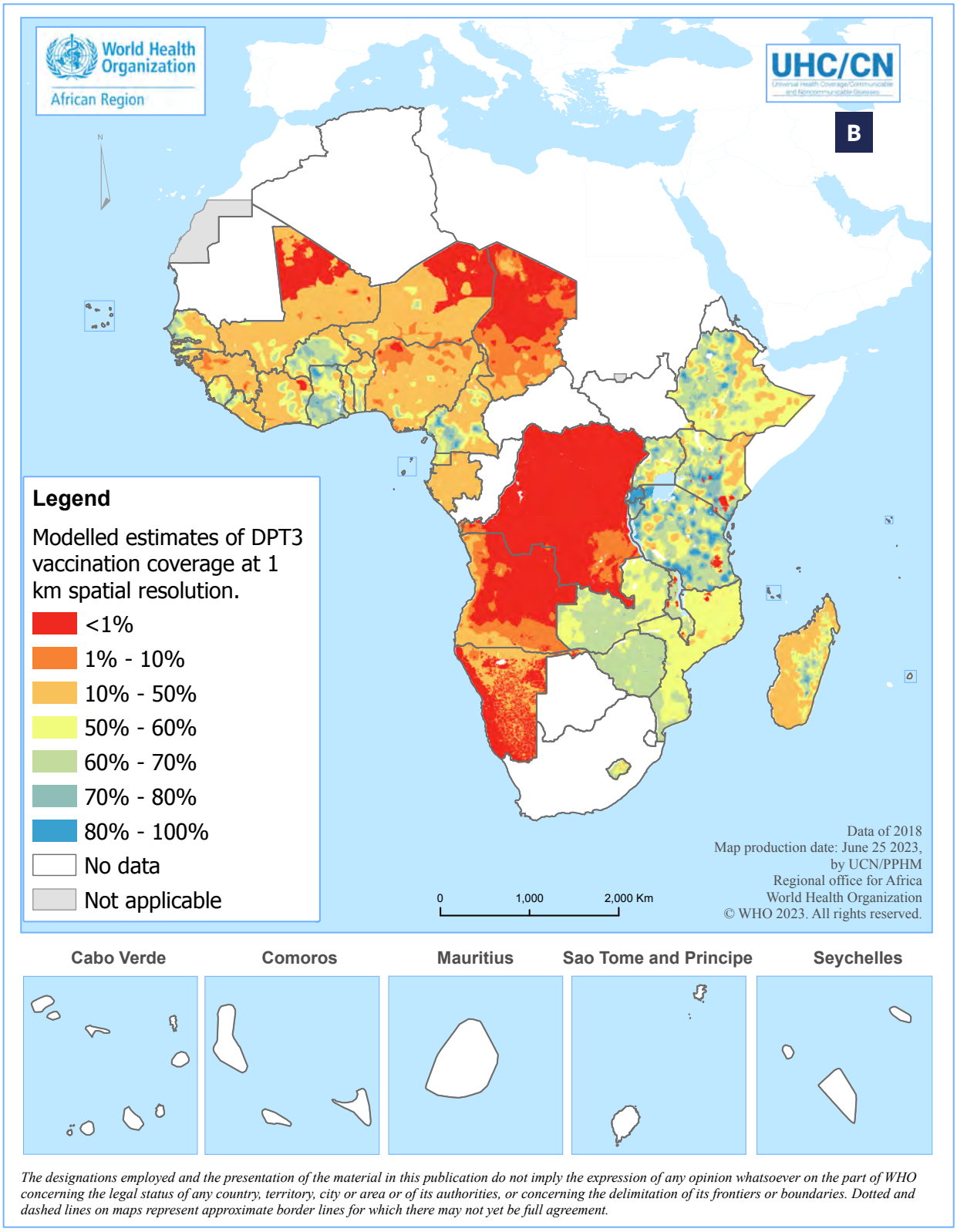

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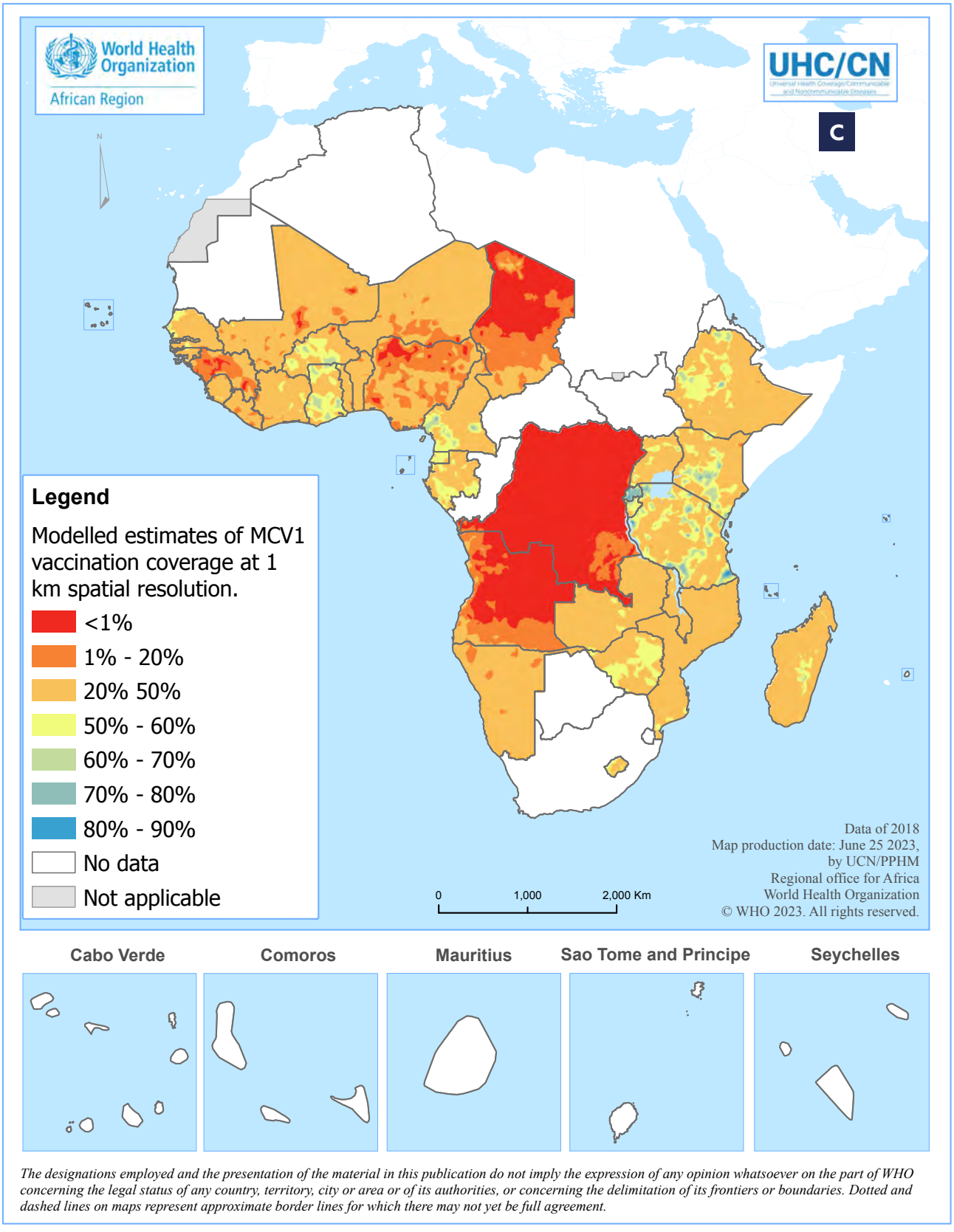

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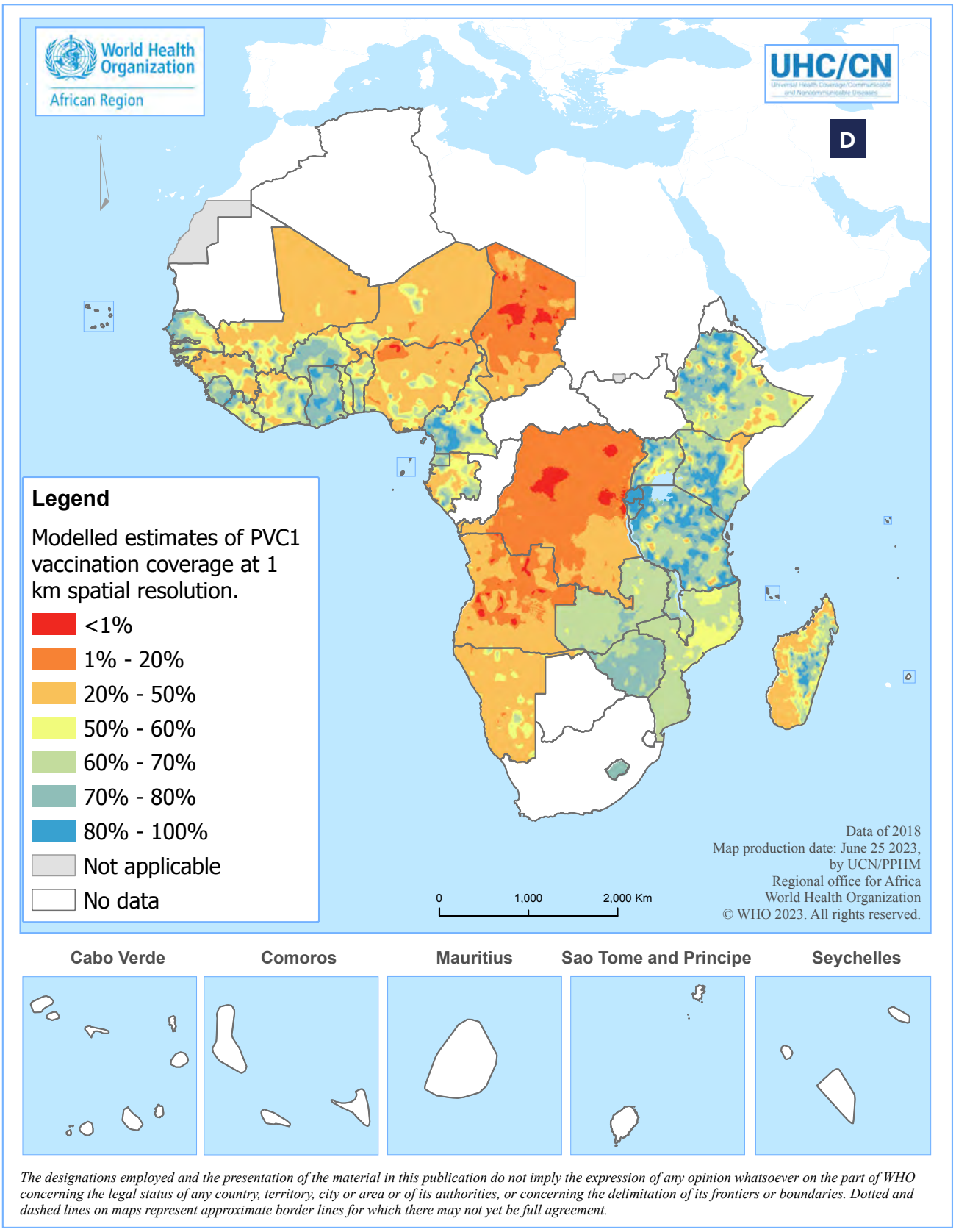

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▲**Figure 5.10 Modelled estimates of vaccination coverage at 1 km by 1 km spatial resolution**
Estimates for (A) DPT1, (B) DPT3, (C) MCV1 (D) PVC1 from recent national representative demographic household surveys since 2010.

5.8.
Malaria vaccine implementation in Ghana, Kenya and Malawi

The RTS,S/AS01 (RTS,S) was the first malaria vaccine to be piloted routinely in Ghana, Kenya and Malawi[110]. The pilot routine immunization started in 2019 and was led by the ministries of health in Ghana, Kenya and Malawi and coordinated by the WHO Malaria Vaccine Implementation Programme (MVIP) with results confirming vaccine safety at a population level. Over 2 million doses had been administered by June 2021 in Ghana, Kenya and Malawi and over 710 000 children had received at least one dose of the malaria vaccine in the three countries. RTS,S-1 (first dose) had an estimated coverage of 74% in Ghana, 80% in Kenya and 93% in Malawi in June 2021. The WHO recommended wide use in malaria endemic regions of moderate to high transmission experiencing high mortality[111].

5.9.
Emerging challenges for immunisation programmes in Africa

Since 2019, WHO and partners (UNICEF, USAID, PATH, CDC and the Gavi Secretariat) conducted a review of the global and regional immunization strategies. The IA2030 agenda outlines a people-centred approach to immunization, country-ownership, broad partnerships and use of data to improve vaccination coverage at country levels. Inequity in vaccine uptake and coverage driven by demand and supply factors continue to impact the achievement of the national targets. More widely, the COVID-19 pandemic impacted the global public health agenda with severe consequences on health programmes at country levels. The effects of the pandemic highlight the need to identify strategic priorities at all levels and provide the means to implement such priorities to be able to realise the IA2030 and Gavi 5.0 objectives with decreasing resources. Country ownership and political will is needed to increase domestic funding for vaccines to ensure the sustainability of immunisation programmes in the region.


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Marginalised and conflict-fragile settings pose a challenge to achieving equity in immunization services. Ongoing conflicts in the region lead to displacement within and across borders, often leaving populations with minimal access to vaccines and at risk of vaccine preventable diseases.

Additionally, rabies, one of the oldest and most terrifying diseases known to man is still responsible for almost 60 000 deaths every year. Up to 99% of human cases are transmitted through dog exposures like scratches and bites. Most human deaths occur in Africa and Asia; affecting mainly already marginalized communities, with around 40% of cases occuring in children under the age of 15. Although it is fatal, rabies is preventable through three pillars: i) Awareness of rabies disease, how to prevent exposures and what to do in case of a scratch, bite or contamination of a mucous membrane; ii) Access to timely, affordable post-exposure prophylaxis (PEP) for people; and iii) Mass dog vaccination to prevent disease at its source. However, despite the availability of effective and safe vaccines, rabies continues to be a serious threat to human health. Since 2016, the Gavi Learning Agenda has provided an opportunity for countries to gather programmatic experiences and necessary data to support consideration of rabies vaccines in the Gavi Vaccine Investment Strategy (VIS)[112]. Although the vaccines and tools for prevention of rabies exist, challenges typically include poor funding amid many disease priorities, low dog vaccination coverage, poor vaccine forecasting and PEP stock-outs in health facilities; and high costs and inadequate cold chain for vaccine delivery to remote areas. Eventually, the decision to invest in human rabies vaccines for PEP was included in Gavi's Vaccine Investment Strategy in 2018[113] and was due to be rolled out in 2021, but delayed due to the global pandemic. The Gavi Board recently decided to unpause new Gavi vaccine programmes including rabies PEP in lower-income countries[114]. Stakeholders need to work with countries to show value-addition for vaccine-based interventions and intersectoral approaches to build country ownership of rabies elimination programmes, and reach communities most at risk. As planning and programming for a Gavi vaccine rollout commence, eligible countries looking to draw on this opportunity may want to start preparing for rabies PEP introduction and Gavi support.

5.10. Priorities and recommendations

The WHO Regional Office for Africa is developing a regional framework for implementing IA2030 in the African Region. Given that the operationalizing of the IA2030 faces the challenges outlined above with regards to resource availability, its adoption at the country level is a priority for the region, with the support of WHO and partners.

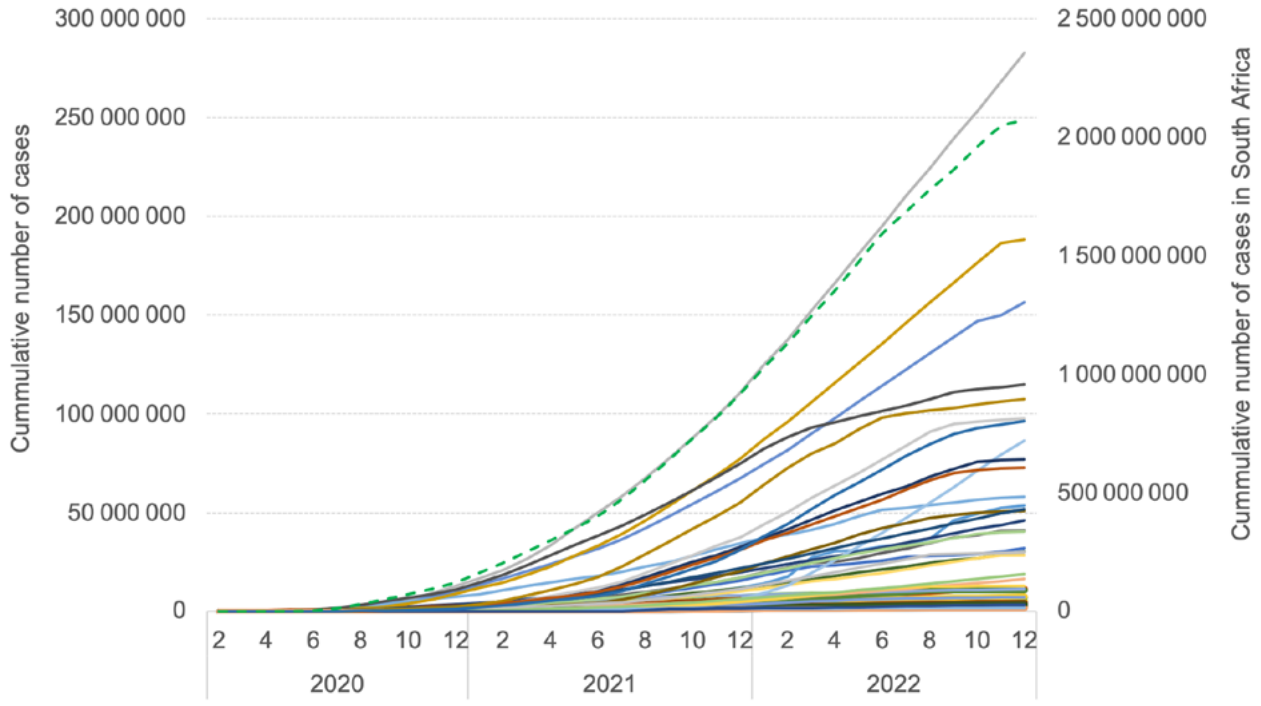
In 2021, WHO published guidance on the National Immunization Strategy (NIS) to support countries in their planning[115]. At least eight countries in the African Region have fully drafted NIS (Burkina Faso, Côte d'Ivoire, Comoros, Eritrea, Madagascar, Rwanda, Togo, and Uganda). The African Region has developed a regional framework for the implementation of the IA2030 through a rigorous consultative process.

One of the core principles of its successful implementation is a data-guided approach to be applied across all IA2030 strategic priorities, including strengthening surveillance systems, generating quality data and use of data for decision-making at country levels. Data is critical to identify areas with lower coverage, including hard-to-reach or marginalised populations for targeting vaccine programmes.

The implementation of IA2030 in the African Region outlines a "high quality, 'fit-for-purpose' data strategy used to track progress, improve immunization programme performance, and form the basis of decision-making at all levels." Increasing investment in PHC, adopting digital technologies sensitive to local contexts (e.g., use of GIS within the polio programme) could improve vaccine targeting. Other digital technologies include the electronic immunization registries logistics management information systems (LMIS) to draw synergies, convergence and integration in planning and implementation of vaccination programmes.

5.11. SARS-CoV-2 infection and vaccination in African Region

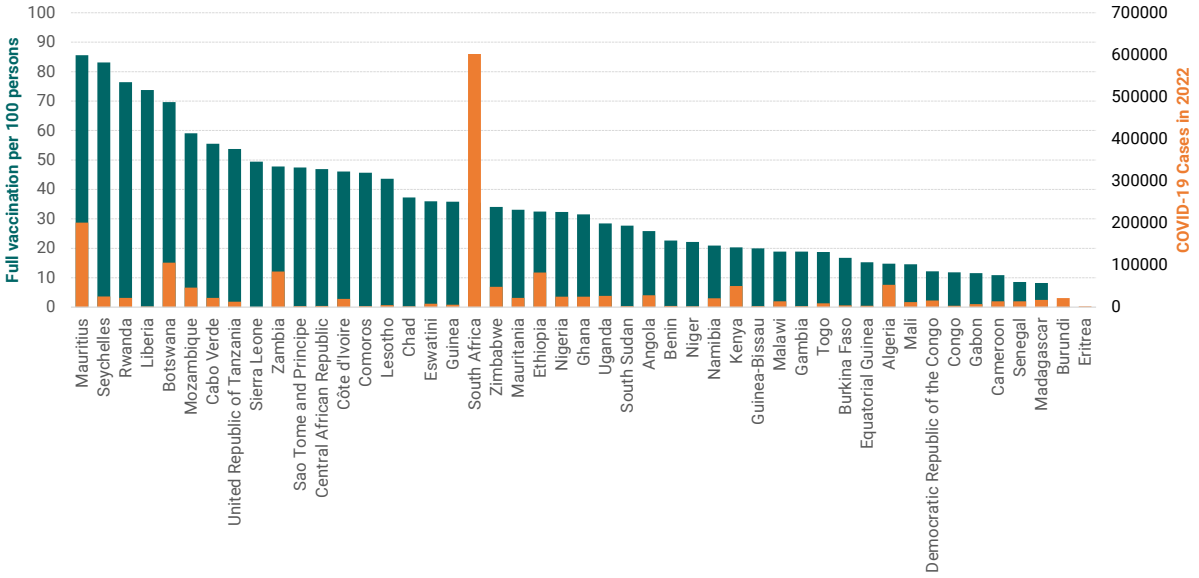
WHO declared the outbreak of coronavirus disease 2019 (COVID-19) as a pandemic in March 2020. Over 656 million cases and 6.6 million deaths have been recorded globally[116]. In the African Region, 8.9 million cases had been reported by December 2022, representing approximately 1.3% of the global COVID-19 cases. About 92% of cases recovered and 173 988 COVID-19-related deaths were recorded in the region with an estimated case fatality ratio of 2%. The highest cumulative number of cases were reported in South Africa 4 049 319 (45.2%), Ethiopia 498 157 (5.5%), Kenya 342 507 (3.8%), Zambia 334 066 (3.7%), and Botswana 328 031 (3.7%). The highest number of deaths were reported in South Africa 102 568 (59% of all deaths), Ethiopia 7572 (4.4% of all deaths), Algeria 6881 (4% of all deaths), Kenya 5688 (3.3% of all deaths) and Zimbabwe 5622 (3.2% of all deaths) (Figure 5.11).



▲**Figure 5.11** Cumulative number of COVID-19 cases in the African region since March 2020
South Africa plotted as dashed green line on secondary axis because of high number of cases reported compared to other countries [116].

5.11.1. Progress on COVID-19 vaccination

There were a variety of responses to pandemic control at country level prior to vaccine development, and this impacted many aspects of health delivery[117,118]. Table 5.1 outlines some of these measures including a synthesis of lessons learned. The coverage of COVID-19 vaccines[119] varies widely across the region. Ten countries have achieved adult population (>18 years) vaccination coverage greater than 50% (Mauritius, Seychelles, Rwanda, Liberia, Botswana, Cape Verde, Mozambique, Sao Tome and Principe, Zambia and Comoros). Countries with lowest coverage rate include Burkina Faso, Malawi, Algeria, Equatorial Guinea, Mali, Gabon, Cameroon, Congo, Senegal, DRC, Madagascar, Eritrea and Burundi[120]. Vaccination programmes continue to struggle to reach geographically marginalised populations, who are often further compromised by crisis situations such as loss of livelihood (e.g., nomadic or pastoral), war and conflict (e.g., refugees, asylum seekers, and internally displaced persons).



▲Figure 5.12 WHO data on COVID-19 cases and vaccination rates in the African region [116], as of December 2022

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▼Table 5.1 Review of national response and strategies during the COVID-19 pandemic[120].

Actions related to health systems	Summary of approach used in countries in Africa	Lessons for future
Governance	Countries in Africa set up a national and regional Public Health Emergency Operations Centre (PHEOC) to guide a coordinated response to the pandemic. Multisectoral collaboration initiatives were mooted and enabled coordination of all available resources towards the COVID-19 response, e.g., in Botswana, Eritrea, Ghana, Guinea-Bissau, Kenya, Liberia, Malawi, Mauritius, Namibia, Rwanda, Seychelles, Sierra Leone, South Sudan, Uganda, United Republic of Tanzania, Zambia and Zimbabwe, Lesotho and Nigeria (national and state-level). Guinea Bissau set up sub national task forces.	High level political commitment and cross-sector collaboration was crucial to guide the response and manage policy and intervention strategies. This highlights the need for active engagement, learning from other countries, regional response before, during and post-pandemic preparedness [121-123].
Public health measures – non-pharmaceutical interventions	Advocacy on social distancing, handwashing and use of masks at national, sub-national, community level. Community health workers were deployed in some settings. Use of lockdown policies to restrict local movement within countries and general cross-border travel. Restrictions related to public gatherings, local transport, school closures and curfews were employed at the height of pandemic.	Employing containment measures early on in the pandemic was important for pandemic control but also demonstrated a high-level political commitment, and general population engagement. However, there were lessons related to the social and economic impact associated with complete lockdowns. Countries needed to weigh the benefits and risks of stringent containment measures against these impacts and future strategies should be evaluated [124,125].
Funding and economic relief packages	Most governments redirected domestic funding to the COVID-19 response and donor support was used to bridge the financial gap. Funding was used for the response (COVID-19 testing, treatment, vaccination, PPE, workforce, health infrastructures) and to cushion against economic losses. Mauritius, Ghana, South Africa, Gambia, Kenya and Sierra Leone provided economic relief packages.	Countries had inadequate emergency funding for pandemic response and to mitigate economic impact. This demonstrates a need for domestic emergency preparedness funding and to build financial reserves for future [5,6,126].
Advocacy and communication and community engagement	Countries used context specific and innovative methods to relay targeted messages to prevent COVID-19. Messages on prevention, adherence to preventive measures, symptoms, and vaccination were disseminated. Messages were transmitted via mass media and through community and religious leaders and community health workers. Examples include the use of blue bicycle messengers in South Sudan, and Rwanda's national police that spread messages using drones in highly populated areas.	Countries had robust and innovative methods of engaging with communities and disseminating messages. However, widespread misinformation was a challenge to the compliance of preventive measures and vaccine uptake. Continued and sustained messaging to communities is needed during the pandemic response.
Essential Health Services delivery	Health service delivery was disrupted during the pandemic mainly due to the implementation of travel restrictions and redirecting of staff and resources to the response[127]. Countries attempted to minimise the disruption and ensure continuity of essential services. However, there some demonstrated resilience, such as mass vaccination campaigns in Benin and Eswatini. Additionally, Ethiopia, Uganda and Liberia received WHO catalytic funding to support the continuity of essential health services.	The continuity of essential health services is important to mitigate the pandemic's impact. A key focus should be on primary care. This should be prioritised early on during emergencies to avoid excess deaths attributable to the indirect impacts of the crisis on health services for patients in long-term care.
Digital technology and innovation	COVID-19 led to a rapid need for digital technologies e.g., for surveillance platforms, digital certificates, apps for contact tracing[117,128,129]. Countries adopted local innovative solutions throughout the pandemic (Table 5.2). Readily available GeneXpert machines were used to support COVID-19 laboratory testing. More oxygen plants, concentrators and ventilators were built to support critical care, and there was mass production of surgical masks and hand sanitisers locally. An example is Rwanda's use of machines for patient examination and recording.	There is local capacity for health innovation in manufacturing and service delivery, as seen during the pandemic. Proactive investment in digital tools tailored to local contexts or cultural sensitivities is important. Local efforts should be encouraged and supported during emergencies and health services should be restored [130-134].

5.11.2. COVID-19 vaccination certificates

The WHO published guidance on the digital documentation of COVID-19-related data of interest. This included technical specifications and guidance for countries and implementing partners on requirements for issuing COVID-19 test results and the Digital Documentation of COVID-19 Certificate: vaccination status (DDCC: VS) (WHO, 2021a, WHO, 2022).

The technical guidance and implementation for DDCC: VS was published in August 2021. The document outlined the technical requirements for developing digital information systems for issuing standards-based interoperable digital certificates for COVID-19 vaccination status, and considerations for the implementation of such systems.

The concept of a DDCC: VS was based on the need to protect and promote the welfare of individuals, communities, and the population as a whole; ensuring equality in the treatment of all individuals and preventing or mitigating, as far as possible, avoidable health inequalities within countries. The concept is also important for creating and maintaining trust in public health activities as part of the healthcare system.

5.11.2.1. The implementation of DDCC:VS in the WHO African Region

In January 2021 WHO African member states adopted the use of DDCC: VS and all Africa Union member states were signatories to the Africa CDC online portal (https://africacdc.org/trusted-travel/)[135]. This platform was primarily established to facilitate cross-border travel among member states. Kenya, Ethiopia and Zimbabwe were among the first countries to introduce verification systems[136].

A report published in 2022 suggested that 22 countries had adopted and used the CDC online portal, which verifies testing and vaccination status since January 2021. Rwanda, Ethiopia, and United Republic of Tanzania were among countries that used national District Health Information System (DHIS2) for COVID-19 data management, implemented a tracker of COVID-19 vaccination, for the management of COVID-19 vaccination and certification (Table 5.2).

Most other countries adopted online portals for the verification of vaccination. Togo, Benin, Cabo Verde, have bilateral agreements with the EU Digital covid certificate system[129]. In countries where a combination of DHIS2 tracker system with COVID-19 vaccination has been deployed, such as Rwanda and Uganda, this is potentially applicable to wider immunization activities[137]. This is because DHIS2 in now widely used across the region as a digital platform for disease surveillance.

▼Table 5.2 Example of COVID-19 documentation and verification systems across countries in African Region by June 2022

Country	Type	URL link to Website
Angola	Electronic/Paper prints/PDFs	https://www.vacina.gov.ao/
Benin	Electronic/Paper prints/PDFs	EU Digital Covid System
Cabo Verde	Electronic/Paper prints/PDFs	EU Digital Covid System
Cote d'Ivoire	Electronic/Paper prints/PDFs	https://vaccination.ci/vaccination.php
Eswatini	Electronic with Mobile application	https://eswatinihealth.org/cert/
Kenya	Electronic/Paper prints/PDFs	https://portal.health.go.ke/login
Liberia	Electronic/Paper prints/PDFs	https://liberiacovidtravel.org/
Malawi	Electronic/Paper prints/PDFs	https://covid19.health.gov.mw/covax/certification
Nigeria	Electronic/Paper prints/PDFs	https://nphcda.vaccination.gov.ng/
Rwanda	Electronic/Paper prints/PDFs	https://his.hmis.moh.gov.rw/results/vaccine
South Africa	Electronic/Paper prints/PDFs	https://www.gov.za/covid-19/vaccine/certificate
Togo	Electronic/Paper prints/PDFs	EU Digital Covid System
Uganda	Electronic/Paper prints/PDFs	https://epivac.health.go.ug/certificates/#/
United Republic of Tanzania	Electronic/Paper prints/PDFs	https://chanjocovid.moh.go.tz/#/
Zambia	Electronic with Mobile application	https://ir.moh.gov.zm/

Finally, these platforms continued to track the percentage of the population travelling across international borders. There is anecdotal evidence on their use for travel within countries, for certification for work or access to public places. From Figure 5.12, it is evident that a significant proportion of the population remains unvaccinated and therefore excluded from verification in the existing international platform. Within countries, digital platforms have been adopted to support vaccine delivery, registration, individual vaccination scheduling and certification.

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5.11.3. Emerging issues for COVID-19 in the African Region

- The following are several challenges related to COVID-19 in the African Region[138].
- Access to COVID-19 vaccines remained inequitable both between and within countries. Individuals with poor access to vaccines are likely to be susceptible to future infections or new variants of the disease. Prioritising access to high-risk groups requires precise definition of denominators to track progress among priority groups, focusing on the 25 countries that are currently not reporting disaggregated data by priority group[7].

The current arrangement of COVID-19 vaccine supply and delivery may not be sustainable from a financial and human resources (HR) perspective. Countries are starting to look at integrating COVID-19 vaccination into routine immunization, as well as integrating access to COVID-19 vaccination into delivery of chronic illness care in order to target priority populations. Integration, however, requires joint planning, budgeting, and coordination.

- There is a lack of clear and consistent international regulations and policies guiding the production, use and verification of electronic vaccination certificates across member states. International data-sharing without user-consent may violate or raise ethical personal data protocols. These relate particularly to personal data protection.
- Some countries used existing DHIS2 tracker system to integrate vaccination certification and to align COVID-19 vaccination within wider health system vaccination mechanisms. The potential operational challenges around this remain unknown in many settings but integration in DHIS2 is potentially applicable to wider vaccination deployment at national level.

7 Congo, Gabon, Equatorial Guinea, Algeria, Burkina Faso, Togo, Guinea Bissau, Angola, Uganda, Nigeria, Zimbabwe, Mauritania, South Sudan, Eswatini, Côte d'Ivoire, Lesotho, Zambia, Comoros, Botswana, Mozambique, Rwanda, Seychelles, Mauritius, Burundi

5.11.4. Role of WHO's Regional Office and recommendations

The Regional Office in collaboration with the African Union through the Africa CDC led discussions with member states on COVID-19 data standards, interoperability, prioritizing high-risk groups, data governance and sharing. There is potential wider application for integration of COVID-19 vaccination into the wider national vaccination and other health programmes, coupled with data management within DHIS2. However, logistics and implementation at the national levels remain a challenge. WHO is committed to working with countries during and after the pandemic, along with national commitment and cross-sector collaboration to mitigate economic impact of pandemic on general health service delivery.

A key lesson learned is that investment in research and development for vaccine development on the continent is crucial. More investment is also needed in diagnostic capabilities such as laboratories to support sequencing and testing, and adopting technologies embedded in the health system for surveillance during emergencies. Strong public health care systems are critical to response activities and routine and acute care.

6.

Noncommunicable Diseases (NCDs)

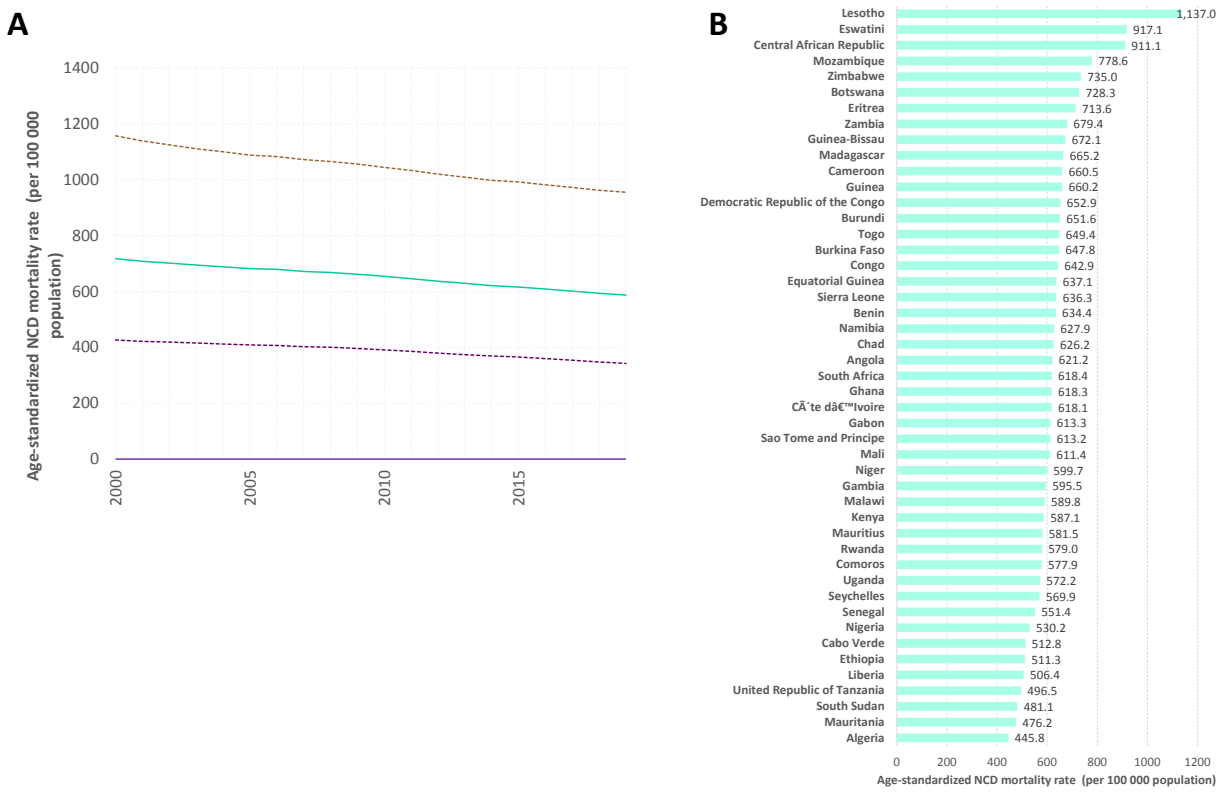
Noncommunicable diseases (NCDs) are chronic conditions that are a result of a combination of genetic, physiological, environmental and behavioural factors. They include cardiovascular diseases (including heart disease and strokes), diabetes, cancers, and chronic respiratory diseases (for example, chronic obstructive pulmonary disease and asthma) and diabetes[139]. These four groups of NCDs constitute over 80% of the NCD burden globally[140,141]. Other NCDs contributing to premature mortality include sickle cell disease, mental disorders, violence and injuries, and oral and eye disorders. Major risk factors for NCD are tobacco use, physical inactivity, poor or unhealthy diet and alcohol misuse, all contributing to raised blood pressure, overweight or obesity, high blood glucose and hyperlipidaemia (high levels of harmful fats in the blood).

6.1.
The burden of NCDs in the African Region

Globally each year, 17 million people die from a NCD before age 70 and 86% of these premature deaths occur in low- and middle-income countries. These deaths are mainly due to cardiovascular diseases (17.9 million people annually), followed by cancers (9.3 million), chronic respiratory diseases (4.1 million), diabetes (2.0 million, including kidney disease deaths caused by diabetes)[142]. The African region experiences a high burden of NCDs, mainly cardiovascular diseases (heart disease and stroke), cancer, diabetes, chronic respiratory diseases, and poor mental health[141,143,144]. Currently, the proportion of mortality due to NCDs ranges from 36% to 88%[145]. Data from Global Health Estimates (GHE) on leading causes of deaths suggest that NCDs were associated with 40.8 million deaths in 2019[146,147]. Figure 6.1 shows mortality per 100 000 population in the Region. In 2019, the age-standardized NCD mortality rate was 587.1 [342.3 - 955.4] per 100 000 population in the African region; 648.3 [379.5 – 1055.0] in men and 536.8 [312.0 – 872.6] in women per 100 000. There is substantial variation across countries, from a high in Lesotho of 1,137 [588.3 - 1958.0] to a low in Algeria of 445.8 [276.5 - 682.7]. The countries with the highest age-standardized death rates were in the Southern African Region (Lesotho, Eswatini, Mozambique, Zimbabwe and Botswana) with only the Central Africa Republic in the top six countries outside this region.

It is estimated that each year, more than 1.6 million people between the age of 30 years and 70 years die prematurely from at least one of the four major NCDs in the African Region[148], representing 63% of all NCD-related deaths. Cardiovascular diseases, cancers, diabetes mellitus and chronic respiratory diseases account for over 70% of these deaths. Over the last decade, the mortality rate due to cardiovascular disease was highest at 294 per 100 000 population compared to a mortality rate of 144 per 100 000 population for all cancer-related deaths, 48 per 100 000 population for diabetes mellitus and 45 per 100 000 population for chronic respiratory disease[149]. Outside this group, other NCDs contributing to premature mortality include sickle cell disease, type 1 diabetes mellitus, insulin-dependent type 2 diabetes, advanced rheumatic heart disease, cardiomyopathy, severe hypertension and moderate to severe persistent asthma, together accounting for approximately 12% of the disease burden[144].

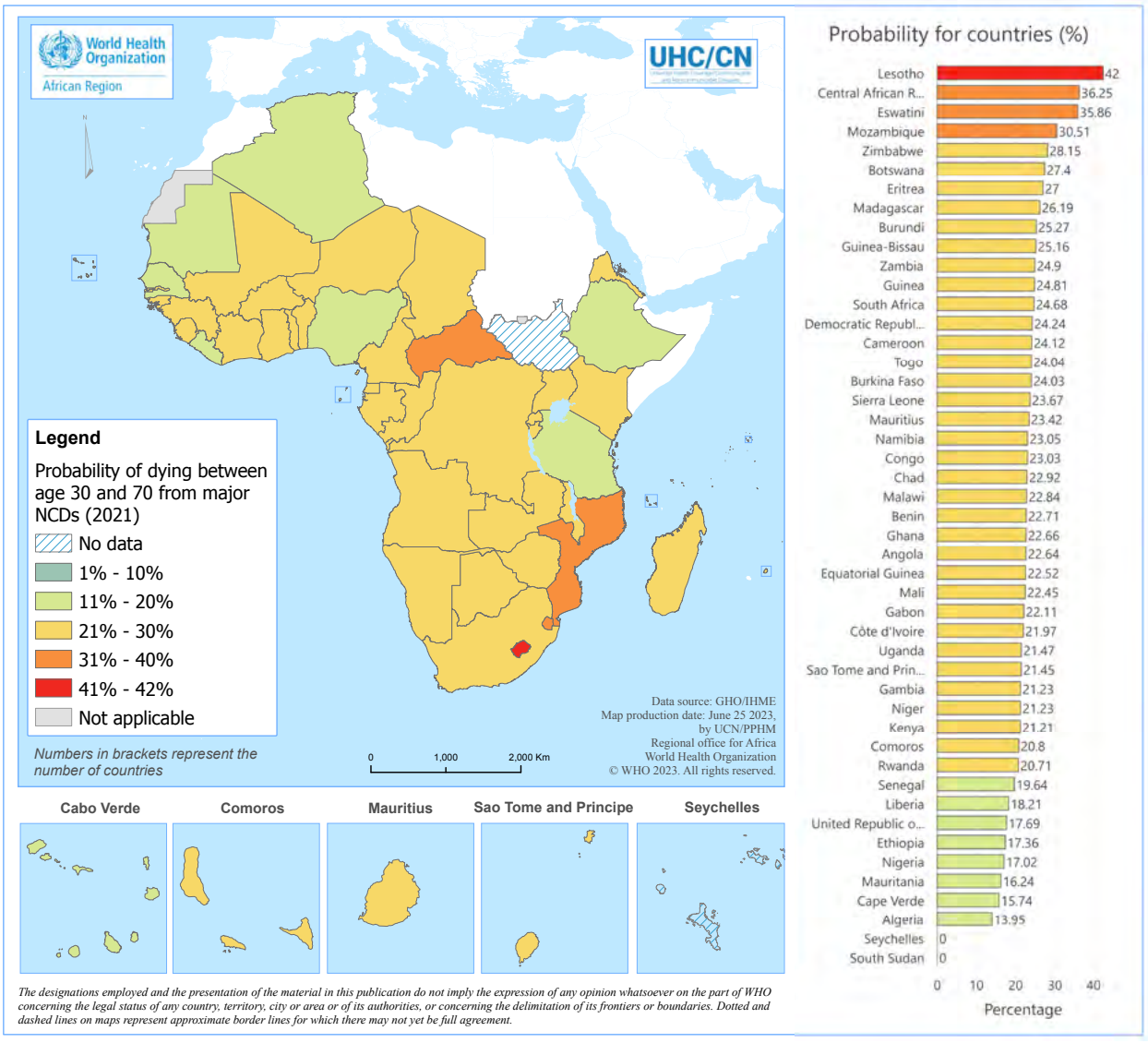
NCDs threaten progress towards the 2030 Agenda for Sustainable Development, which includes a target of reducing the probability of death from any of the four main NCDs between ages 30 and 70 years by one third by 2030. The rapid rise in NCDs is predicted to impede poverty reduction initiatives in the WHO African Region countries, particularly by increasing household costs associated with health care. Vulnerable and socially disadvantaged people get sicker and die sooner than people in higher socioeconomic groups, because they are at greater risk of being exposed to harmful products, such as tobacco, or unhealthy dietary practices, and have limited access to health services.



▲**Figure 6.1** Age-standardised deaths per 100,000 population attributable to non-communicable diseases in the African Region by year (A) and by country (B)

6.2.
Premature mortality due to four major NCDs

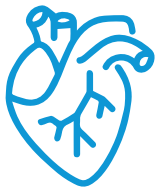
The WHO Global Action Plan for the Prevention and Control of NCDs advocates for a 25% reduction in mortality for cardiovascular diseases (CVDs), cancers, diabetes, and chronic respiratory diseases (CRDs) among people aged 30–70 years by 25% in 2025[140]. In 2019, cancer, cardiovascular diseases and diabetes accounted for approximately 37% of all mortality, up from 24% in 2000[147]. Moreover, in 2021, 1.8 million people died prematurely from an NCD. NCD-related premature mortality as a percentage of all NCD-related deaths in the WHO African Region was around 63.6% [47.7%-75.7%]. Men aged 30-70 were more likely to die from NCDs (67.11% [51.7-78.5%]) compared to women of the same age-group (59.9% [43.8%-72.8%])[147]. Figure 6.2 shows that the risk of dying between the ages of 30 and 70 from NCDs was high (>=30%) in four countries in 2021 (Central African Republic, Eswatini, Lesotho and Mozambique) and was relatively low in Algeria (< 15%).



▲**Figure 6.2** The percentage chance (probability) of dying between age 30 and 70 from major NCDs at national levels in WHO African Region in 2021.

6.3. The main noncommunicable diseases

6.3.1. Cardiovascular diseases (CVDs)

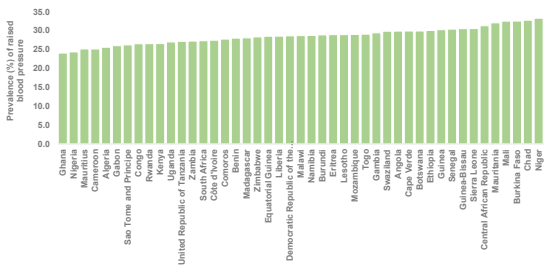


CVDs are heart and blood disorders, including coronary heart disease, cerebrovascular disease, peripheral arterial disease, rheumatic and congenital heart disease, and deep vein thrombosis and pulmonary embolism[150]. There are several broad risk factors for these diseases, including behavioural factors, such as tobacco use, alcohol misuse and diet-related factors. To compound this, poor access to primary health care (PHC) for early diagnosis and management of CVD and related conditions results in poor outcomes[151,152]. In 2019, the WHO estimated that there were 1 093 577 [674 149 - 1 665 773] deaths attributable to CVD in the African Region compared to 17 900 000 [13 400 000 - 22 900 000] CVD deaths globally (Table 6.1)[147].

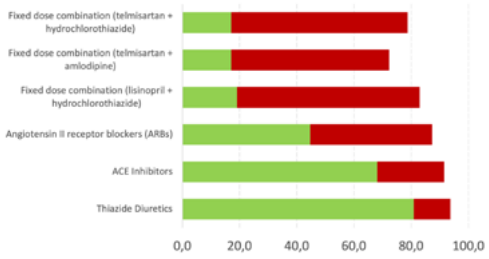
▼Table 6.1 Estimated deaths related to cardiovascular diseases in the African Region in 2019 from the Global Health Estimates (GHE)[147]

Region	Estimated deaths attributed to cardiovascular diseases
West Africa including Algeria	428 455 [270 644 – 635 749]
Central Africa	186 899 [142 524 – 252 519]
East and Southern Africa	478 227 [460 287 – 503 984]
WHO African region	1 093 577 [674 149 – 1 665 773]

Figure 6.3 shows the prevalence of raised blood pressure in the WHO African region. There was a reported higher attributed risk of CVDs due to high blood pressure (19% of global deaths), high blood sugar, overweight and obesity. Tobacco (27%) and alcohol (25%) are known risk factors for mortality in the region, but policy related to their use remains poorly implemented[144]. Overall mortality estimates due to CVDs in the African region in 2019 from GHE were highest in Nigeria 146 627 [95 353 - 213 039], Democratic Republic of the Congo 98 582 [54 207 - 164 202] Ethiopia 98 378 [61 583 - 147 833] and Algeria 91 515 [61 977 - 126 382] and lowest in Seychelles 235 [166-319] and São Tomé and Príncipe 240 [149-356][147].



▲Figure 6.3 The national prevalence (%) of raised blood pressure by country in the WHO African Region in 2019



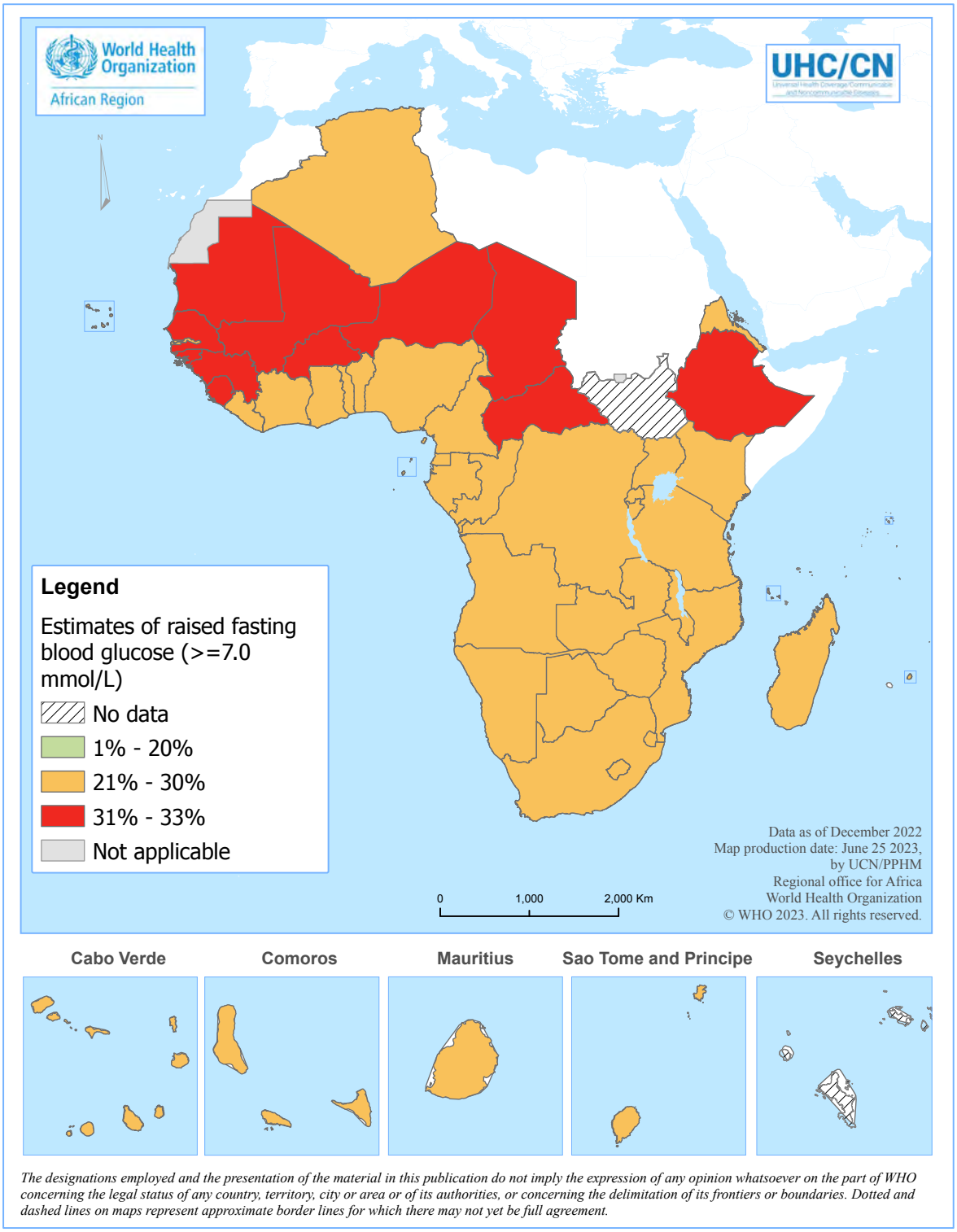
▲Figure 6.4 Availability of essential blood pressure medicines within the African Region

6.3.2. Priorities

Since 2016, various initiatives have been put forward to help combat disease at population level. This includes the WHO PEN initiative, the Global Hearts initiative by the United States Centers for Disease Control and Prevention (U.S. CDC and partners), Resolve to Save Lives, an initiative of Vital Strategies, focusing on the reduction of risk factors (consumption of tobacco, alcohol and including daily physical activity), and the recent WHO guidelines on the pharmacological treatment of hypertension in adults in 2021. Regional targets include diagnosing at least 80% of adults with high blood pressure and treating at least 64% of those diagnosed.

6.3.3. Diabetes and raised fasting blood glucose

According to the International Diabetes Federation (IDF), it is estimated that approximately 24 million [20 - 79] adults were living with diabetes in the African region in 2021, with 416 000 million deaths directly attributed to diabetes[153]. Thirteen million adults living with diabetes in the IDF African Region were undiagnosed (54% of the total number of adults with diabetes in the region). In 2014, the prevalence of high fasting blood glucose (>=7.0 mmol/L) was 7.1% [5.7% – 8.7%] in the WHO African region; 7% [5% – 9.3%] in men and 7.1% [5.2% – 9.4%] in women.



▲**Figure 6.5** National estimates of raised fasting blood glucose (>=7.0 mmol/L) in the WHO African Region [101]

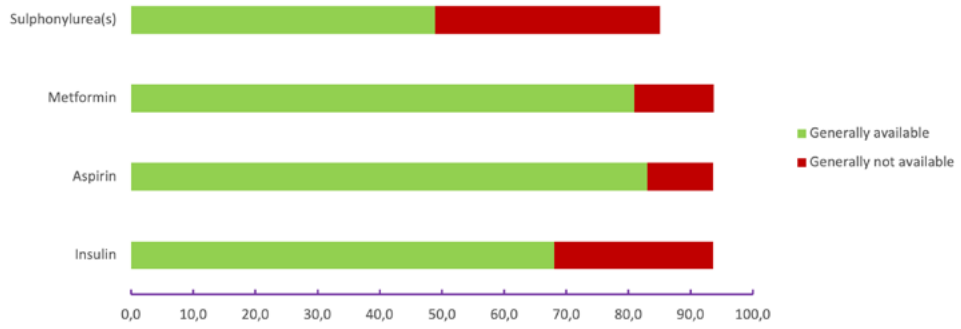


Figure 6.6 General availability of essential medicines for diabetes in countries in the African Region

6.3.4. Cancer

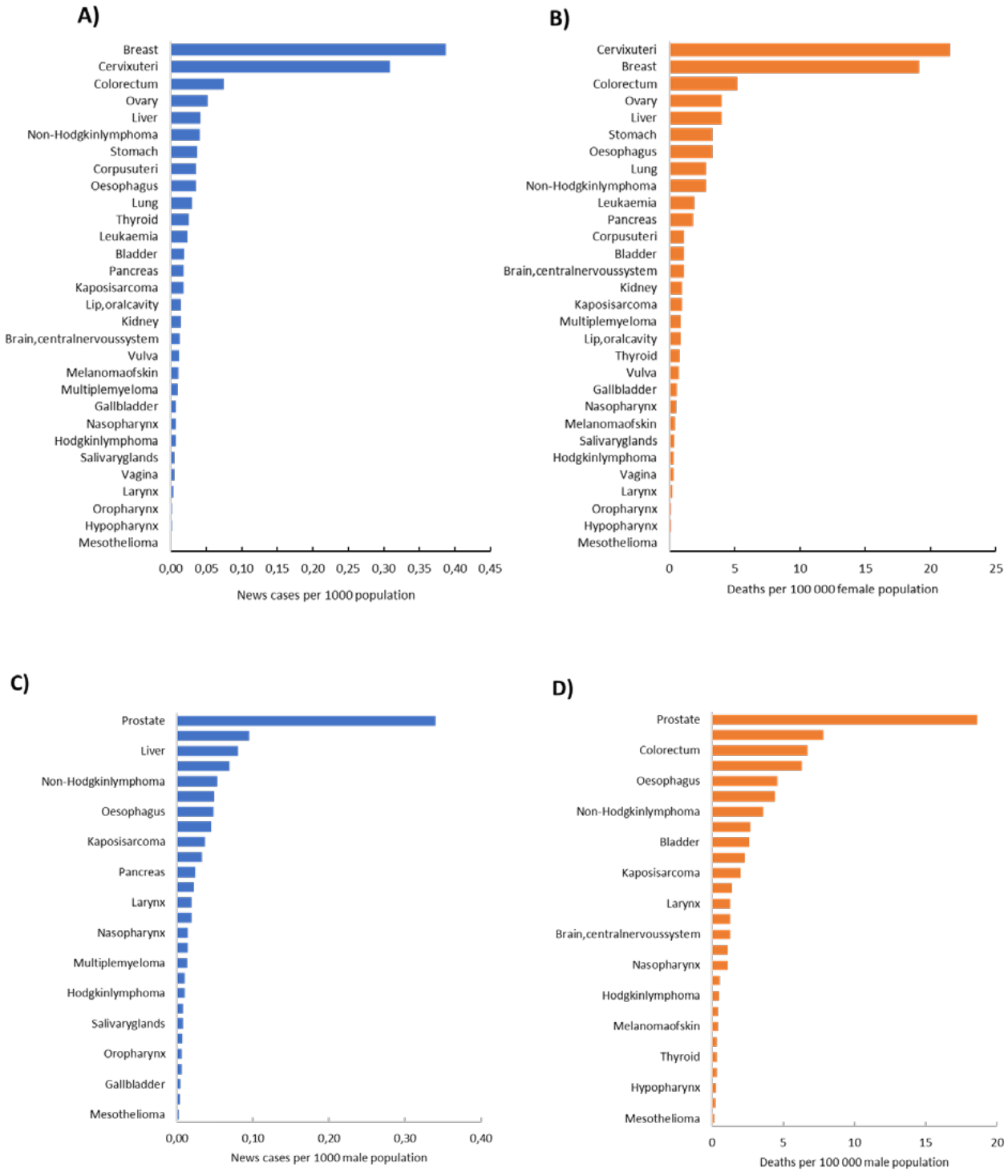
There is an increasing incidence of cancer—particularly of the prostate, breast, and cervix—across the African region[154-156].

Table 6.2 summarises the number of cancer cases sub-regionally by age in 2020. A total of 845 946 [732 270 - 977 270] new cases of cancer were reported. A total of 543 471 [464 198 - 636 281] deaths were attributed to cancer in 2020, of which 309 637 [250 635 - 382 528] were in women and 233 834 [184 553 - 296 274] were in men [157].

Table 6.2 Number of new cases and deaths (mortality) in 2020 by age for breast, cervix uteri, colorectum, lung and non-Hodgkin lymphoma in the WHO African Region and its three sub-regions[157]

Regions	Age group	Breast		Cervix uteri		Colorectum		Lung		Non-hodgkin lymphoma	
		New cases	Deaths	New cases	Deaths	New cases	Deaths	New cases	Deaths	New cases	Deaths
African Region 47 Member States	15-19	210	81	149	84	150	100	32	30	1 768	949
	20-29	7 453	2 867	5 776	2 186	1 715	1 079	273	213	3 870	2 136
	30-39	24 055	9 486	18 365	7 877	3 953	2 260	626	547	5 174	2 801
	40-49	34 525	15 576	26 736	15 195	7 604	4 329	2 623	2 030	5 999	3 405
	>= 50	73 158	38 913	59 698	47 344	37 175	26 308	23 310	21 345	14127	11061
West, including Algeria	15-19	85	30	40	16	82	55	12	11	243	126
	20-29	2 661	899	1 614	698	403	262	56	42	584	300
	30-39	10 213	3 815	4 850	2 083	1 363	743	129	103	861	423
	40-49	15 821	9 916	7 094	4 010	2 853	7 640	548	433	1 069	568
	>=50	33 063	18 048	15 861	12 893	6 555	4 715	4 024	3 805	2 954	2 324
Central	15-19	51	21	8	2	18	9	0	0	347	195
	20-29	1 560	708	532	193	270	168	33	25	551	337
	30-39	3 865	1 756	2 178	850	352	221	87	72	556	353
	40-49	4 795	2 402	3 654	2 124	667	395	264	227	618	395
	>=50	7 624	4 613	9 274	7 403	4 454	3 430	1 653	1 573	1 319	502
East and South	15-19	74	30	101	66	43	29	17	15	809	441
	20-29	3 250	1 267	3 633	1 296	943	583	144	112	1 821	1 028
	30-39	10 026	3 937	11 483	5 013	1 909	1 161	320	261	2 355	1 338
	40-49	13 971	6 273	16 003	9 075	3 250	1 941	896	716	2 622	1 551
	>=50	32 586	16 325	34 602	27 079	14 721	10 562	8 212	7 662	5 739	4 559

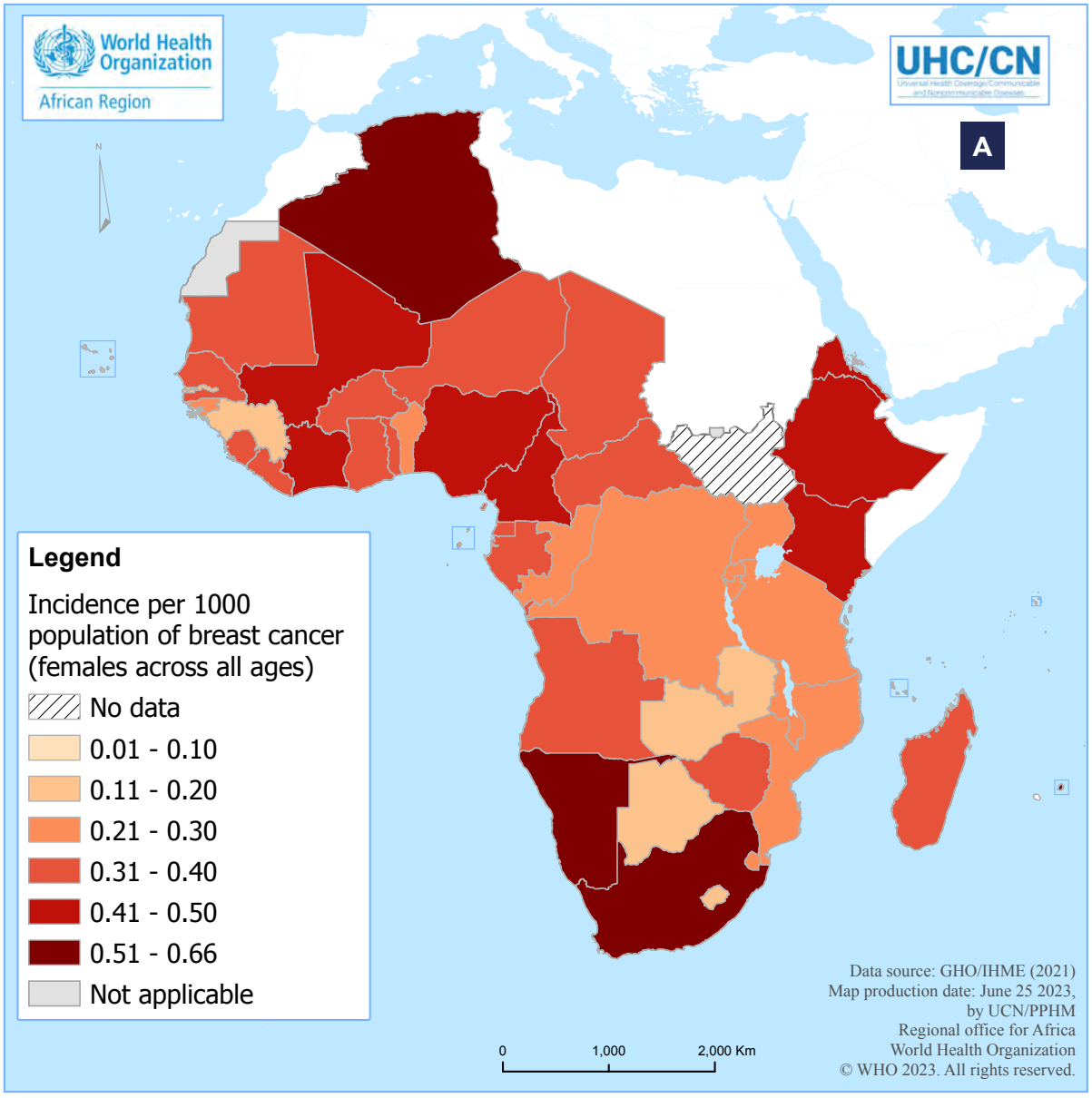
Breast cancer was the cancer with the highest incidence in the female population at 0.387 per 1000 population, compared to an incidence of 0.215 per 1000 population for cervical cancer. In men the incidence of prostate cancer was 0.340 per 1000 population and the mortality rate in 2020 was 18.6 per 100 000 population (Figure 6.7) [158].

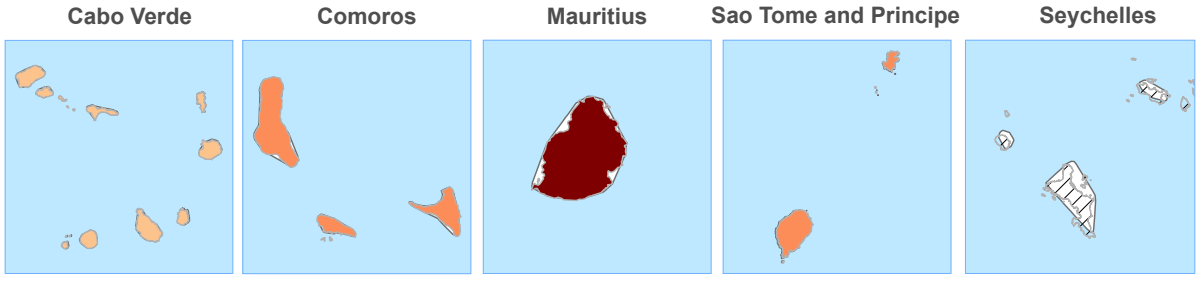


▲Figure 6.7 Incidence of cancers by gender

2020 Regional level estimates of A) Female new cancer-related cases in 2020, B) Female cancer-related deaths C) male new cases in 2020 D) male cancer deaths [157].

Countries with the highest reported cases of breast cancer include Mauritius (0.662 per 1,000 female population), Namibia (0.576 per 1,000 population), Algeria (0.558 per 1000), South Africa (0.526 per 1000 population) and Nigeria (0.490 per 1000 population) [158]. Zimbabwe (0.706 per 1000 population), Zambia (0.692 per 1,000 population), South Africa (0.683 per 1,000 population), Namibia (0.668 per 1000 population) and Sao Tome and Principe (0.513 per 1000 population) reported the highest incidence of prostate cancer in 2020 (Figure 6.8).





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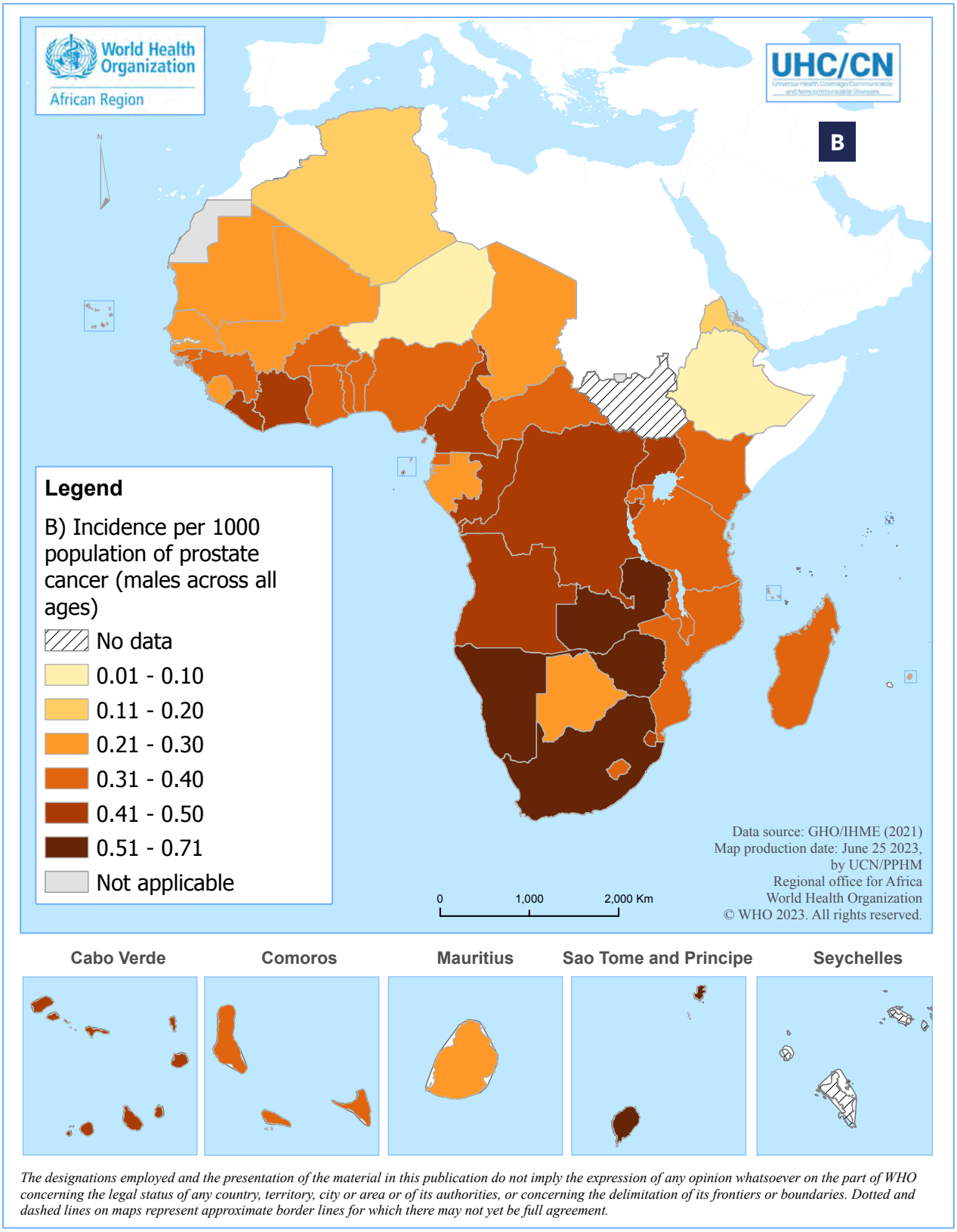

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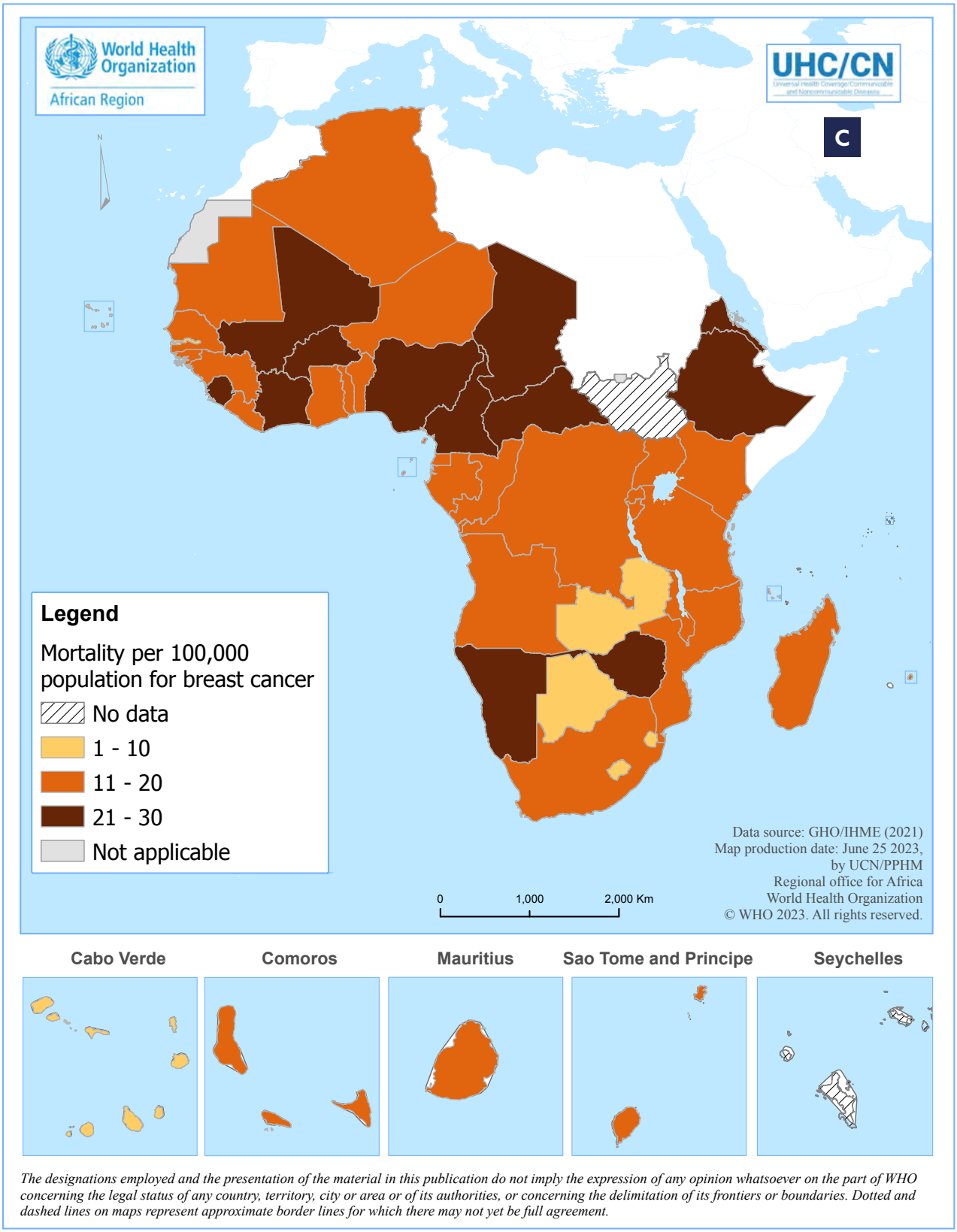

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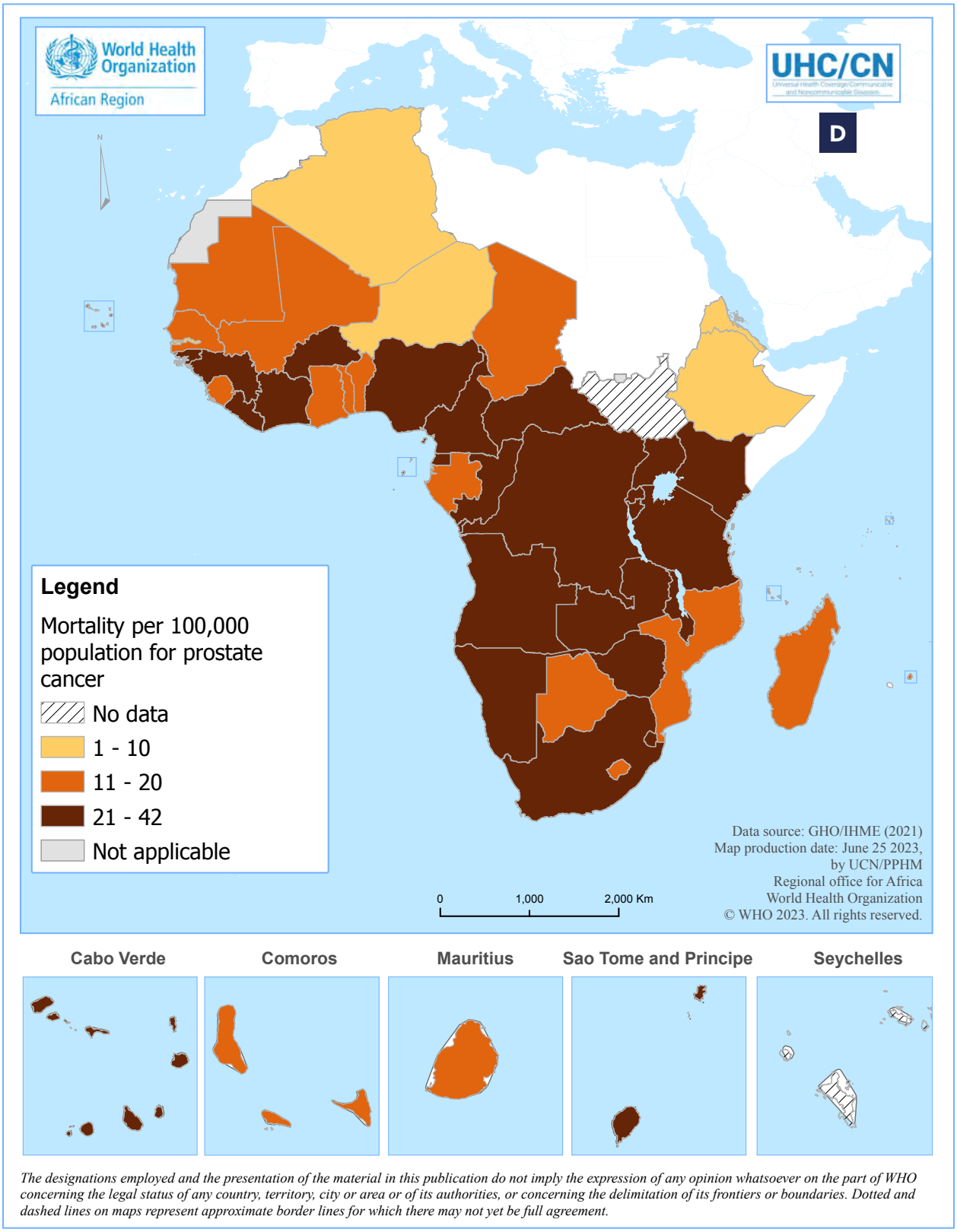

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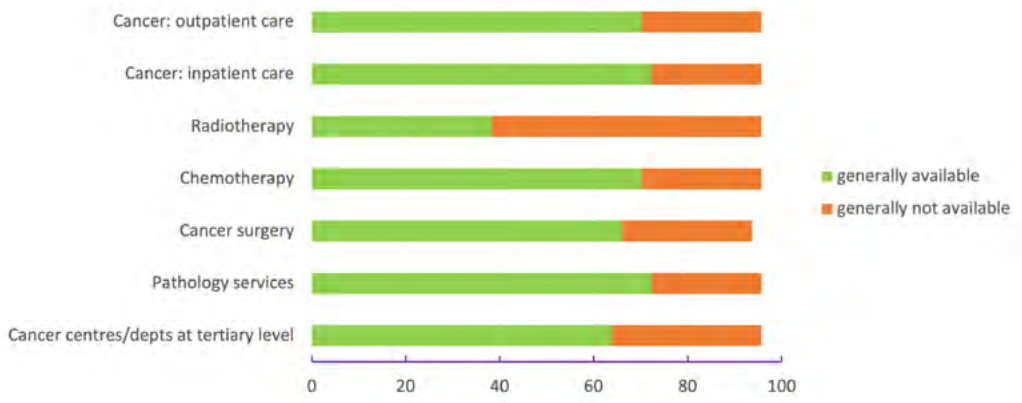
▲Figure 6.8 Incidence of breast and prostate cancer in the WHO African Region in 2020.

A. Incidence per 1000 population of breast cancer (females across all ages)
B. Incidence per 1000 population of prostate cancer (males across all ages)
C. Mortality per 100 000 population for breast cancer
D. Mortality per 100 000 population for prostate cancer

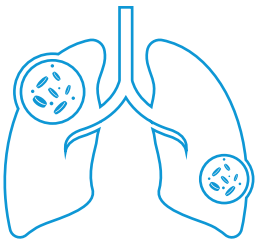
The risk of prostate and breast cancer increases with age, disproportionately affecting older age-groups. For example, 77 514 of the prostate cancer cases reported were in men over 50 years and only 1549 new cases were reported in the age-group 45-49[147]. Mortality is increased because of delays in diagnosis and early management, unfamiliarity with cancer and cancer prevention including exposure to risk factors, and the inaccessibility and unaffordability of care.

Availability of outpatient and inpatient cancer care centres were reported in 33 countries and these countries also reported availability of inpatient care services (Figure 6.9).



▲**Figure 6.9** Availability of cancer services within the African Region in 2021 (among 33 reporting countries)

6.3.5. Chronic respiratory diseases (CRD)

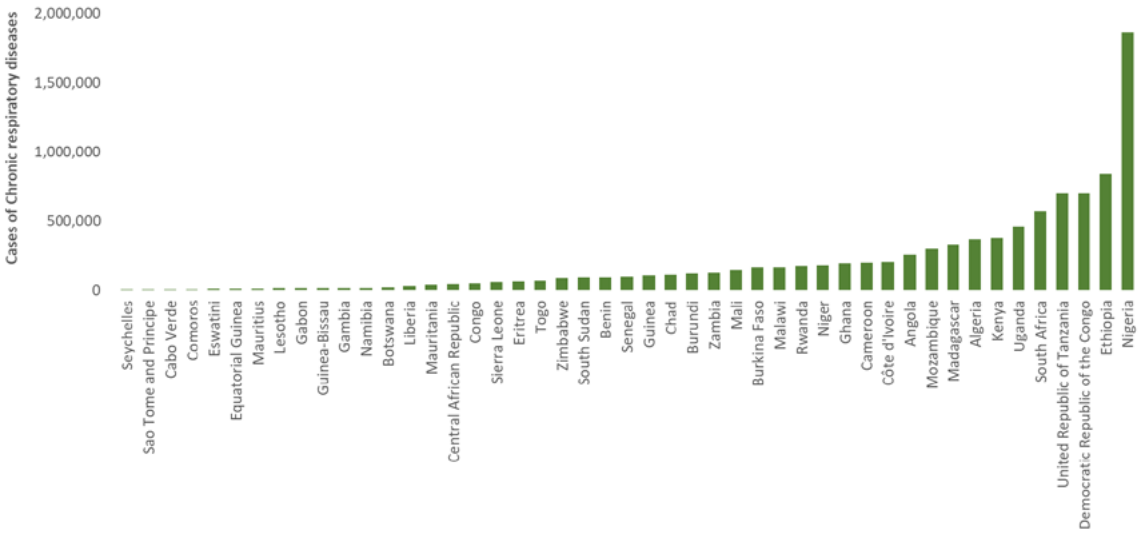


Chronic respiratory diseases (CRDs) include chronic obstructive pulmonary disease (COPD), asthma, occupational lung diseases and pulmonary hypertension[139]. Some of the risk factors for CRDs are smoking tobacco, air pollution (including indoor air pollution), occupational hazardous chemicals and dusts, and frequent respiratory infections during childhood. Globally, it was estimated that 3 974 315 [3 581 757 - 4 303 823] deaths in 2019 were as a result of CRDs. In WHO African region, they were responsible for 178 908 [153 544 - 206 284] deaths in 2019 with subregional variations at country level (Table 6.3). The number of CRDs continue to rise over the years from 170 376 [147 603 - 192 927] in 2015 to approximately 178 900 [153 544 - 206 284] in 2019. Nationally there were more cases recorded in Nigeria in 2019 at approximately 24 506 [19 595 - 30 356] compared to the Democratic Republic of the Congo at 19 997 [12 900 - 32 274], and South Africa at 17 827 [16 467 - 20 125] The lowest disease burden was in Seychelles 31 [26 - 35], Sao Tome and Principe 79 [59 - 98], Equatorial Guinea 157 [103 - 262] and Cabo Verde 107 [86 - 145] (Figure 6.10).

▼**Table 6.3** Estimated deaths related to chronic respiratory diseases in the African Region in 2019

Source: IHME 2019 Global Burden of Disease Study.

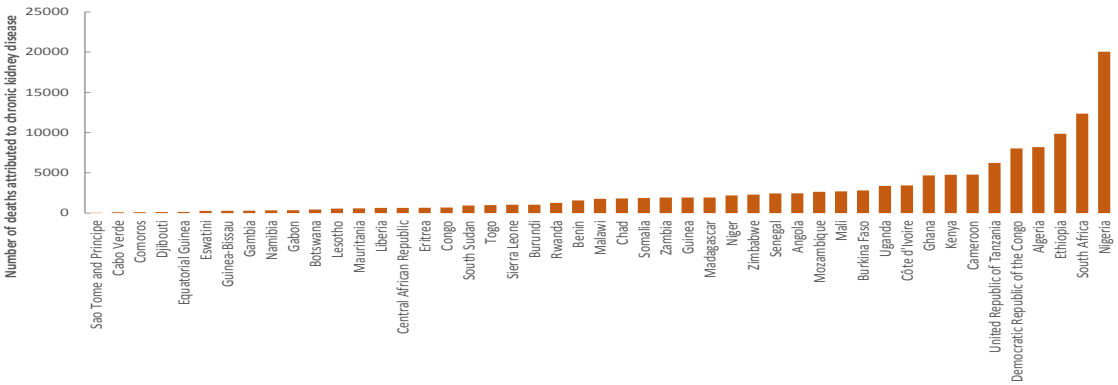
Region	Estimated deaths attributed to chronic respiratory diseases
West Africa including Algeria	64 745 [49 530 - 81 412]
Central Africa	33 820 [23 037 - 50 476]
East and Southern Africa	80 344 [65 510 – 98 570]
WHO African region	**178 908 [153 544 – 206 284]**



▲Figure 6.10 The national level of chronic respiratory diseases cases in WHO African Region in 2019

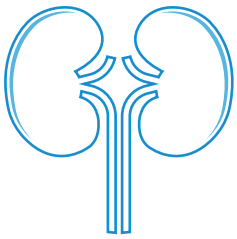
Data obtained from IHME 2019 Global Burden of Disease Study.

At country level, only one country reported a joint general availability of the bronchodilator, combination budesonide-formoterol inhaler, steroid inhalers, spirometry and nicotine replacement therapy. However, 28 countries reported the availability of either bronchodilators or steroid inhaler (Figure 6.11). The lack of health products for the management of CRDs impact health outcomes, often contributing to mortality.

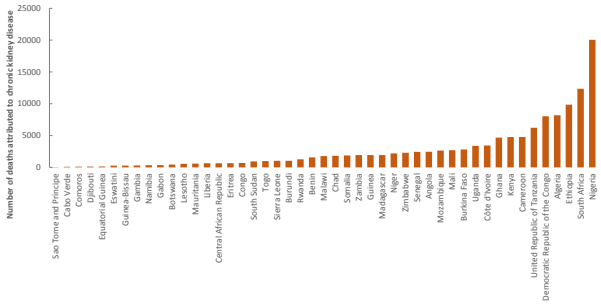


▲Figure 6.11 Availability of chronic respiratory services within the African Region in 2021

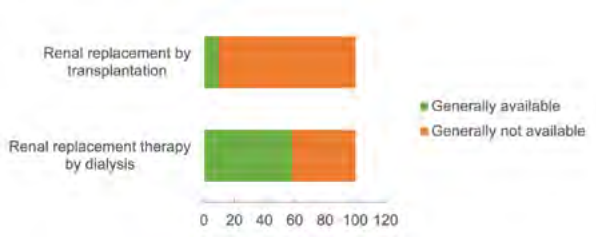
6.3.6. Chronic kidney disease



Kidney disease is loss of kidney function. The kidneys filter waste and excess fluids from the blood. The global burden of disease is estimated at approximately 1.4 [1.3–1.5] million cases[84] and approximately 127 158 [113 401 - 142 425] deaths in the WHO African region in 2019. This number was 116 436 [105 243 - 128 891] in 2015, reflecting a 10% increase in the number of deaths over the period. Numbers of deaths varied between different sub-regions and was approximately 53 920 [41 737 - 68 749] in West Africa and 54 265 [45 468 - 64 685] in East and Southern Africa. At country level, this was highest in Nigeria 20 045 [15 894 - 25 087], Ethiopia 9860 [8583 - 11 286] and South Africa 12 353 [11 414 - 13 224] and lowest in Cabo Verde 105 [92–118], Sao Tome and Principe 50 [39-59] and Seychelles (44 [39-49]) (Figure 6.12).

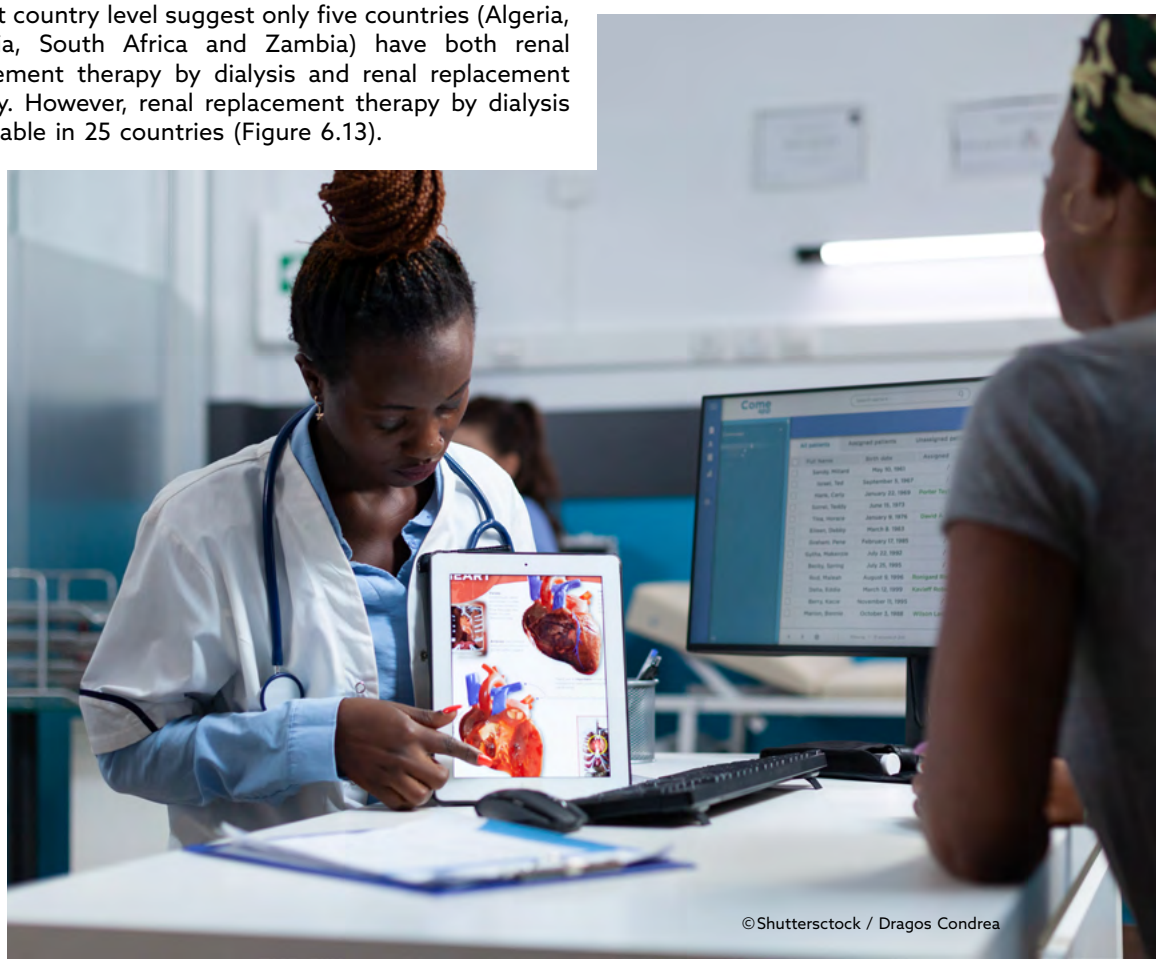


▲**Figure 6.12** The national level chronic kidney disease cases in WHO African Regional in 2019
Data obtained from IHME 2019 Global Burden of Disease Study.



▲**Figure 6.13** Availability of chronic kidney disease services within the African Region in 2021

Data at country level suggest only five countries (Algeria, Ethiopia, South Africa and Zambia) have both renal replacement therapy by dialysis and renal replacement therapy. However, renal replacement therapy by dialysis is available in 25 countries (Figure 6.13).



6.4. Mental health

6.4.1. Burden of mental health disorders in sub-Saharan region

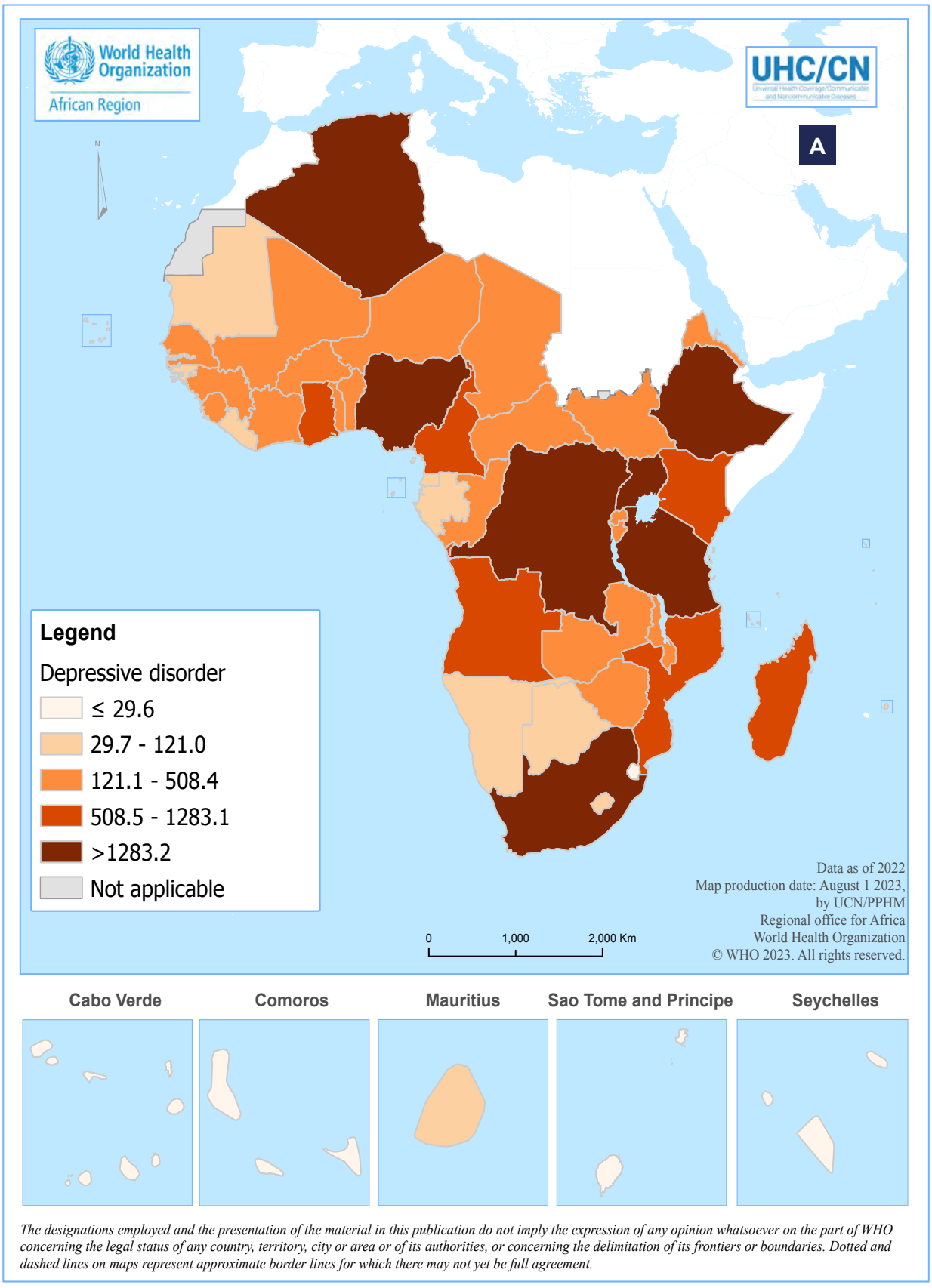
Mental health problems are increasing in importance in Africa. True estimates of the burden are limited, and the few that are available are based on systematic reviews of studies done in the continent, and so figures vary. A recent systematic review published in 2022 by Global Diseases Burden (GBD) 2019 Mental Disorders Collaborators showed an increase in mental disorders from 1990 to 2019. Table 6.4 presents age-standardised prevalence by mental disorder and region in 2019. Depressive disorders and anxiety disorders were common in the African region, and comparatively high compared to the global estimates.

The prevalence of depressive disorders in sub-Saharan Africa was 4540.4 cases per 100 000 people, 95% CI 4038·1–5112·4, and for anxiety disorders was estimated at 3462.6 per 100 000 people, 95% CI: 2839.1-4184.2 per 100 000 people. These disorders affect all ages. The most recent systematic review of studies from sub-Saharan African countries, encompassing a total population of 97 616 adolescents found the following prevalence estimates; 40.8% for emotional and behavioural problems, 29.8% for anxiety disorders (29.8%), 26.9% for depression, 21.5% for post-traumatic stress disorder, and 20.8% for suicide.

▼Table 6.4. Prevalence of mental health disorders (per 100 000 people) in the sub-Saharan African region

	Mental disorders	Schizophrenia	Depressive disorders	Anxiety disorders	Bipolar disorder	Eating disorders	Autism spectrum disorders	Attention-deficit hyperactivity disorder	Conduct disorder	Idiopathic developmental intellectual disability	Other mental disorders
Sub-Saharan Africa	11 934.6 (11 080.2–12 879.4)	214.2 (178.2–254.3)	4540.4 (4038.1–5112.4)	3462.6 (2839.1–4184.2)	566.4 (458.1–690.1)	106.7 (78.3–137.7)	373.5 (307.4–447.6)	583.8 (414.2–797.0)	592.7 (430.2–763.1)	806.1 (398.8–1237.4)	1415.7 (1088.2–1808.5)
Central sub-Saharan Africa	13 396.2 (12 307.9–14 613.9)	208.5 (166.2–253.9)	5536.9 (4801.3–6307.6)	3864.0 (3089.6–4826.5)	554.3 (432.0–696.3)	93.7 (68.8–120.7)	370.8 (303.3–446.9)	569.6 (403.3–776.8)	588.6 (432.7–757.8)	1052.6 (572.8–1570.3)	1456.9 (1129.1–1864.0)
Eastern sub-Saharan Africa	12 616.5 (11 687.3–13 609.8)	210.8 (174.3–250.2)	4849.2 (4317.2–5416.8)	3716.3 (3050.0–4530.6)	595.6 (480.3–722.6)	92.6 (68.1–119.6)	378.4 (311.7–454.4)	572.4 (404.0–779.4)	597.0 (436.2–766.8)	997.0 (537.0–1504.4)	1419.2 (1091.7–1813.0)
Southern sub-Saharan Africa	11 453.9 (10 687.1–12 279.3)	220.9 (187.5–256.8)	4166.3 (3736.3–4612.3)	3658.0 (3100.4–4307.8)	553.2 (459.0–654.1)	151.2 (111.9–196.6)	371.6 (304.9–447.7)	575.3 (404.0–789.5)	617.9 (456.6–801.4)	443.4 (176.1–722.3)	1379.9 (1057.1–1747.4)
Western sub-Saharan Africa	11 000.7 (10 217.1–11 866.6)	217.1 (181.1–256.5)	4075.4 (3633.0–4556.1)	3066.5 (2532.6–3683.3)	546.6 (445.2–661.4)	114.4 (84.0–148.0)	370.6 (305.5–443.3)	599.6 (421.8–832.2)	586.7 (423.0–763.5)	626.0 (282.1–1001.2)	1408.6 (1081.2–1797.9)
Global	**12 262.0 (11 382.9–13 213.3)**	**287.4 (246.2–330.9)**	**3440.1 (3097.0–3817.6)**	**3779.5 (3181.1–4473.3)**	**489.8 (407.5–580.6)**	**174.0 (130.1–222.1)**	**369.4 (305.9–441.2)**	**1131.9 (831.7–1494.5)**	**559.0 (405.0–722.3)**	**1426.6 (873.6–1991.7)**	**1428.7 (08.4–1816.1)**

Source: GBD 2019 Mental Disorders Collaborators



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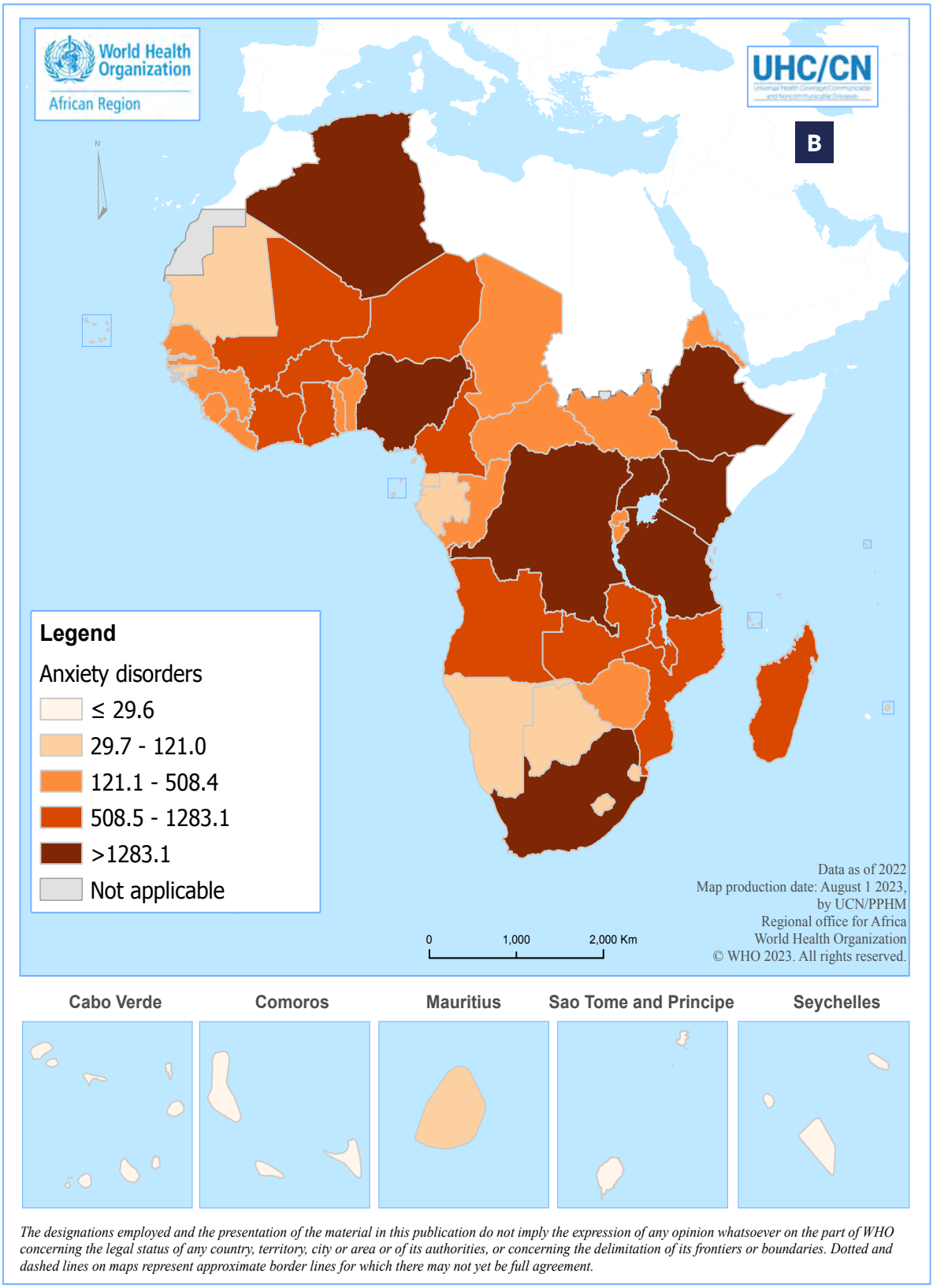
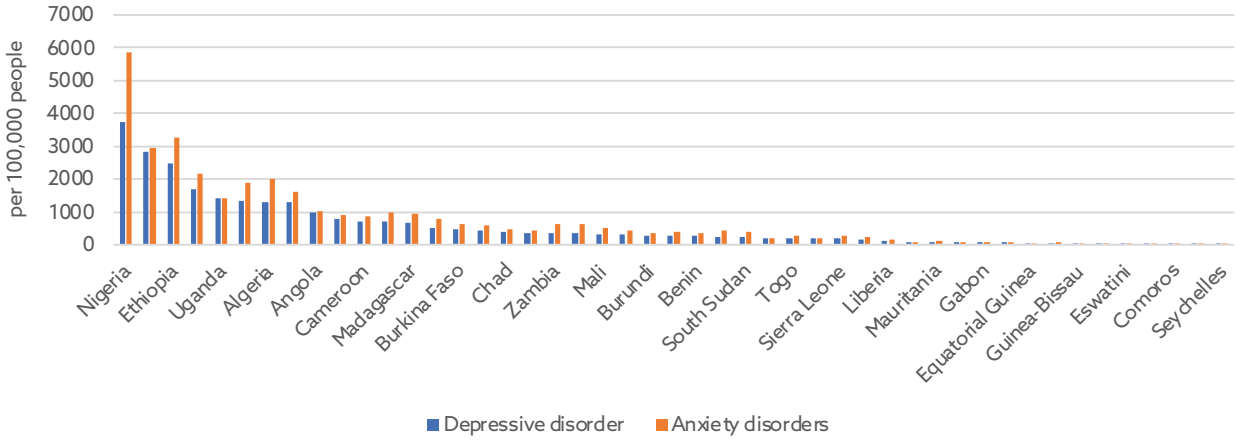


▲**Figure 6.14** shows that Nigeria, DRC, Ethiopia and South Africa had the highest burden of both depressive (A) and anxiety disorders (B). Across most countries in the region, anxiety disorders were relatively more. The high burden countries, with over 7000 cases per 100 000 people for both mental disorders include Algeria, Angola, Cameroon, DR Congo, Ethiopia, Ghana, Kenya, Madagascar, Mozambique, Nigeria, South Africa, United Republic of Tanzania and Uganda



▲**Figure 6.14** Maps and graph of incidence of (A) depressive and (B) anxiety disorders in WHO African Region

6.4.2. Progress on integrating and strengthening health services for mental health

At present, health systems fail people with mental disorders in every country worldwide. At best only a third of people with mental disorders are treated in some high-income countries, and at worst fewer than 5% of people with mental disorders in low- and middle-income countries (LMICs) receive any treatment or care. In Africa, the treatment gap, difference between true levels of need and actual treatment rates, is due, in part, to inadequate staffing. Many countries do not have the budgetary allocation for mental health. Most African countries spend less than 1% of their budget on mental health. Additionally, mental health is not a popular subject. Stigma and discrimination may also contribute to the treatment gap because people do not access services or are exposed to human rights abuses.

The Mental Health Atlas 2020 has shown progress in many African countries. This is assessed in the following areas: mental health information systems, mental health system governance, financial and human resources, service uptake and treatment, and mental health promotion and prevention. The following are the key findings in 2019 evaluation.

Mental health information systems

- There are now several high-quality sources that synthesise information on effective interventions for people with mental disorders
- Percentage of responding countries with data compiled and/or reported by age and sex (40%, n=19)
- Number and percentage of countries reporting against all five mental health indicators (66%, n=31)

Mental Health System Governance

- 76% of Member States have a stand-alone policy or plan for mental health, which is an increase from 68% in 2014.
- 46% of WHO Member States have updated their mental health policy or plan and 27% have updated their mental health law since 2017.
- 68% of WHO member states in the Region, reported full alignment of their policy or plan for mental health with international and regional human rights instruments.
- 38 countries in African region indicated existence of indicators/targets to monitor implementation of policies/plans, with 46% suggesting indicators available but not used, 27% with indicators available and have been used in the past two years for some/a few components, while 5% having indicators and have been used in the past two years for most or all components

Financial and human resources

- Levels of public expenditure on mental health are low (a global median of 2.1% of government health expenditure) and particularly meagre in low- and middle-income countries.
- 80% of responding countries reported that care and treatment of persons with severe mental health conditions are included in national health insurance or reimbursement schemes and in insurance coverage for inpatient/outpatient mental health services.
- The median number of mental health workers was 1.6 per 100,000 population compared to the global median of 13 per 100,000 population.

Service availability and uptake

- Only 6 countries, equivalent to 13% of countries in the Region, reported the integration of mental health into primary health care. This was estimated based on the adoption of guidelines for integration into primary care (66%), the provision of pharmacological interventions (16%), psychosocial interventions (11%) and training for mental health conditions at primary care level (82%), and the involvement of mental health specialists in training and supervision of primary care professionals (74%).
- The median number of mental hospital beds per 100 000 population ranges from below two in the region. The median number of mental hospital beds reported per 100 000 population remained relatively the same from 2.4 beds in 2014 to 2.6 beds in 2020, while the median admission rate per 100 000 population nearly doubled from 18.3 admissions in 2014 to 34.3 admissions in 2020.
- A reported 30% of mental health inpatients receive timely diagnosis, treatment and follow-up for physical health conditions.
- The service utilization rate for people with psychosis per 100 000 population ranged between 48.8 and 171.3.

Mental health promotion and prevention

- 28% of countries in the region have at least two functioning national, multisectoral mental health promotion and prevention programmes. There is virtually no increase from the 25% recorded in 2014.
- Of the 47 countries in the African region 6% of countries had a stand-alone, and 13% had an integrated suicide prevention strategy, policy or plan
- Of the 13 countries that reported functioning programmes, 28% had at least two functioning mental health promotion and prevention programmes. At a global level 18% were aimed at improving mental health awareness or combating stigma, 17% were school-based mental health prevention and promotion programmes, and 15% were aimed at suicide prevention.
- The region age-standardized suicide rate in 2019 was estimated to be 11.2 per 100 000 population. This represents a 11% reduction in the rate of suicide since the 2013 baseline.

6.5.
WHO voluntary global target for NCDs

Countries in the African Region monitor progress on NCDs based on the global target indicators[140]. There are feasible and cost-effective interventions to reduce the current and future burden and impact of NCDs and tracking national-level implementation is essential. It also helps to highlight challenges and areas requiring renewed attention.

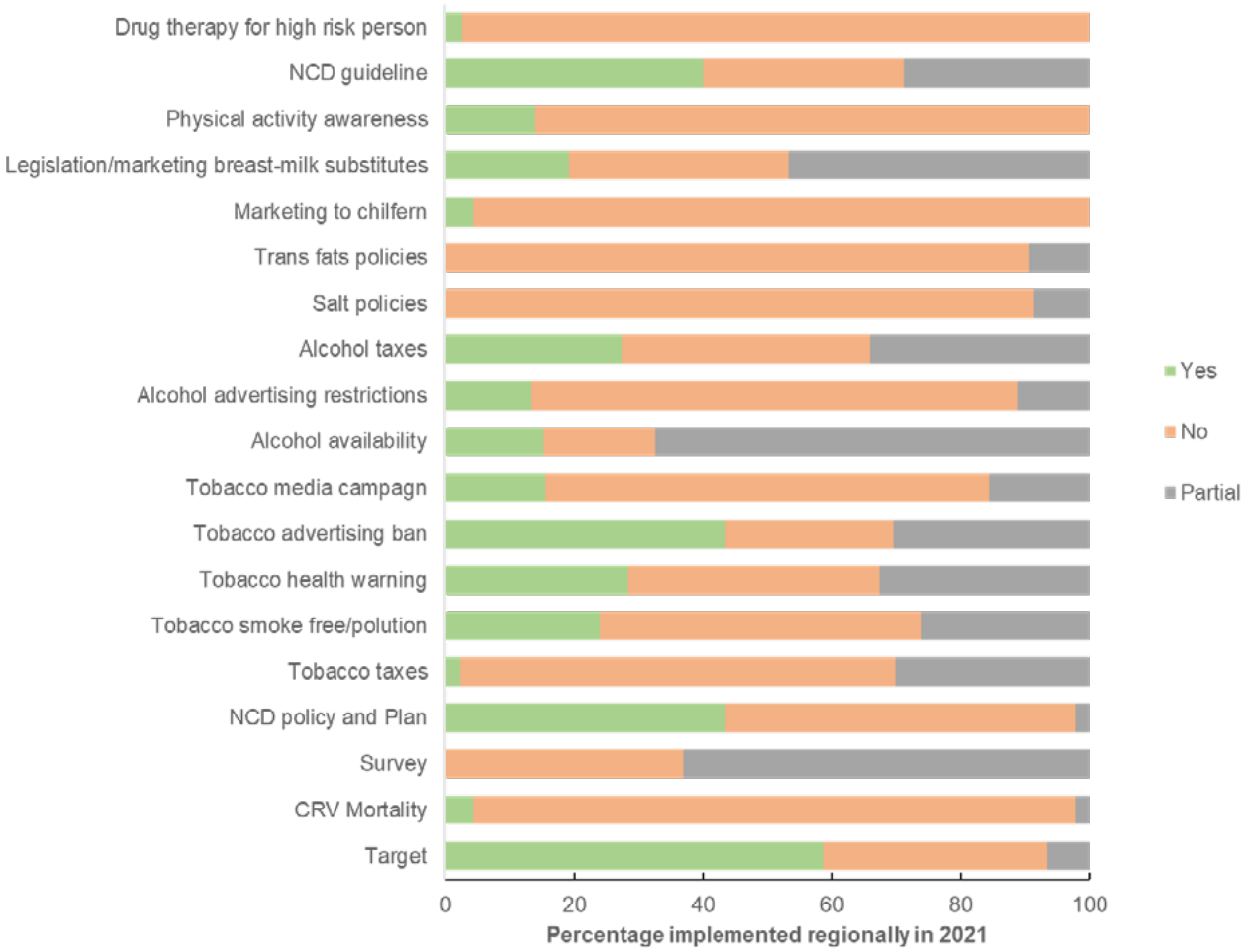
Table 6.5 show progress monitoring indicators tracked at country levels with varying levels of implementation regionally.

▼Table 6.5: WHO voluntary global monitoring targets for NCDs[142]

Dimensions	Indicator/Target
Consider setting national NCD targets for 2025	Member State has set time-bound national targets based on WHO guidance
	Member State has an effective system in place to consistently produce reliable cause-specific mortality data
	Member State conducts a STEPS survey or comprehensive survey every five years
Consider developing national multisectoral policies and plans to achieve national targets by 2025	Member State has an operational multisectoral strategy or action plan encompassing the main NCDs and their common risk factors
Reduce NCD risk factors based on guidance from the WHO Global NCD Action Plan	The Member State has implemented as fully as possible the following five tobacco demand reduction measures of the WHO Framework Convention on Tobacco Control:
	1. Make tobacco products less accessible by increasing excise duties and prices
	2. Eliminate passive exposure to tobacco smoke in all indoor workplaces, enclosed public places and public transport
	3. Adopt plain/standard packaging and/or large pictorial health warnings on all tobacco packaging
	4. Implement a comprehensive ban on tobacco advertising, promotion and sponsorship
	5. Launch effective media campaigns to warn the general public about the dangers of tobacco smoking, tobacco consumption in general and passive smoking
	The Member State has implemented, as appropriate and according to national circumstances, the following three measures to reduce the harmful use of alcohol, in line with the WHO Global Strategy to Reduce harmful use of alcohol
	1. Enforce restrictions on the availability of alcohol at retail (by limiting the hours of sale)
	2. Enforce blanket bans or restrictions on alcohol advertising (in multiple types of media)
	3. Increase excise duties on alcoholic beverages
	The Member State has implemented the following four measures to combat unhealthy diets
	1. Adopt national policies to reduce salt/sodium consumption in the population
	2. Adopt national policies to limit saturated fatty acids and virtually eliminate trans fatty acids in industrially produced foods
	3. Implement WHO recommendations on the marketing of foods and non-alcoholic beverages to children
	4. Adopt legislation/regulations fully implementing the International Code of Marketing of Breastmilk Substitutes
	The Member State has recently carried out at least one public awareness and mobilization effort to encourage physical activity, including mass media campaigns for behaviour change.
Strengthen health systems to prevent and control NCDs through people-centred primary health care and universal health coverage as outlined in the WHO Global NCD Action Plan	Member State has evidence-based guidelines/protocols/standards for the management of major NCDs using a primary health care approach, recognized/endorsed by government or relevant authorities
	The Member State shall provide eligible high-risk individuals with drug therapy (including blood sugar control) and counselling to prevent myocardial infarction and stroke, with emphasis on primary health care

6.6.
NCD Progress Indicators in the African Region

Figure 6.15 summarises the NCD progress indicators within the African Region showing that most countries have not fully implemented policies to effectively monitor and track NCD related indicators. Twenty-seven of the 47 member states have set national NCD targets based on WHO guidelines. Moreover, recent reports suggested that only 30% of deaths in Africa are recorded, with only four countries in the Region having optimal civil registration systems that meet international standards[159,160]. This impacts mortality estimation related to NCDs and other diseases. There are no measures in most countries related to tobacco taxation (in 46 of the 47 countries, except in Madagascar). However, measures prohibiting advertising exist in 20 of 47 Member States. Warnings on the use of tobacco products are found in only 7 of the 47 Member States. This suggests a need to increase the implementation of tobacco demand reduction measures within African countries. There are large gaps in restrictions on alcohol use, with taxation fully implemented in only 12 countries. The largest gaps, however relate to policies on the use and availability of harmful levels of salt and fat in foods (only partially implemented in Algeria, Seychelles, Mauritius, South Africa and Zambia) and a lack of guidelines at the country level on physical activity (implemented in Algeria, Cabo Verde, Gambia, Eswatini and United Republic of Tanzania).



▲**Figure 6.15** NCD progress indicators in the African Region in 2021

6.7.
A regional challenge for NCDs and the role of WHO

In 2021, among the 47 countries, 14 (30%) had PHC guidelines for the management of NCDs, 13 (28%) countries had adapted and were using the WHO PEN, and 17 (36%) countries reported either health workers have been trained or have a national strategy that includes a plan to train PHC workers for NCDs management[142]. In general, NCDs are poorly reported across the African countries with only Seychelles, Mauritius and South Africa having reliable routine reporting of NCDs and with the ability to generate case specific mortality estimates. STEPs surveys have been conducted every five years in six countries (representing 11% of the 47 countries), namely Botswana, Kenya, Lesotho Tanzania, Uganda and Zambia.

For example, there are specific challenges relating to the control of cardiovascular diseases. At country level, only 20 countries reported the availability of thiazide diuretics, ACE inhibitors and angiotensin II receptor blockers (ARBs) (Figure 6.4). However, the distribution and availability at sub-national level and within PHC facilities is not well understood and could vary substantially at sub-national level. Improving community awareness of high blood pressure through advocacy programmes is critical to reducing the time to treatment and case management, thereby reducing premature mortality. Previous research in sub-Saharan Africa suggests a large percentage of hypertensive individuals are unaware of their condition[161]. Early detection of hypertension through regular blood pressure measurements is important for case management, and this requires the availability of these services at primary care facilities[162].

The WHO Package of Essential NCD interventions for primary health care in low-resource settings (WHO PEN) outlines an integrated approach to the detection, diagnosis, treatment, and care of NCDs in primary health care facilities using evidence-based algorithms and protocols for hypertension, type 2 diabetes, chronic respiratory diseases, and the referral of patients with suspected breast and cervical cancer. Moreover, the regional framework for integrating essential NCD services in primary health was adopted in 2017[163]. It provides additional guidance to member states on decentralized care for NCDs and this framework complements the WHO PEN. While 21 countries have adopted these frameworks[145], there are still gaps in access to prevention and care for patients with chronic and severe NCDs[164].

In addition to WHO PEN, various sectoral initiatives are being implemented in the WHO African region. These include the Cervical Cancer Initiatives, Breast Cancer Initiative, EU Beat Plan, and the PEN Plus strategy. The Lancet Commission on reframing NCDs and injuries for the poorest billion played a role in the development of WHO PEN and the region will benefit from the support of the Hemsley Charitable Trust for its operationalization. Moreover, for cardiovascular diseases, initiatives such as the Global Hearts Initiative and Resolve to Save Lives, make investments to reduce the incidence of high blood pressure. There are also initiatives geared toward the NCD risk factors such as the Physical Activity 2018-2030 initiative, the WHO toolkit ACTIVE and Global Physical Activity, Tobacco Control (WHO FCTC), and the WHO Global Strategy on Diet. Along with the World Health Assembly resolution on strengthening the prevention and control of diabetes in 2021, the global diabetes compact initiative was launched with the aim of increasing and sustaining improvements in diabetes prevention and care. Successful implementation of these initiatives requires implementing strategic partnerships (technical, financial), strengthening health systems and improving epidemiological data to track the impact of interventions at the population level.

The implementation of WHO PEN plus strategy, enacting and implementing national level policies for NCDs, the Global Hearts Initiative and Resolve to Save Lives, an initiative of Vital Strategies by countries of the Region is essential for mortality reduction related to NCDs. There is an urgent need to focus on implementing existing cost-effective policies and interventions if the Region is to meet the targets for Sustainable Development Goal 3 and achieve a 30% reduction in premature mortality due to NCDs. Thus, strengthening the implementation of a series of cost-effective interventions could improve patient outcomes, including, but not limited to, blood glucose control through a combination of diet, physical activity and, if necessary, medication; control of blood pressure and lipids to reduce cardiovascular risk and other complications; and regular screening for other NCD conditions.

Most premature NCD deaths are preventable by taking cost-effective action to tackle some of the environmental and behavioural risk factors – tobacco use, harmful use of alcohol, physical inactivity, unhealthy diets and reducing pollution. Genetic and physiological factors pose additional challenges. These risk factors call for multi-sectoral approaches, endorsed in the 2011 Political Declaration on the Prevention and Control of NCDs. It is possible to identify strategies and approaches that deliver shared gains and co-benefits for all sectors involved.

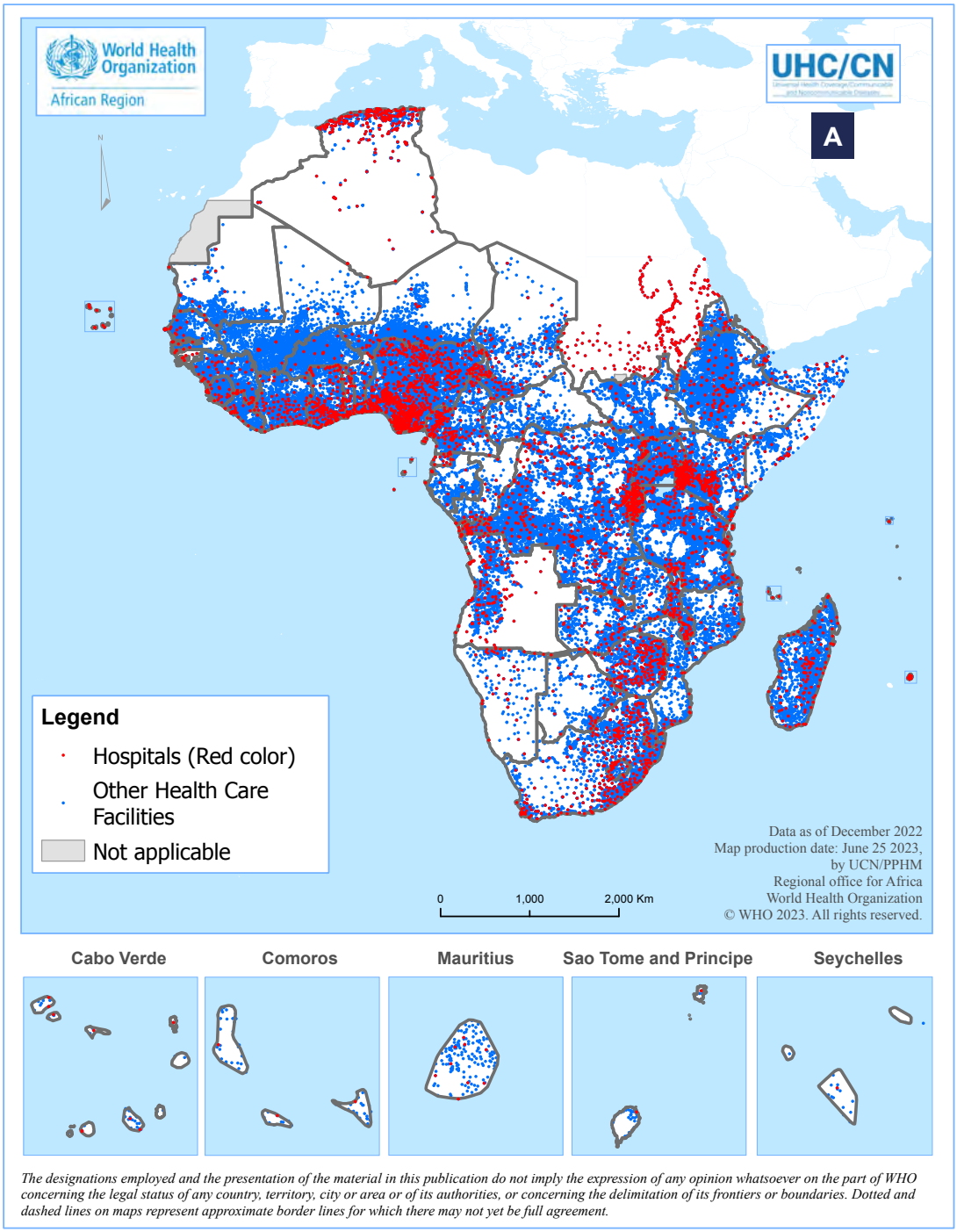
7.

Discussion

Central to all initiatives to eliminate, eradicate and control disease in the WHO African region is recognition of the need for universal health coverage, equitable access to health care, improved primary health care facilities that are close to the communities they serve and robust referral pathways where these are required. Discussions related to the determinants of health such as water, sanitation and hygiene, the effects of climate change, and regional and national sociodemographic conditions, are outside the scope of this report.

One determinant of health that is amenable to measurement is the availability and accessibility of health facilities. People-centred service delivery requires a functional health system, which requires availability of and easy access to health services. Access to health care facilities has multiple definitions that often contribute to health inequalities: availability, accessibility, affordability, acceptability and accommodation.

Within African countries where the burden of ill health is greatest[84], adequate information on the location of populations, health services, facility workload, patient addresses and socio-demographic characteristics are important variables for people-centred health care delivery. An assessment of available health facilities at population level from Figure 7.1 suggests that approximately 84% (of the 1.1 billion people) of all-age population are within one hour of any (public or private) health facility. It is clear from the continuing burden of disease in the region that proximity to health facilities is only one factor to consider when assessing the region's resilience. While 84% of the population have what appears to be relatively easy access to health facilities, we require detailed knowledge of the actual distribution of services, the dynamic curation of the existing master health facility database, and knowledge of the availability of essential commodities across the countries contributing to disproportionately high health care delivery at population level.



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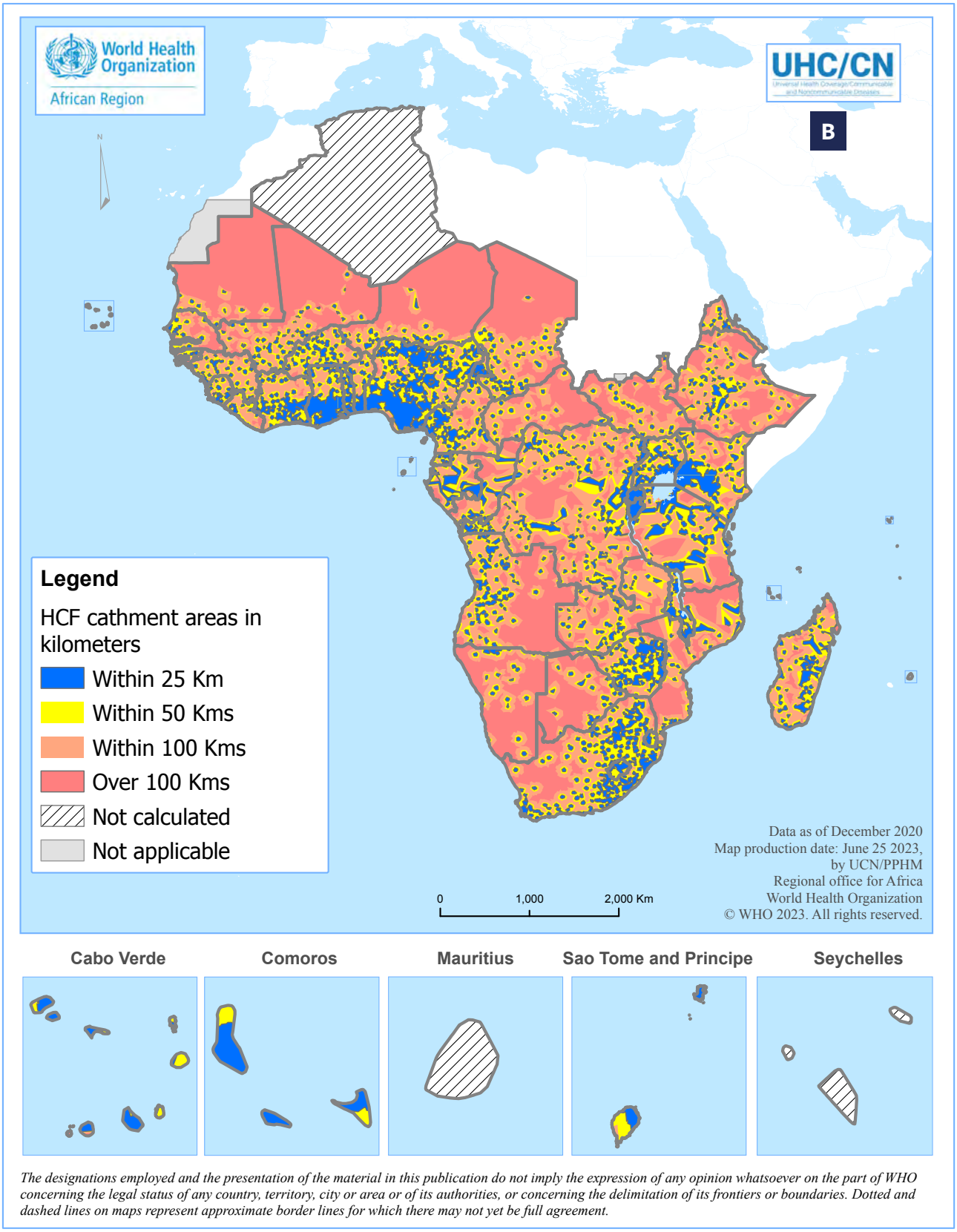

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▲**Figure 7.1** Spatial distribution of health facilities and their accessibility.
(A) Health facilities comprising of regional or district hospitals, mid-tier health centres and primary or lower-level dispensaries, clinic or health posts165,166 (B) estimated average travel time to nearest health facility (all levels) in minutes

It is clear that, although there has been enormous progress in reducing the burden of disease in the region, many challenges remain. The region needs to make progress towards disease control using the resources available to sustain the current outlook, reverse declining or stagnated trends, and achieve the 2030 targets[30]. The rapid "acceleration of the momentum towards the 2030 disease burden reduction targets in the WHO African Region" is the requisite response to the stagnated and/or declining disease control situation in the region. It will, however, require adequate financing, which has historically been poor. In addition, the COVID-19 pandemic damaged African economies. Therefore, achieving more with the available resources is paramount to attaining the regional 2030 disease control targets. The latter calls for drastic improvement in investment efficiency, equity, effectiveness and impact on disease burden.

To continue making gains in disease control, elimination, and eradication, renewed and concerted efforts must be made in disease programming, including governance and system coordination. This calls for new approaches to identify high-burden communities to facilitate tangible progress. Countries can no longer apply a single strategy.

Governance and system coordination

WHO continues its work to strengthen policy and guidance for disease control, including the implementation of technical products. These include: the development of a regional framework to guide countries in the African region to implement the Global AIDS Strategy 2021–2026; the regional framework for data governance and acceleration of COVID-19 vaccination; the development and implementation of WHO PEN Plus model for severe NCDs that complements the current WHO PEN; the regional-specific or tailored NTD roadmap; and a regional framework for implementing IA2030.

Capacity strengthening for data surveillance and sub-national tailoring of interventions

The African region needs to continue to strengthen its capacity for disease surveillance across several disease areas. WHO is providing technical support for the implementation of technical guidance for disease control, surveillance and monitoring. However, there is a general lack of quality routine sub-national data on the causes of deaths and case-specific data to guide disease control at sub-national levels. NCD STEP surveys are sporadically implemented across the region, with just 5 countries having conducted at least 2 surveys. Most non-NCD community cluster surveys occur every 3-5 years, with insufficient sampling to track and measure biomarkers or severe and/or rare disease conditions.

Certain areas lack key data, including hepatitis, detailed data on noncommunicable disease and their risk factors, COVID-19 sub-national surveillance and vaccination tracking, case incidence and prevalence data for most NTDs and strengthened sub-national surveillance on vaccine preventable diseases.

Data science capacity

Predictive policy-relevant modelling for disease control is required to understand the impact of different intervention mixes at sub-national levels, and financial modelling to understand of the potential impact of disease investment.

The use of data for policy and decision making needs to be strengthened. There is increasing impetus from WHO for integrated monitoring and evaluation systems, for example through the ESPEN data portal across countries.

There are opportunities for sharing the lessons learned through regional policy modelling and learning networks, such as the NTD modelling consortium. WHO Regional Office for Africa will need to play a greater role in coordinating the generation and dissemination of key lessons learned across countries to optimize programme implementation.

8.

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9.

Annex

9.1. Methods

Definition of terms

Control: Reduction of disease incidence, prevalence, morbidity and/or mortality to a locally acceptable level due to deliberate efforts; continued interventions are required to maintain the reduction. Control may or may not be related to global targets set by WHO.

Disability-adjusted life year (DALY): A measure of overall disease burden, expressed as the number of years lost due to ill health, disability, or early death; introduced in the 1990s to compare overall health and life expectancy in different countries. DALYs for a disease or health condition are calculated as the sum of the years of life lost due to premature mortality in the population and the years lost due to disability resulting from the health condition or its consequences.

Elimination (interruption of transmission): Reduction to zero of the incidence of infection caused by a specific pathogen in a defined geographical area, with minimal risk of reintroduction, due to deliberate efforts; continued action to prevent re-establishment of transmission may be required. Documentation of elimination of transmission is called **verification**.

Elimination as a public health problem: A term related to both infection and disease, defined by achievement of measurable targets set by WHO in relation to a specific disease. When reached, continued action is required to maintain the targets and/or to advance interruption of transmission. Documentation of elimination as a public health problem is called **validation.**

Eradication: Permanent reduction to zero of the worldwide incidence of infection caused by a specific pathogen, due to deliberate efforts, with no risk of reintroduction. Documentation of eradication is termed **certification**.

Extinction: Eradication of a specific pathogen, so that it no longer exists in nature or in the laboratory, which may occur with or without deliberate work.

Preventive chemotherapy: Large-scale use of medicines, either alone or in combination, in public health interventions. Mass drug administration is one form of preventive chemotherapy; other forms could be limited to specific population groups such as school-aged children and women of childbearing age.

Population distribution: Population downloaded from UN population prospects for 2022. The gridded estimates of population counts adjusted to match the UN estimates were downloaded from Worldpop https://www.worldpop.org/methods/populations/.

Modelled age-structure of children 12-23 months: Age-specific denominators and their spatial distributions are important for supporting planning and delivery of interventions, such as vaccination. Fine spatial resolution of age-structured denominators can also be combined with fine estimates of disease for burden estimation. However, most age data is available in five-year intervals, and these do not always correspond to target groups for interventions such as vaccine delivery in young children. To support vaccination coverage mapping, proportions of age-groups targeted for vaccination were modelled spatially.

Data on the proportion of children 12-23 were obtained from nationally representative surveys conducted after 2010 enumerating de facto members of households. Surveys are standardised across countries and use a stratified two-stage sampling design, with the first stage clusters (census enumeration areas, EAs) selected and stratified by urban and rural status. The second stage of sampling involve selection of household from comprehensive listing.

Modelling used geostatistical approaches combined with suitable covariates such as those used in previous modelling in Nigeria [167] namely temperature, precipitation, conflict, and vegetation index. A covariate selection procedure was conducted prior to modelling at continental level. Posterior approximations of age proportions were produced using the integrated nested Laplace approximations (INLA) for latent Gaussian models [168,169]. In brief, the methodology used data at known cluster centroid locations, survey date, together with the selected set of covariates to predict the proportion of the population that is 12-23 years. The data and spatially matched covariates were then used in a Bayesian hierarchical spatio-temporal model, implemented through a stochastic partial differential equations (SPDE) approach with INLA for inference, to produce continuous maps of the estimated proportion of the population.

Spatial distribution of health facilities and estimation of physical access: Primarily assembled from Maina et al. 2019 and Alegana et al. 2019 and recently updated where possible with most recent national databases available online. The assembly of comprehensive national health facility databases first took place between 2012 and 2018 and were updated through a systematic review of databases at national levels, collaborations with ministries of health, other health stakeholders at national levels. This was done through online searches and downloads of MFLs or maps hosted on the MoH website or on data portals managed by the MoH, health facility registries and online Health Management Information Systems (HMIS), including District Health Information Systems version 2 (DHIS2). In some instances, MoH publications with information on facility lists or maps were used. Occasionally, while the MoH sources did not have comprehensive lists of facilities or maps, other government agencies' websites, for example national statistical agencies, hosted health facility listings were consulted. Other sources of data included data hosted by the United Nations Office for the Coordination of Humanitarian Affairs' (UNOCHA) Humanitarian Data Exchange (HDX) portal and websites of other UN agencies, and where relevant, websites of FBOs and NGOs working in each country.

Computation of gridded travel time at 1 km by 1 km to the nearest health facility was modelled by combining gridded data on land cover (Medium Resolution Imaging Spectrometer (MERIS) GlobCover product (http://ionia1.esrin.esa.int/)[170]), elevation (topography) from the NASA's Shuttle Radar Topography Mission (SRTM) (https://www2.jpl.nasa.gov/srtm/), and roads data from the

OpenStreetMap (OSM, 2017) in AccessMod software (https://www.who.int/tools/accessmod-geographic-access-to-health-care). This methodology has been used in numerous access studies[171-173]. The algorithm for deriving travel time in each class, excluding the motorised roads class, included a slope correction derived from elevation data with travel speeds calculated for each degree rise of slope based on Tobler's equation (V=6*exp(-3.5abs[Tan(slope in degrees/57.296) + 0.05]) 44 where V is the calculated speed. Hence, on flat terrain, the walking pace is about 5.0kmh^{-1} while for a 20° rise in slope, the pace is lower (1.4 kmh^{-1}).

Vaccination coverage from survey data: Demographic and Health Surveys (DHS) were used in modelling gridded fine spatial resolution estimates of vaccination. Community-cluster estimates geolocated in space were used for modelling basic vaccine antigens (BCG, DPT1 and DPT 3, Measles and Polio 1). Vaccination status based on the vaccination card or as reported by caregiver was extracted at cluster level controlling for sampling design. For each country, only the most recent geo-located survey data was used to reflect most recent vaccination coverage estimates in children 12-23 months.

For each country a hierarchical Bayesian Binomial spatial regression model was used. Gaussian process models have been employed previously for vaccination coverage estimation for specific antigens[108,109] combined with a set of environment covariates. An INLA SPDE approach was used to predict probability of vaccination in this selected age-group and the predicted probabilities mapped at 1 km x 1 km spatial resolution.

Zero dose children are children who did not receive any routine vaccinations. It is calculated as children who did not receive the first dose of DTP as a proxy. For each country, region, and sub-region the number of zero dose children was calculated using the coverage rates of children that did not receive DTP1 in 2021 multiplied by the number of surviving infants in the same year from UN population prospects for 2022. (https://population.un.org/wpp/)

Under-immunised children are children who did not receive a full course of routine vaccinations. It is calculated using the number of children who did not receive the third dose of DTP as a proxy. For each country, region, and sub-region the number of under-immunised children was calculated using the coverage rates of children that did not receive DTP3 in 2021 multiplied by the number of surviving infants in the same year from UN population prospects for 2022. (https://population.un.org/wpp/)

Noncommunicable diseases (NCD) comprise all diseases categories and subcategories from Group II of the GHE list of causes. The four major NCD (4NCD) deaths are those with underlying cause-of-death coded as cardiovascular diseases, cancer, diabetes, and chronic respiratory diseases.

Noncommunicable disease mortality and burden of diseases indicators were calculated based on the estimated number of deaths from Global health Estimates (GHE)[147]. The WHO methods and data sources for the GHE estimates 2000-2019 are extensively documented elsewhere[146]. In summary, data from national civil registration and vital statistics (CRVS) and/or mortality information systems reported to WHO by national authorities were used as the main data source. Mortality data was corrected by missing sex and age, and deaths are rescaled by sub-registration level. Cause-of-death data quality issues due to diagnostic and coding accuracy were adjusted using formal demographic techniques called death distribution methods (DDM). For instance, deaths with underlying causes of death coded to ill-defined and garbage codes are redistributed to well-defined causes and mapped to the WHO GHE. Age-standardized death rates by country and year were calculated by the direct method of standardization of rates using the WHO World Standard Population.

The basic data used in the analysis of noncommunicable diseases (NCDs) were obtained from "The Global Health Observatory" of the World Health Organization. These were available for the majority of 2000-2019 at national levels.

The unconditional probability of dying from NCDs

The risk of premature death from target NCDs was measured using the unconditional probability of dying between exact ages 30 and 70 years from any of the four major NCDs. It refers to the probability of dying without any competing cause of death, and methods for estimation are based on life tables informed by age-specific death rates.

Cancer: The number of cancer cases and deaths (International Classification of Diseases, Tenth Revision) for the 47 countries of the WHO African region in 2020 were extracted from the website CANCER TODAY (https://gco.iarc.fr/today/home). CANCER TODAY conducts a comprehensive assessment of the cancer burden worldwide in 2020, based on the Cancer Observatory database (GLOBOCAN) estimates of incidence, mortality, and prevalence in 185 countries or territories for 36 cancer types by sex and age group as compiled by International Agency for Research on Cancer (IARC). IARC's approach is not only to evaluate, compile, and use the data from the Agency's collaborators in these estimates but also to work alongside national staff to improve local data quality, registry coverage, and analytical capacity. GLOBOCAN estimates are derived from the best available recorded data from national cancer registries and national vital registry systems in countries around the world. Caution should be exercised when interpreting these estimates, given the limited quality and coverage of cancer data in the WHO African region at present.

9.2. Tables

Annex Table 1.0 Data source for geolocate community cluster surveys used for the estimation of fever, fever treatment-seeking behaviour in children and modelling age distribution at fine spatial resolution of 1 km by 1 km.

Country	Data sources	Survey year
Angola	Demographic and Health Surveys (DHS)	2015
Burkina Faso	Malaria Indicators Survey (MIS)	2017
Burundi	Demographic and Health Surveys (DHS)	2016
Cameroon	Demographic and Health Surveys (DHS)	2018
Ethiopia	Demographic and Health Surveys (DHS)	2016
Ghana	Malaria Indicators Survey (MIS)	2019
Guinea	Malaria Indicators Survey (MIS)	2021
Kenya	Malaria Indicators Survey (MIS)	2020
Liberia	Demographic and Health Surveys (DHS)	2019
Madagascar	Demographic and Health Surveys (DHS)	2021
Malawi	Demographic and Health Surveys (DHS)	2017
Mali	Demographic and Health Surveys (DHS)	2018
Mozambique	Demographic and Health Surveys (DHS)	2018
Nigeria	Demographic and Health Surveys (DHS)	2018
Rwanda	Demographic and Health Surveys (DHS)	2019
Senegal	Demographic and Health Surveys (DHS)	2019
Sierra Leone	Demographic and Health Surveys (DHS)	2019
South Africa	Demographic and Health Surveys (DHS)	2016
Togo	Malaria Indicators Survey (MIS)	2017
Uganda	Demographic and Health Surveys (DHS)	2018
United Republic of Tanzania	Demographic and Health Surveys (DHS)	2017
Zambia	Demographic and Health Surveys (DHS)	2018
Zimbabwe	Demographic and Health Surveys (DHS)	2015

Annex Table 2.0 WHO/UNICEF (WUENIC) Immunization coverage of BCG, DPT1, DPT3, IPV, MCV1, HEPB3 and HEPBB by country in the WHO African region. Blanks represent missing values or estimates. BCG: bacille Calmette-Guerin, DPT 1: Diphtheria Pertussis Tetanus first dose, DPT 3: Diphtheria Pertussis Tetanus third dose, IPV1: Inactivated poliovirus vaccine first dose, MCV1: Measles containing vaccine first dose, HEP3: Hepatitis B vaccination third dose, HEPBB: Hepatitis B vaccination birth dose

Country	BCG	DTP1	DTP3	IPV1	MCV1	HEPB3	HEPBB
Algeria	99	96	91	94	80	91	99
Angola	56	57	45	37	36	41	
Benin	88	84	76	76	68	76	71
Botswana	98	98	95	95	97	95	
Burkina Faso	98	95	91	91	88	91	
Burundi	95	96	94	94	90	94	
Cabo Verde	98	93	93	94	95	94	96
Cameroon	77	76	69	69	62	69	
Central African Republic	61	54	42	44	41	42	
Chad	67	73	58	59	55	58	
Comoros	96	95	85	84	82	85	
Congo	81	81	77	74	68	77	
Cote d'Ivoire	93	85	76	76	68	76	66
Democratic Republic of the Congo	67	81	65	68	55	65	
Equatorial Guinea	85	77	53	53	53	53	
Eritrea	97	97	95	95	93	95	
Eswatini	97	86	77	74	80	77	
Ethiopia	68	70	65	65	54	65	
Gabon	86	76	75	74	64	75	
Gambia	81	82	82	82	79	82	25
Ghana	99	99	98	98	94	98	
Guinea	72	62	47	47	47	47	
Guinea-Bissau	34	81	67	28	63	67	
Kenya	97	99	91	91	89	91	
Lesotho	96	92	87	87	90	87	
Liberia	81	81	66	64	58	66	
Madagascar	52	65	55	57	39	55	
Malawi	89	95	93	92	90	93	
Mali	83	82	77	77	70	77	
Mauritania	79	75	68	62	63	68	
Mauritius	95	93	92	93	77	92	
Mozambique	79	67	61	70	84	61	
Namibia	99	97	93	76	90	93	86
Niger	95	94	82	82	80	82	
Nigeria	75	70	56	56	59	56	52
Rwanda	89	90	88	88	87	88	
São Tomé and Príncipe	93	97	97	93	77	97	69
Senegal	87	87	85	86	87	86	78
Seychelles	99	99	94	98	94	94	
Sierra Leone	74	94	92	93	87	92	
South Africa	86	91	86	86	87	86	
South Sudan	52	51	49	39	49	49	
Togo	98	88	83	83	70	83	
Uganda	83	97	91	90	90	91	
United Republic of Tanzania	75	82	81	81	76	81	
Zambia	92	94	91	80	90	91	
Zimbabwe	88	93	86	86	85	86	
African Region	**78**	**80**	**71**	**70**	**68**	**71**	**17**

World Health Organization

African Region

UHC/UCN

Universal health coverage/Communicable and noncommunicable diseases