BOTSWANA NEGLECTED TROPICAL DISEASES (NTDs) MASTER PLAN

2023-2027

MINISTRY OF HEALTH, BOTSWANA

CONTENTS

TABLE OF FIGURES

TABLE OF CONTENTS FOR TABLES

ACRONYMS

ADR -	Adverse Reaction
AIDS -	acquired immunodeficiency syndrome.
ALB -	Albendazole
BNTP-	Botswana National Tuberculosis Programme
CM -	Case Management
CMS -	Central Medical Store
CSO -	Central Statistical Office
DHMT -	District Health Management Team
DRU-	Drug Regulatory Unit
EDC -	Epidemiology and Disease Control
FECT -	Formal Ether Concentration Technique
GDP-	Gross Domestic Product
HAT -	Human African Trypanosomiasis
HIV -	Human Immunodeficiency Virus
ICT-	Immunochromatographic
IDSR -	Integrated Disease Surveillance and Response
IRS -	Indoor Residual Spraying
ITECH-	International Training and Education Centre for Health
ITNs -	Insecticide Treated Nets
KK -	Kato Katz
LF -	Lymphatic Filariasis
MB -	Multibacillary
MDA -	Mass Drug Administration
MDT -	Multi-Drug Therapy
MO -	Medical Officer
MOH -	Ministry of Health
NGO -	Non-Governmental Organization
NTD -	Neglected Tropical Diseases
PB -	Paucibacillary
PCT -	Preventive Chemotherapy
PHC -	Primary Health Care
PI-	Principal Investigator
POA -	Plan of Action
QC-	Quality Control
SAE-	Severe Adverse Events
STH -	Soil transmitted helminths

TA-	Technical Advisor
TRA -	Trachoma Rapid Assessment
UFT -	Urine filtration Technique
UN -	United Nations
UNICEF -	United Nations Children's Fund
VIP -	Ventilated Improved Pit latrine
WASH-	Water, Sanitation and Hygiene
WFP -	World Food Programme
WHO -	World Health Organization

Key Definitions

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

Elimination (interruption of transmission): Reduction to zero of the incidences of infection caused by a specific pathogen in a defined geographical area, with minimal risk of reintroduction, because of 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 incidences of infection caused by a specific pathogen, because of deliberate efforts, with no risk of reintroduction.

Hygiene: Conditions or practices conducive to maintaining health and preventing disability.

Integrated vector management: A rational decision-making process to optimize the use of resources for vector control.

Mass drug administration: Distribution of medicines to the entire population of a given administrative setting (for instance, state, region, province, district, sub district or village), irrespective of the presence of symptoms or infection; however, exclusion criteria may apply. (In this document, the terms mass drug administration and preventive chemotherapy are used interchangeably.)

Morbidity: Detectable, measurable clinical consequences of infections and disease that adversely affect the health of individuals. Evidence of morbidity may be overt (such as the presence of blood in the urine, anemia, chronic pain, or fatigue) or subtle (such as stunted growth, impeded school or work performance or increased susceptibility to other diseases).

Monitoring and evaluation: Processes for improving performance and measuring results to improve management of outputs, outcomes, and impact.

Platform: Structure through which public health programs or interventions are delivered.

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. (in this document, the terms preventive chemotherapy and mass drug administration are used interchangeably.)

PREFACE

Neglected tropical diseases are diseases of the socio-economically disadvantaged and neglected people living in abject poverty. They include schistosomiasis, soil transmitted helminths (STH), trachoma, Human African Trypanosomiasis (HAT), leprosy, rabies, chagas disease, leishmaniasis, lymphatic filariasis, onchocerciasis, anthrax and plague to mention but a few. Some of these diseases are transmitted through contamination of the environment (schistosomiasis and STH). Others are zoonotic, being transmitted from animals to humans (anthrax, plague, rabies).

The world Health Organization has now specified 20 NTDs which are endemic in149 countries. They affect more than 1.4 billion people, contributing to loss in economy of billions of dollars annually. Although many can be prevented and treated cost-effectively, NTDs have in the past failed to attract global attention and elimination agenda until recently. The 73rd World Health Assembly (WHA73/8) endorsed a new roadmap (2030 NTD Global Roadmap) for the control and elimination of NTDs by 2030. The new roadmap is anchored on four strategic pillars namely: (i) Accelerating Programmatic action, (ii) Intensify cross-cutting approaches (iii) Operating Models and culture to facilitate country ownership. And (iv) Strengthening the resource mobilization, inter-sectoral collaboration for the elimination of NTDs. The new road map migrates from the siloed approach in control and elimination of NTD to more sustainable and cost-effective community centered program including integrated intervention strategies, government ownership and funding of the NTD program as well as coordination mechanism preferring multi -stake holder collaboration in control and elimination of NTDs for which one health concept is also central.

Other NTDs including schistosomiasis and STHs cause exacerbating morbidities especially in pre-school and primary school age children leading to impaired cognitive potential, reduced school performance and high unemployment rates and reduced socio-economic development of adults in the affected communities. Reduced growth as a result of impaired nutrition in pre-school and primary school age children is commonly associated with NTDs. Reproductive women with schistosomiasis are at greater risk of contracting HIV from their infected partners. Neglecting NTDs therefore results in deaths, unemployment, failed economy, compromised reproductive health and failure of any endemic country or region to achieve the Millennium Development Goals.

In response devastating impact of NTDs and the current global call for NTDs control, elimination, and eradication of some NTDs by 2030, Botswana with support from the World Health Organization, planned to review and update its NTD Master Plan aligning it with the new WHO country NTD Master Plan 2021-2025 Framework for Development. A situational analysis of endemic NTDs was therefore conducted to inform updating of the previous master plan.

Based on the desk review and surveys conducted in Botswana., neglected tropical diseases specified in Botswana include schistosomiasis, soil transmitted helminthiasis, trachoma, leprosy, anthrax, rabies, **Snakebites Envenoming, and Mycetoma**. HAT was endemic in the county but for over two decades now, no single case has been report leading to a belief that the disease has been eliminated. Scabies outbreaks have been recorded in some districts warranting its prioritization among other NTDs in Botswana in line with the global prioritisation of the same. Although Snake Bite Envenoming has not been mapped, snake bites reports are made annually some with high Case Fatality Ratios especially in the wake of limited availability of anti-venoms prompting the listing of this disease among the priority NTDs in Botswana.

Except for Schistosomiasis and STH that were mapped with technical support from WHO, other NTDs are suspected based on cases reported through the Botswana National Health System and these remain to be mapped.

The government of Botswana through the Ministry of Health, the Ministry of Education and Skills Development with support from the World Health Organization currently prioritize the control of all NTDs of Public Health Importance in the country and hence the collaboration has been achieved in developing this Master plan. The strategy is to map out the disease distribution and initiate effective control measures until the disease are eliminated in Botswana. The development of this Master plan involved inputs from the Ministry of Health, Ministry of Education and Skills Development, the Health Research Unit, Institute of Health Sciences, University of Botswana, Central medical stores, and expert advice from the World Health Organization. This tool will be used in conjunction with the NTD control policy in prevention and control of NTDs by all stakeholders throughout the country, thereby contributing to an effective national NTD control program. The document will be reviewed and revised as and when necessary to align it with any new developments.

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Ms Grace Muzila	Mr Ps Education
Permanent Secretary	**Permanent Secretary**
Ministry of Health	**Ministry of Education**

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The Neglected Tropical Diseases (NTDs) National Master Plan is the main strategic document for the NTD program prepared by the Ministry of Health in Botswana. In preparing the National Master Plan for the Elimination of Neglected Tropical Diseases (NTDs), the Ministry of Health (MoH) seeks to provide strategic lenses for NTD programming as a guiding framework at the disposal of decision makers, health and education professionals, planners, development partners and all other stakeholders. It is a comprehensive plan and roadmap for action towards the reduction of the heavy burden of NTDs in the country. The Ministry of Health is appreciating the government's technical leadership and funding support that led to the development of this plan.

The Communicable Diseases Control Division (CDCD) of the Ministry of Health (MoH) acknowledges all the efforts of organizations and individuals who contributed immensely to the successful completion of this third strategic plan of NTD (2023 -2027)

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EXECUTIVE SUMMARY

The Neglected tropical diseases affect the poorest of the poor communities where they exacerbate disease morbidities, disfigurement and negatively impact on economic development. NTDs specified by the World Health Organization which are also endemic in Botswana are: Based on the desk review and surveys conducted in Botswana., neglected tropical diseases specified in Botswana include schistosomiasis, soil transmitted helminthiasis, trachoma, leprosy, anthrax, rabies, Snakebites Envenoming, and Mycetoma**.** The Government of Botswana through the Ministry of Health, in response to the burden of NTDs endemic in the country and in aligning itself with the current global NTD road map 2021-2030, developed a new comprehensive NTD Master Plan to guide NTD programme activities. This multi-year framework for NTD control, elimination and eradication is an essential component for effective planning and implementation of sustainable NTD activities. It provides programme goals, objectives and a 5-year strategy based on extensive situational analysis of endemic NTDs.

This document provide direction from the current NTD position through situational analysis, where we want to be by 2027, being the NTD strategic agenda and an Operational framework showing how we plan to reach the destination of the NTD road map 2030. The NTD master plan prepares Botswana to control, eliminate and eradicate priority NTDs endemic in the country by 2027 with a view to contribute towards the improvement of quality of life of all the people of Botswana and ultimately resulting in Botswana free of NTDs by 2030.

This document shall therefore be used as a vehicle for state in planning for the country's fight against NTDs and further coordinate and strengthen partner support towards achievement of the intended objectives. It further outlines the targets for the year 2027, being the country's aspired period for the eradication and elimination of these diseases including control. To ensure relevance and reliability, these targets are drawn and, or aligned with the WHO's Thirteenth General Program of Work 2019 -2023 and the globally renowned sustainable development goals. The document also fortifies the need for the integration of the NTDs into the national health care system and their inclusion and visibility in the national health development plans.

The master plan encompasses four critical sections including the situational analysis in the country which also covers the national environmental contextual factors that pivotal in having a in-depth understanding of the country's disease profile, strategic agenda, purpose and goals which also set out the targets and milestones for the endemic NTDs in the country, operational framework which details the three fundamental shifts towards tackling NTDs and this is underpinned on the belief that same shall be achieved through increased accountability for impact and process indicators, integration and mainstreaming with other programs and finally budgeting for impact which provides estimates for the planned activities and justification thereof.

The Master plan further identifies the NTDs that are earmarked for elimination and control by the country. Leprosy is earmarked for complete elimination while rabies, trachoma, lymphatic filariasis, soil transmitted helminths and schistosomiasis have due to their transmission dynamics been identified as those which could be eliminated as public health problems. The other group of NTDs is targeted for control and these are scabies, snakebite envenoming.

INTRODUCTION

The African Region bears close to 40% of the global burden of neglected tropical diseases (NTDs). All the 47 countries in the Region are endemic for at least one NTD, and 36 of them (78%) are co-endemic for at least five of these diseases. Comprehensive multi-year plans for the control, and elimination (and eventual eradication of all NTDs) that are relevant in country, called *NTD Programme Master Plans*, are essential strategic documents for governments to effectively plan and implement sustainable NTD programmes in the African region. Each national NTD programme's comprehensive multi-year plan (the NTD Master plan) provides programme goals, objectives and year strategy based on extensive situation analysis, and addresses all components of the NTD programmes relevant to the country. It enhances synergies among various NTD initiatives, provides the basis for integrated or linked NTD project plans and includes costing and financing requirements for effective NTD programme performance. The country NTD Master plan will also form the basis for harmonized implementation and performance monitoring of all NTD interventions in a country.

Among the WHO NTDs portfolio Botswana is endemic to SCH, STH, Leprosy and Scabies, snakebite envenoming in some areas. By impairing the physical and intellectual capacities of the affected persons and because they thrive in areas where access to quality healthcare, clean water and sanitation is limited, NTDs perpetuate a cycle of poverty. Botswana with its technical support from WHO produced this third generation NTD master plan, following extensive review of the current mapping data for endemic NTDs. This master plan is aligned to 2021 to 2030 NTD road map and the current country NTD master plan guide 2021 to 2025: framework for development. The momentum to control of NTDs in Botswana is inspired by the emerging understanding that for every treatment US$1 invested in preventive chemotherapy for NTDs, the net benefit to individuals could be up to US$25.00 in averted out -of- pocket payment and lost productivity representing a 30% annualized of return (WHO.2020).

Below is the NTD masterplan key content explained in figure 1. The NTD masterplan in management cycle is described in figure 2 whilst Figure 3 explains the whole matrix of NTD master plan process.

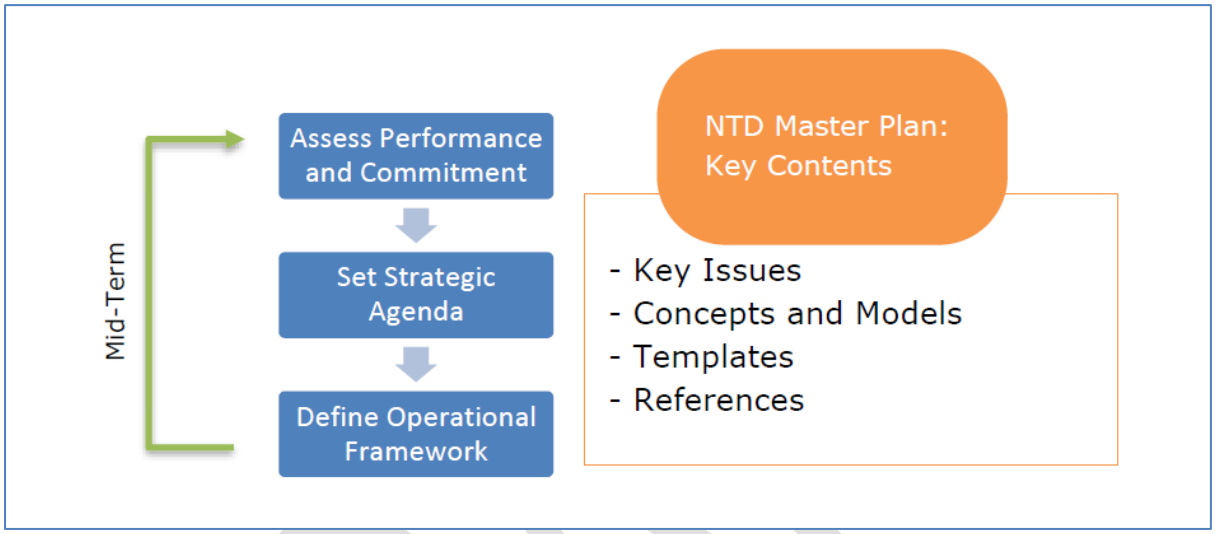


Figure 1: NTD Master Plan Key Contents

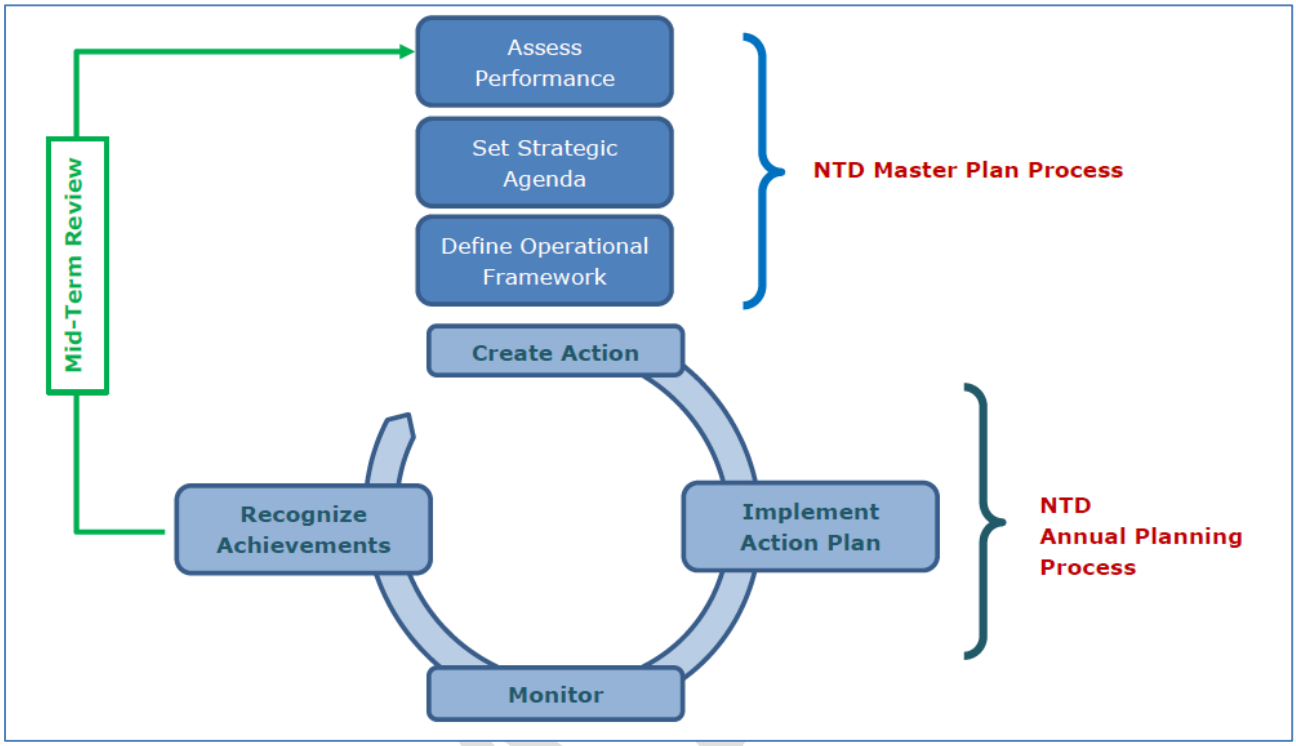


Figure 2 : NTD Master Plan: Process and Management Cycles

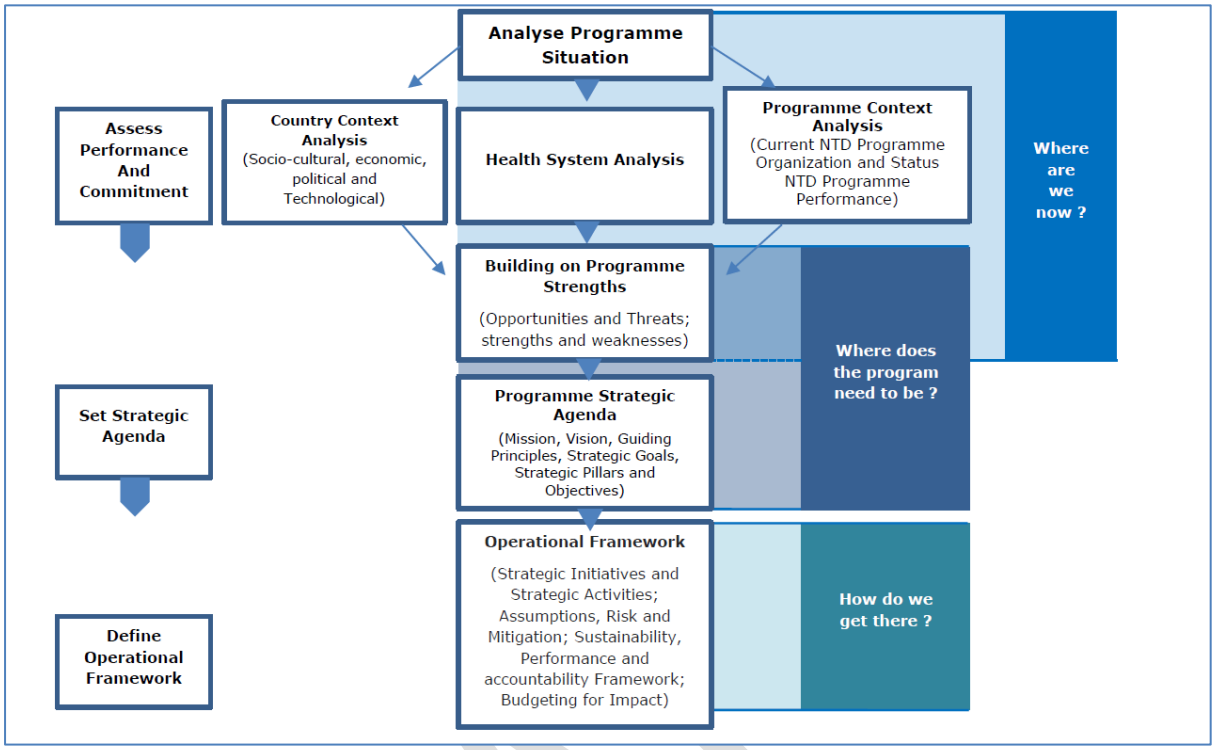


Figure 3 : NTD Master Plan Process

NTD Master Plan Tools

Table 1 describes the NTD master plan tools.

Table 1: NTD Master Plan Tools

KEY AREA	TOOLS
Country Context Analysis	PEST ANALYSIS
Health System Analysis	6 Building Blocks
Programme Context Analysis	Prog. Results and Impact Trends Analysis; Gap Assessment; Structure and Functional Review
Building on Programme Strengths	SWOT Analysis
Programme Strategic Agenda	Mission Statement; Vision, Guiding Principles and Goal Statements; Targets sets; Milestones Charts; 3-level Hierarchy of Objectives. Master Plan Strategic Logic Map
Operational Framework	Operations Planning Tools; Programme Strategic Shifts; Programme Culture and Dual Operating Model; Partnerships Matrix; Coordination Mechanisms chart and TOR; Risk Likelihood and Impact Matrix; Assumption and Risk Register; Risk Mitigation Plan; M&E Framework; Balanced Scorecard; Budgeting Tools

PART 1: NTD SITUATION ANALYSIS

Section 1.1. Re-assessment of National Priorities and the National, Regional and Global NTD Commitments

Neglected tropical diseases (NTDs) are ancient diseases of poverty that impose a devastating human, social and economic burden on more than 1 billion people worldwide, predominantly in tropical and subtropical areas among the most vulnerable, marginalized populations.

The Neglected tropical diseases affecting more 1 billion people living in extreme poverty worldwide include 20 diseases or groups of diseases: Buruli ulcer, Chagas disease, Dengue, chikungunya, Dracunculiasis, Echinococcosis, Foodborne trematodiases, Human African trypanosomiasis, Leishmaniasis, Leprosy, Lymphatic filariasis, Mycetoma, chromoblastomycosis and other deep mycoses; Onchocerciasis, Rabies, Scabies, other ectoparasitoses; Schistosomiasis, Soil-transmitted helminthiases, Snakebite Envenoming, Taeniasis, cysticercosis, Trachoma and Yaws. They cause debilitating and disabling condition and are associated with intense stigma and promote the cycle of poverty. Table 1,1 is a summary of NTDs endemic in Botswana.

Summary of NTDs endemic in Botswana

Table 1.1 describes NTD endemic or suspected in Botswana.

Table 1. 1 NTDs endemic in Botswana

Preventive Chemotherapy NTDs	Case management Diseases
Schistosomiasis	**leprosy,**
Trachoma	**Scabies**
Soil transmitted helminthiasis	**Rabies**
	Snakebites Envenoming
	Mycetoma
	Anthrax,

Strategies for the control of NTDs

Neglected Tropical Diseases can be controlled and eliminated through the implementation of five evidence-based interventions: preventive chemotherapy, innovative and intensified disease management, vector control, veterinary public health measures for zoonotic diseases and clean water and sanitation facilities. Effective delivery of these interventions has been recognized as a marker of progress towards the realization of universal health coverage in the Sustainable Development Goals 2015-2030. This is exemplified through SDG 3.3.5 which measures the number of people requiring interventions against NTDs including preventive chemotherapy.

Whilst various strategies do exist for elimination of NTDs, Botswana, like many other NTD endemic countries, has not yet fully embraced domestic funding specifically towards control and elimination of NTDs although it is notable that domestic financing when increased for NTD control, chances of meeting global targets on NTDs will be enhanced. Currently NTDs are not accounted for in the annual national budgets for health as they have not yet been mainstreamed into the National Health system.

National health development goals

National Development Plans (NDPs) and strategic sector plans guide Botswana's health sector. The overarching plan, the National Vision 2036, is implemented through a series of medium-term National Development Plans (NDPs). The current plan, NDP 11, runs from April 2017 to March 2023. The plan includes various health sector priorities: strengthen health promotion interventions; household food security and nutrition; prevention of non-communicable diseases; universal coverage of essential health services; and promotion of mental health. The Integrated Health Services Plan for 2010-2020 (IHSP) also guides health sector strategic priorities.

Objectives of the Integrated Health Services Plan

- To scale up utilization of an essential health service package
- To redefine the existing service delivery levels
- To Increase and strengthen partnership with the private sector and NGOs.
- To involve all community-based groups (effective demand)
- To promote community participation in the planning and delivery.

Below are Botswana's critical national health commitments which are favourable for the accelerated control, elimination as public health problem, elimination and eradication of NTDs endemic in the country once the NTDs are fully mainstreamed into the National Health System.

Botswana's commitment to Universal Health Coverage

Like many countries, the Government of Botswana, through its long-term development strategies that is Vision 2036, National Development Plan 11, National Health Policy (2011), has committed to the goal of Universal Health Coverage. The revised National Health Policy (2011) for Botswana envisions "an enabling environment whereby all people living in Botswana have the opportunity to achieve and maintain the highest level of health and well-being" (MOHW; 2011). To realize this vision, the country is striving to achieve universal health coverage for current and future generations, and to finally bring the HIV/AIDS epidemic under control. Health Financing is one of the key elements of UHC. Botswana's commitment to the UHC goal is evidenced by its current health system which is built on a financing mechanism that has in many ways a solid base i.e. the financing system in Botswana is an essential constituent of a strong public financing that has enabled Botswana to develop a robust health system where affordability of health services have been largely guaranteed. The positive health system achievements that have been observed in Botswana's health system are demonstrated by key indicators, such as the level of out-of-pocket (OOP) spending which accounts for only around 4% of total health expenditure implying that in Botswana financial protection is guaranteed as such people do not face financial barriers in accessing health services and do not face financial hardship for having to pay directly for the health services they need (Land scape analysis Botswana. 2020).

Essential service coverage is another dimension used to track progress towards (UHC). In Botswana, geographic distribution and access to health facilities is largely guaranteed, with coverage estimated at 96 percent and 89 percent of the population living within the 8km radius to the nearest health facility in urban areas and rural areas respectively (Republic of Botswana, Central Statistics Office 2007). The greatest challenge to UHC remains in rural areas, where improved access has not necessarily translated to utilization of high-quality services. Despite the country's efforts to ensure the shortest distance to the nearest facilities, challenges related to availability of the essential services including essential medicines and shortages of health workforce at health facilities remain some of the challenges and hinder the country's progress towards UHC. Disparities in availability of services at the different facilities, particularly those in remotest areas of the country also threatens health service provision in Botswana (Land scape analysis Botswana. 2020).

Botswana's Vision 2036 (2017-2036)

Following and building on the Republic of Botswana's first national vision 2016 (1966-2016), the Vision 2036 outlines the transformational agenda that defines Botswana's aspirations and goals for its people. With the aim of 'Achieving Prosperity for All" the vision is anchored on seven Pillars, within which the UHC agenda fits on the vision's Pillar 2 of Human and Social Development, where the Government of Botswana has made recognition that it is the responsibility of the state to guarantee access to health care services of the highest standard

attainable, specifically aiming to reduce HIV/AIDS to minimal levels as well as tackling Non-Communicable Diseases for Batswana to live longer and healthy lives (Land scape analysis Botswana. 2020).

Botswana's National Development Plan 11 (2017-2023)

The National Development Plan (NDP 11) is the first medium term plan towards the implementation of the country's Vision 2036, running from April 2017 to March 2023. Taking into consideration the development challenges facing Botswana, the NDP 11 advocates for various policies and strategies for all sectors of the economy to promote the country's development as well as give the estimated financial resources that are likely to be available to Government, as well as their proposed allocations between the recurrent and development budgets. For the health sector, four strategic approaches to health service delivery during the NDP 11 period include strengthening prevention interventions; improvement of access to quality health care services for all; strengthening rehabilitation services; and sustainable health and health care services for all (Land scape analysis Botswana. 2020). Strategies for strengthening preventative health care services include strengthening collaborative partnerships and addressing social determinants of health in all sectors through an engagement of civil society organizations and non-state actors in health sector response; addressing key drivers of the HIV epidemic such as gender based violence, substance abuse and other social ills; revitalizing the primary health care approach including decentralization and enhancing structures at district level on primary health, strengthening integration and coordination of services; promotion of healthy life style to increase public ownership and responsibility on health issues and reducing morbidity and mortality from preventable diseases; adequate provision of nutrition and ensuring food security; promotion of good sanitation and use of potable water; and promotion of gender and age sensitive health care services (Land scape analysis Botswana. 2020). Strengthening integration and coordination of services, promotion of healthy lifestyle to increase public ownership and responsibility on health issues and reducing morbidity and mortality from preventable diseases, promotion of good sanitation and use of potable water are key strategies specified in the 2021-2030 NTD Road map for successful and sustained elimination and eradication of NTDs.

Botswana's National Health Policy (NHP) 2011-2021

The National Health Policy (2011) guides the health sector in Botswana. The Integrated Service Plan (IHSP) was developed as the health sector's strategic guiding document for implementation of the NHP. The NHP and IHSP have outlined reforms in critical areas of service delivery, human resources for health, healthcare financing, health management information systems, governance and leadership. The IHSP describes the goal of service delivery as the attainment of universal coverage of a high-quality essential health services

package through: (a) scaling up utilization of a well-defined and comprehensive essential health service package; (b) redefining existing service delivery levels and delineating types of health services for each level of the health care to ensure continuity and harmonized referral and supervisory functions; (c) increasing and strengthening partnerships with the private sector and NGOs; (d) community involvement to ensure effective demand for health services; and (e) promoting community participation in the planning and delivery of health services (Land scape analysis Botswana. 2020). This policy embraces sustainable strategies such as (multi-sectoral collaboration and government ownership of NTD programme), for the elimination, eradication specified in the 2021-2030 NTD Roadmap.

Botswana National Health Financing Strategy 2019-2023: Towards Universal Health Coverage (2018)

The Health Financing Strategy 2019-2023 outlines the Government of Botswana's (GOB) plan for building its health financing structure. The strategy has its foundations in the country's vision 2036 which aspires guaranteed access to health care services of the highest standard attainable to Batswana, specifically aiming to reduce HIV/AIDS and Non Communicable Diseases, the National Development Plan (NDP) 11 which calls for a heath financing strategy to enable a "sustainable heath financing system to achieve the principles of financial protection, high efficiency levels, equity, and quality" and the National Health Policy (NHP), whose financing goal is to "raise and allocate sufficient resources and putting in place appropriate payment arrangements to ensure that all people living in Botswana have access to a range of cost effective health interventions at an affordable price regardless of their economic status". The policy calls for the Ministry of Health and Wellness (MOHW) to "develop a health financing strategy that will guide the financing of the entire health sector and the attainment of universal coverage of a high-quality package of essential health services. The development of the strategy came upon the realization that the country faces an increase in the resources needed to address critical health issues (Land scape analysis Botswana. 2020). National health financing by the Government of Botswana creates an enabling environment for the universal health and hence for equity in access to essential health packages which leaving no one out and hence no NTD uncontrolled.

Global, regional and national commitments on NTDs

The Regional Strategy on Neglected Tropical Diseases in the WHO African Region (document afr/rc63/10); AFR/RC63/R6, Sept. 2013

The Regional Committee,
Having examined the document entitled "Regional Strategy on Neglected Tropical Diseases (NTD) in the WHO African Region" and the related Regional NTD strategic plan 2014-2020.

Recalling the commitment that ministers of health of Member States of the African Region made during the Fifty-ninth session of the Regional Committee, the sixth Conference of African Union Ministers of Health, as well as resolution WHA 66.12 on scaling up proven interventions against the major NTDs;

Cognizant that the African Region bears a very high burden of neglected tropical diseases (NTDs) which pose a threat especially to the poorest and most marginalized communities and hamper socioeconomic development.

Urged member states:

(a) to provide leadership and ensure ownership in establishing and strengthening integrated national NTD programmes and national NTD coordination mechanisms, while forging multisectoral collaboration to address functional gaps that constrain programme interventions and promoting linkages between NTDs and other health programmes.

(b) to strengthen planning and increase national financial commitments to achieving NTD targets and goals by including national NTD multi-year budgets into the national health sector budget, and promote the inclusion of NTDs in the post-2015 national development agenda;

(c) to rapidly scale up interventions and strengthen health systems to tackle NTDs at all levels and ensure regular monitoring and tracking of progress;

(d) to expand investment in research and development of medical products and the strategies to tackle NTDs;

It also urged Partners: to mobilize increased resources including medicines, funds and logistics and confirm long-term commitments to country NTD programmes, aligning their support with national priorities and NTD coordination mechanisms and structures.

The 66.12th World Health Assembly Resolution: WHA66.12, 2013

Recognizing that increased national and international investments in prevention and control of neglected tropical diseases have succeeded in improving health and social well-being in many countries,

Acknowledging the linkages between, and mutual supportiveness of, control and elimination of neglected tropical diseases and the global strategy and plan of action on public health, innovation and intellectual property.

Acknowledging also that expansion of activities to prevent and control neglected tropical diseases will need adequately resourced national programmes functioning within effective

health, education and other sectors in order to provide for an uninterrupted supply and delivery of quality-assured commodities and services, among other key observations.

Recognizing also the diversity of neglected tropical diseases, their causative agents and relevant vectors and intermediate hosts, their epidemic potential (such as for dengue, Chagas disease, human rabies of canine origin and leishmaniasis), and their morbidity, mortality and associated stigmatization urged member states to:

- to ensure continued country ownership of programmes for neglected tropical disease prevention, control, elimination and eradication.
- to further strengthen the disease surveillance system especially on neglected tropical diseases targeted for eradication.
- to expand and implement, as appropriate, interventions against neglected tropical diseases in order to reach the targets agreed in the Global Plan to Combat Neglected Tropical Diseases 2008–2015, as set out in WHO's roadmap for accelerating work to overcome the global impact of neglected tropical diseases and noting the London Declaration on Neglected Tropical Diseases by;
- ensuring that resources match national requirements and flow in a sustainable manner as a result of thorough planning and costing of prevention and control activities and detailed analysis of associated expenditures;
- enabling improvement of the management of the supply chain, through forecasting, timely procurement of quality-assured goods, improved stock-management systems, and facilitating importation and customs clearance.
- integrating neglected tropical diseases control programmes into primary health care services and vaccination campaigns, or into existing programmes where feasible, in order to achieve greater coverage and reduce operational costs;
- ensuring appropriate programme management and implementation through the development, sustenance and supervision of a cadre of skilled staff (including other sectors than health) at national, district and community levels;

The 2021-2030 NTD Road Map (2020)

The road map for neglected tropical diseases 2021–2030 is WHO's second proposal for preventing, controlling and, eliminating and eradicating neglected tropical diseases.

The WHO Global Roadmap for Neglected Tropical Diseases 2021-2030 proposed three strategic shifts that will facilitate accelerated progress towards control, elimination (interruption of transmission, and where possible eradication of NTDs namely, i) accelerating programmatic action with a focus on impact rather than progress measures; ii) intensifying cross cutting approaches and iii) changing operating models and culture to facilitate country ownership for NTD control.

The Seventy-Third World Health Assembly, WHA73; 13 November 2020

WHA73, having considered the report on neglected tropical diseases, and recalling resolution WHA66.12 (2013) on neglected tropical diseases, and WHO's Road map for accelerating work to overcome the global impact of neglected tropical diseases (2012–2020), and Member States' commitment to Sustainable Development Goal target 3.3, decided:

- to endorse, and urge Member States to implement, the new road map for neglected tropical diseases 2021–2030, "Ending the neglect to attain the Sustainable Development Goals: a road map for neglected tropical diseases 2021–2030";
- to request the Director-General to advocate for and provide technical assistance and guidance to Member States and partners in the implementation of, the new road map for neglected tropical diseases 2021–2030 towards reaching Sustainable Development Goal target 3.3.

The London Declaration on NTDs (2012)

In 2012, partners including the pharmaceutical companies, donors, endemic countries and non-governmental organizations committed themselves to: sustain, expand and extend programmes that ensured the necessary supply of drugs and other interventions to help eradicate guinea worm disease and help to eliminate by 2020, lymphatic filariasis, leprosy, sleeping sickness (Human African trypanosomiasis) and blinding trachoma;

- Sustain, expand and extend drug access programmes to ensure the necessary supply of drugs and other interventions by 2020 to control schistosomiasis, chagas disease, soil transmitted helminthiasis, visceral leishmaniasis, and river blindness (leishmaniasis), Advance Research and Development to through partnership and provision of funding to find next generation treatment and intervention of for neglected tropical diseases.
- To enhance collaboration and coordination on NTDs at national and international level through public and private multilateral organizations to work more efficiently and effectively together.
- Enable adequate funding with endemic countries to implement NTD programmes necessary to achieve these goals, supported by strong and committed health systems at national level;
- Provide technical support and tools and resources to support NTD endemic countries to evaluate and monitor NTD programmes.

The Addis Ababa NTD Commitment (2014)

The assembled Ministers of Health and Heads of Delegations used their unique voice to buttress the efforts of many others who have committed to fighting NTDs and combating global poverty; Whereas Ministers of endemic countries had endorsed and committed to

achieving the WHO Roadmap goals through passage of the WHA 66.12, and further committed to:

- Work to increase our domestic contribution to the implementation of NTD programs through the expansion of government, community and private sector commitments,

- Promote a multi-sectoral approach in the implementation of NTD program goals that improves national coordination, facilitates partner collaboration, and improves the management of technical and financial contributions,

- Ensure the adoption of both long-range strategic and annual implementation plans which are grounded by appropriate goals and detailed costs that drive and support NTD programs to achieve global targets,
- Report and use program data in a timely fashion to follow progress against program goals and to inform program planning and execution,

- Ensure that the implementation of NTD programs contribute to the strengthening the overall health system and vice versa.

The place of NTDs in the national health plan and the commitment of national authorities to the control, elimination and eradication of NTDs.

Botswanan Government through the Ministry of Health has recognized NTDs as a problem in the country, NTDs indicators forms part of the National Health Priority Indicators as per the HSP block. Like any other country Botswana had not yet managed to allocate domestic funding annually specifically for the NTD programme. MDA medicines have been donated by the World Health Organization resulting in the country having been able to conduct one round of MDA for schistosomiasis and another round of MDA for STH respectively. The programme falls under the Division of Epidemiology and Disease Control however, it does not have a full time Directorate, a sign showing the minimal recognition of the programme.

Purpose of the master plan

The Botswana NTD Master Plan (2023-2027) governs the prevention, control and, where feasible, elimination and eradication of neglected tropical diseases endemic in Botswana. It aligns with the NTD Roadmap '*Ending the neglect to attain the Sustainable Development Goals A road map for neglected tropical diseases 2021–2030*. The aim of this Master Plan is to be a tool for the government of Botswana to plan for all NTD programmes in the country which facilitate alignment among partners and stakeholders for a joint and complementary support to this country and to accelerate progress towards the prevention, control, elimination and eradication of all NTDs in Botswana. It provides all partners working on NTDs in Botswana with a harmonized tool that will facilitate joint support to this country.

The Master Plan outlines specific, measurable targets for 2027 for the eradication, elimination and control of all NTDs endemic in Botswana, as well as cross-cutting targets aligned with WHO's Thirteenth General Programme of Work 2019-2023, and the SDGs. It includes the strategies and approaches for achieving these targets, with cross-cutting themes for several diseases, and moves towards the prevention of infections and alleviation of the suffering of people affected by NTDs endemic in Botswana, as well as how this contributes to attaining the SDGs.

Progress in implementing planned activities as well as the programme performance and outputs will be monitored regularly and evaluated at appropriate intervals by the government. The strategic plan will be the framework for coordination, harmonization, and alignment of both central and sub-national governments, as well as partners. Therefore, consensus on the content will enhance commitment and accountability of all stakeholders for success in resource mobilization.

The integration of NTDs into the national health system is critical, therefore this NTD Master Plan will be integrated and reflected into the national health development plans.

This document is divided into three main sections: Operating Context, Programmatic Targets and Operational Framework. Figure 2 illustrates the NTD master plan development and revision process.

Section 1.2. National Context Analysis

1.2.1 Country Analysis

Botswana is a landlocked country in Southern Africa, sharing borders with South Africa to the south and south-east, Namibia to the west and north-west, Zimbabwe to the north-east and Zambia to the north. The country has a mean altitude of 1,000 meters above sea level, with a total land area of approximately 582,000 km^2, of which only 5% is arable. Most of the land consists of semi-desert scrubland, with the Kalahari Desert to the west. The mean annual rainfall ranges from 250 mm in the South-west to 650 mm in the North-east.

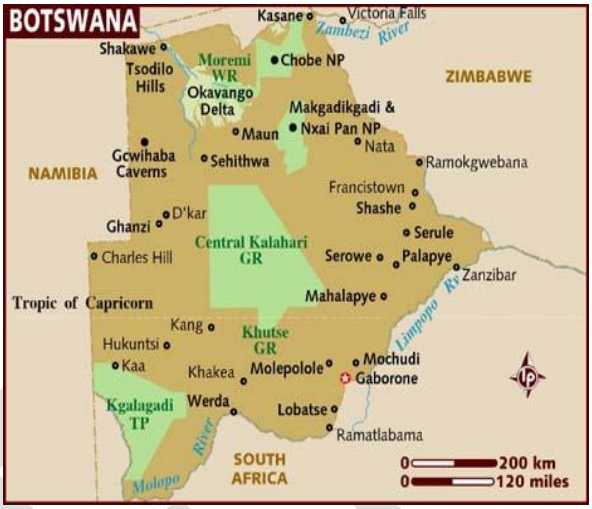


Figure 3. 1 : The map of Botswana and its neighbouring countries

Figure 3.2 shows the map of Botswana, and its neighbouring countries describes the political map of Botswana showing provinces and provincial capitals.

Political map of Botswana

Figure 3. 2 : Political map of Botswana showing provinces and provincial capitals.

Sources: https://ebird.org/region/BW/regions,

Administrative, Demographic and Community Structures

Based on the latest census (2021) Botswana registered a population of 2 359 609 persons, constituting an increase of 15.9% over the period between the two (2) censuses *(2 024 904, 2011 to 2 359 609, 2021)*, 45% of whom live in rural areas (The World Bank. 2017). The population density increased from 3.5 persons per square kilometre in 2011 to 4 persons per square kilometre in 2021. While the share of the population residing in cities and towns had been increasing between the previous censuses it has declined slightly between 2011 and 2021. Table 1.2 shows trends in distribution of population growth across localities from 2001 through 2011 to 2022. Generally, there is a marked increase in population growth.

POPULATION & HOUSING CENSUS	2022	2011	2001
Total Population	2,359,609	2,024,904	1,680,863
Cities			
Gaborone	289,703	231,592	186,007
Francistown	118,125	98,961	83,023
Major Towns			
Selibe Phikwe	45,542	49,411	49,849
Lobatse	26,056	29,007	29,689
Major Villages			
Mogoditshane	88,098	66,466	54,561
Maun	85,293	47,007	40,628
Molepolole	74,719	50,820	42,444
Tlokweng	55,517	43, 289	39,719
Serowe	55,484	60,263	43,776
Palapye	52,398	44,815	36,962
Mochudi	49,845	58,079	32,843
Kanye	48,030	44,815	36,962
Mahalapye	47,726	58,079	32,843

Table 1. 2 : Trends in population growth and distribution across localities in 2001, 2011 and 2022.

i. **The Political Situation in Botswana:**

Botswana has a unique record in Southern Africa as the country that adhered to multi-party democracy. Regular elections consistently deemed 'free and fair' have manifested that resilience. The bedrock of Botswana's democracy is embedded in the traditional Kgotla system. The Kgotla is a time-tested forum where issues of public policy are discussed openly by the community (Lekorwe *et al*., 2001). In a measure to widen the frontiers of democracy, in 1997 Botswana instituted electoral reforms that created an Independent Electoral Commission (IEC), reduced the voting age from 21 to 18 years, and created an absentee ballot. In its first three decades of independence, Botswana become a model of a working democracy. The constitution of Botswana created an executive presidency in which the President is both Head of State and Government. It provides for a unicameral legislature based on the Westminster parliamentary system in which Members of Parliament (MPs) are elected on the 'First-Past-The-Post' (FPTP) or 'winner-take-all' electoral system. There is also a lower chamber consisting of 15 non-elected members of the House of Chiefs that advises government on traditional and customary issues. It is the interface of these two institutions and the populace that has defined Botswana's democratic practice (Lekorwe *et al*., 2001).

Political instability and conflict can be barriers to progress in NTD programmes. It can also result in gaps in governance, diversion of NTD funding to other cause and difficulties for

implementation such as disruption of infrastructure, restricted access to local populations and risks for health care personnel (WHO. 2020). Botswana is a democratic state and has sound political stability since independence in 1966. The country has not experienced any civil war (unrest). This makes the country a suitable environment for uninterrupted implementation of successful NTD control, elimination and eradication programmes. Government poverty eradication initiatives are included in nation's long-term strategy, Vision 2036 and other National Development Plans, which outlines poverty eradication as one of the key policy deliverables. Botswana has government agencies dedicated to improving WASH conditions: the Ministry of Land Management, Water and Sanitation Services and The Ministry of Health. This Ministry has worked with the U.N. to participate in the Water Global Analysis and Assessment of Sanitation and Drinking Water (GLAAS) survey. Furthermore, since 2000, Botswana has improved basic sanitation by 25% according to UNICEF. Education in Botswana is free and there is a basic requirement for all comprising of primary and secondary education. Going forward, progression to tertiary is the merit selective and sometimes on individual choice as there is an option for vocational training. Hygiene is taught to students in elementary schools, but there is still a greater need for implementation and proper hygiene practices.

ii. Economic

Botswana is classified as an upper-middle-income country, with an annual GDP of more than $17,000, according to World Bank estimates. The government is spending significant resources on health, as evidenced by the fact that the government's health budget exceeds the "Abuja target" of 15 % of total government expenditures on health. But significant inequities in access to health services persist, and families continue to suffer from preventable and treatable health conditions. Botswana's macroeconomic policy framework is anchored in prudent macroeconomic policies and good governance, but despite having maintained positive political and economic levels over the years, challenges remain. Botswana's reliance on diamonds and a public sector-driven model makes the economy vulnerable to external shocks, as diamonds contribute over 80% of total exports and are a major source of fiscal revenues. This vulnerability was evident during the COVID-19 pandemic when the economy contracted by 8.7% in 2020 and fiscal pressures rose. Inequality in Botswana remains among the highest in the world, job creation lags, and unemployment is structurally high at 26% at the end of 2021. Economic growth rebounded to an estimated 12.1% in 2021. As the base effects from the pandemic shock fade, the World Bank projects moderate in 2022 of about 4.1%, driven by improvements in the global demand for diamonds, the easing of restrictions on mobility, and an expansionary fiscal stance, all supported by extensive rollout of COVID-19 vaccines. Below are the Botswana economic growth trends published in the African Economic Outlook (AOE), 2022.

Recent macroeconomic and financial developments

GDP expanded by 12.5% in 2021 as COVID-19 restrictions eased, from a contraction of 8.7% in 2020. Mining output rose with the global diamond market recovery. Non-mining output also expanded, particularly from public administration and defence, construction, and wholesale and retail. Aggregate demand rose in 2021 as the adverse COVID-19 impact on net exports waned, and the public expenditure increase prompted by the pandemic preserved consumption. Per capita GDP growth followed the GDP trend. The fiscal deficit, financed through borrowing and a reserves drawdown, widened to 6.2% of GDP in FY2020/21, with increased pandemic-related net expenditure. Public debt, at 18.6% of GDP in FY2020/21, remains sustainable. The Bank of Botswana's monetary policy stance was accommodative, with its policy rate at 3.75% in 2021. Average annual inflation in 2021 rose above the upper end of the central bank's range of 3–6%, reflecting higher fuel prices, value-added tax, and domestic demand. Botswana's financial sector is well capitalized. The capital-adequacy ratio averaged 19.8% in 2020, and 18.5% in August 2021, above the 12.5% prudential requirement. The NPL ratio fell to 3.7% in August 2021, from 4.5% in August 2020. The current account deficit, largely financed by offshore pension fund investments, narrowed to 1.9% of GDP in 2021, from 10.6% in 2020, as diamond prices and Southern African Customs Union (SACU) revenues rebounded (African Economic Outlook. 2022).

International reserves stood at $4.6 billion at end-November 2021 (10 months of import cover). Botswana received SDR 189 million in the IMF allocation (about $268.4 mil- lion; 1.6% of GDP), which is likely to be used to rebuild reserves or for budget support. Botswana has a relatively low poverty headcount ratio of 16.1% (2019) and high unemployment of 26.0% (quarter to December 2021).

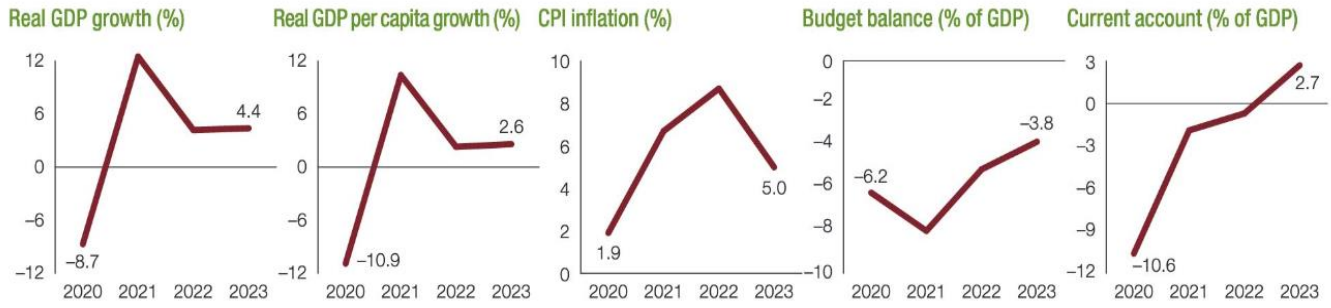
Growth rates

A critical factor in Botswana's success has been the prudent use of the country's natural resource wealth. The government showed great acumen in its negotiations with multinational corporations (first and foremost, De Beers). An almost overly cautious budget policy (and spending problems) led to regular budget surpluses. The country's infrastructure and educational facilities were systematically expanded. Despite a fundamental market orientation, and numerous efforts to privatize and diversify the economy, Botswana remains largely dependent on its diamond deposits, which are mainly mined by Debswana, a joint venture between De Beers and the government (Bertelsmann Stiftung, BTI 2022 Country Report). The 2008 Great Recession caused the shrinking of the economy by 5.4% in 2009 owing to plummeting diamond exports. Since 2010, the economy has shown signs of recovery: real GDP growth was 5.8% in 2013, 5.2% in 2014 and 0.3% in 2015. Economic growth rates for 2016 and 2017 were initially projected to be 3.5% and 4.1%, respectively (State of the Nation Address 2016), and were subsequently revised to 4.3% and 4.7%, respectively. In the 2018/19 budget, the government reported that it expected the economy to grow by 5.3% in 2018,

showing a positive recovery. Growth rates were also projected for 2019 and 2020 (2020/2021 budget speech), with the growth rate projected to be 3% in 2019 and 4.4% in 2020. However, owing to the COVID-19 pandemic, the economic growth rate was revised, with the economy projected to contract by 8.9% in 2020, although a 7.7% growth rate is anticipated for 2021 (State of the Nation Address 2020).

Outlook and risks

GDP growth is projected to moderate at 4.2% in 2022, supported by the continued pickup in economic activity and diamond prices, a successful COVID-19 vaccine rollout, and full implementation of the Government's Economic Recovery and Transformation Plan (ERTP). Headwinds include weaker diamond demand if the global economic recovery loses momentum, COVID- 19 variants, persistent drought, and effects of South Africa's weak economic growth on Botswana's exports and SACU revenues (African Economic Outlook. 2022). With the economy operating below full capacity up to the medium term, inflation is projected to revert to within the central bank's range in 2023. The fiscal deficit may narrow, as domestic revenues rise with the ERTP growth stimulus. The current account may register a surplus in 2023, with the revival of the diamond and tourism industries (African Economic Outlook. 2022).



Source: Data are as of April 2022 and are from domestic authorities; figures for 2021 are estimates and figures for 2022 and 2023 are projections by the African Economic Outlook team. The fiscal years start in the named April and conclude the end of March in the following year.

Figure 3.2: Economic growth rates (Source: African Economic Outlook (AEO) 2022)

iii. Social: Socially, the cultural beliefs differ from one place to another. There are highly mobile or nomadic tribes and there are also hard to reach communities. (Religious, nomadic, economic, hard to reach) there is disparity in receiving health care services**.**

Botswana lifestyle and culture

Botswana is filled with the most diverse ecological environment. With one of the most famous deserts in Africa, to one of the biggest deltas in the world. Culturally, Botswana is engrained in a solid cultural base that guides interactions between Batswana and with

the rest of the world. Although there are different tribes, there is a common thread that unifies Batswana.

The diamond driven economy has brought about much-needed development in terms of modern infrastructure. Like most African countries the culture and traditions of the Tswana people is infused in the architecture to bring out unique outstanding buildings that identify with the society.

All around the country you can learn the rich history of Botswana from its museums.

Some of these museums are, the Botswana National Museum in Gaborone, Kgosi Bathoen II (Segopotso) Museum in Kanye, Kgosi Sechele I Museum in Molepolole, Khama III Memorial Museum in Serowe, Nhabe Museum in Maun, Phuthadikobo Museum in Mochudi, and Supa Ngwano Museum Centre in Francistown.

Tswana people are friendly and are bound to greet you in the street even if they are not acquainted to you. It is part of their culture so do not be startled when you settle there.

Tswana people are celebratory people so you might come across a number of celebrations like marriage ceremonies, anniversaries, birthday parties, or even meet-ups/reunions between old friends. At these functions, often women ululate as a sign of excitement. When Tswana people gather to celebrate, they usually roast meat over an open fire and drink traditional beer or Kgalagadi Breweries Limited's St. Louis beer, Botswana's national beer that identifies with Botswana's rich history. Batswana are agriculturalists who treasure livestock, in particular sheep, goats, horses, and cattle. These are not only sources of food, clothing, and trade, but they are an indication of prominence in society. Meat is an essential part of the Tswana people as Botswana is a cattle country.

Most of their cuisines include meat therefore it comes as no surprise that the national dish seswaa is pounded meat made from goat or beef. Madila, fermented milk in a yogurt form is a very popular delight amongst the Tswana people, something you must-try during your stay in Botswana. Botswana's cuisines identify a lot with the cuisines of Southern Africa; therefore, you are bound to have the same types of foods when you travel across Southern Africa.

Botswana traditional music mainly consists of singing and rhythmic clapping of hands and stomping of feet. Doing this produces instrumental sounds that people can dance to and enjoy. This is very popular in many cultures and ethnic groups around Africa.

Botswana traditional music has numerous instruments such as setinkane, a small piano-like instrument, phala, a whistle, and meropa, drums that come in different forms shapes and sizes.

The traditional attire is worn during traditional ceremonies usually entails animal skin; material that has been used by the people as clothing.

Botswana Population growth and demographics, family size/ structure, migration, lifestyle trends,

This brief presents preliminary results of the 2022 Population and Housing Census which was conducted in March 2022. Although these results have been checked and verified to the extent possible, they are based on data that has not yet been fully edited and processed and are therefore subject to change. However, any changes that may occur following more extensive data processing are not expected to result in significant differences (Botswana National statistics 2022).

Population Size

The estimated population of Botswana from the 2022 Population and Housing Census is 2,346,179 as compared to 2,024,904 enumerated in the 2011 Population and Housing Census. Botswana population growth rate is 1.4% (Statistics Botswana 2022). Table 1.3 describes the Population, Household and Persons outside Botswana by Census Districts.

Table 1. 3: Population, Household and Persons outside Botswana by Census Districts (Source: Statistics Botswana 2022).

SN	District Code	Census Districts	2011 PHC Enumerated			2022 Population Projections	2022 PHC Enumerated				Growth Rate (%)
			Households	Population	H/Hold Size		Households	Population	H/Hold Size	Citizens Outside Botswana	
1	01	Gaborone	74,957	231,592	3.1	289,703	84,317	244,107	2.9	1,314	0.5
2	02	Francistown	31,297	98,961	3.2	118,125	34,299	102,444	3.0	323	0.3
3	03	Lobatse	9,214	29,007	3.1	26,056	10,001	29,457	2.9	100	0.1
4	04	Selebi_Phikwe	16,058	49,411	3.1	45,542	13,730	41,839	3.0	128	-1.6
5	05	Orapa	3,292	9,531	2.9	9,528	3,086	8,614	2.8	19	-0.9
6	06	Jwaneng	5,940	18,008	3.0	21,381	6,704	18,576	2.8	62	0.3
7	07	Sowa Town	1,191	3,598	3.0	4,518	1,113	2,901	2.6	6	-2.0
8	10	Ngwaketse	31,480	129,247	4.1	145,837	38,905	140,321	3.6	437	0.8
9	11	Barolong	13,758	54,831	4.0	63,086	16,642	58,394	3.5	344	0.6
10	12	Ngwaketse West	3,556	13,689	3.8	17,962	6,635	23,253	3.5	28	5.1
11	20	South East	23,990	85,014	3.5	118,602	36,977	111,474	3.0	547	2.6
12	30	Kweneng East	68,317	256,752	3.8	347,492	102,891	330,442	3.2	1,274	2.4
13	31	Kweneng West	12,231	47,797	3.9	56,312	16,171	57,261	3.5	73	1.7
14	40	Kgatleng	24,915	91,660	3.7	114,837	37,150	121,411	3.3	532	2.7
15	50	Central Serowe Palapye	46,187	180,500	3.9	212,885	57,958	201,775	3.5	492	1.1
16	51	Central Mahalapye	29,795	118,875	4.0	125,760	37,270	130,530	3.5	439	0.9
17	52	Central Bobonong	19,155	71,936	3.8	75,281	22,639	76,922	3.4	188	0.6
18	53	Central Boteti	14,110	57,376	4.1	68,613	21,654	74,099	3.4	98	2.4
19	54	Central Tutume	38,352	147,377	3.8	176,121	47,038	164,228	3.5	558	1.0
20	60	North East	15,865	60,264	3.8	73,790	21,145	68,910	3.3	274	1.3
21	70	Ngamiland East	21,736	90,334	4.2	113,275	32,366	120,603	3.7	436	2.8
22	71	Ngamiland West	13,164	59,421	4.5	71,263	18,225	73,122	4.0	74	2.0
23	72	Chobe	6,830	23,347	3.4	29,995	10,240	28,388	2.8	71	1.9
24	73	Delta	655	2,529	3.9	2,112	198	2,849	14.4	1	1.1
25	80	Ghanzi	11,354	43,095	3.8	57,320	15,698	55,396	3.5	226	2.4
26	81	CKGR	21	260	12.4	-	84	488	5.8	-	6.1
27	90	Kgalagadi South	7,956	30,016	3.8	34,618	9,989	35,160	3.5	178	1.5
28	91	Kgalagadi North	5,542	20,476	3.7	26,149	7,330	23,215	3.2	57	1.2
		Total	550,918	2,024,904	3.7	2,446,163	710,455	2,346,179	3.3	8,279	1.4

Population Growth

Botswana's population continues to grow, albeit at a decreasing rate. The population increased from 2,024,904 in 2011 to 2,346,179 in 2022 constituting an increase of 15.9 percent over the period between the two censuses. The annual population growth rate between 2011 and 2022 is estimated at 1.4 percent, indicating a decline from the 1.9 percent estimated in 2011. The current growth rate follows the previous trend showing a decline starting from 4.6 percent in 1981, 3.5 percent in 1991, 2.4 percent in 2001 to 1.9 percent in 2011. At the current rate of growth, Botswana's population will take approximately 58 years to reach double the current figure. A notable feature of this growth is the variations observed across the districts. The Census District of Ngamiland East recorded the highest growth rate at 2.8 percent followed by Kgatleng and Southeast with 2.7 and 2.6 percent respectively. The high growth rates for Kgatleng and Southeast Districts may be attributed to their proximity to Gaborone. The notable

growth in Ngamiland East Census District may be attributed to the tourism activities in that district. Worth noting also, is the 5.1 percent increase in population of the Ngwaketse West Census District which however is not due to growth but rather a result of a re-alignment of boundaries that annexed six villages previously (2011) located in the Kanye/Moshupa Census District, resulting in a surge in the population of Ngwaketse West. On the reverse side of growth, the Urban Districts of Sowa, Selebi Phikwe and Orapa recorded declines in their populations between the two census periods. The reasons for these declines may generally be related to the current state of mining activity and access of some mining towns in Botswana. This would be the closure of copper-nickel mine in the case of Selebi-Phikwe and the reduced soda-ash mining activity in the case of Sowa. Limited access applies in the case of Orapa as it is a closed town, hence its potential for growth is curtailed. Further, the microcosm of Letlhakane acts as a proxy to individuals seeking accommodation and business opportunities related to diamond mining activities in areas near Orapa, explaining its rapid growth to be one of the ten largest villages in Botswana (Statistics Botswana, 2022).

Average Household Size

The household size denotes the ratio of the total population to the total number of households. The national average household size is estimated to be 3.3 persons per household as opposed to 3.7 persons per household recorded in the 2011 Population and Housing Census. The results also depict a general decline in the average household size across districts when compared to the 2011 household sizes. Across the census districts, the average household size ranges from 2.6 persons per household in Sowa to 4.0 persons per household in Ngamiland West. The mean average household size across the districts is 3.3 persons per household and the median is 3.8 persons per household. Cities and towns show an average household size which is less than 3.1 persons whereas for other districts it goes up to 4.0 persons. Comparing the urban census districts, Selebi-Phikwe and Francistown tend to have larger average households, while those in Orapa and Jwaneng tend to be smaller with 2.8 persons per household each. Gaborone and Lobatse each have an average of 2.9 persons per households. However, the smallest household size as stated above is found in Sowa town (Table 1.3)

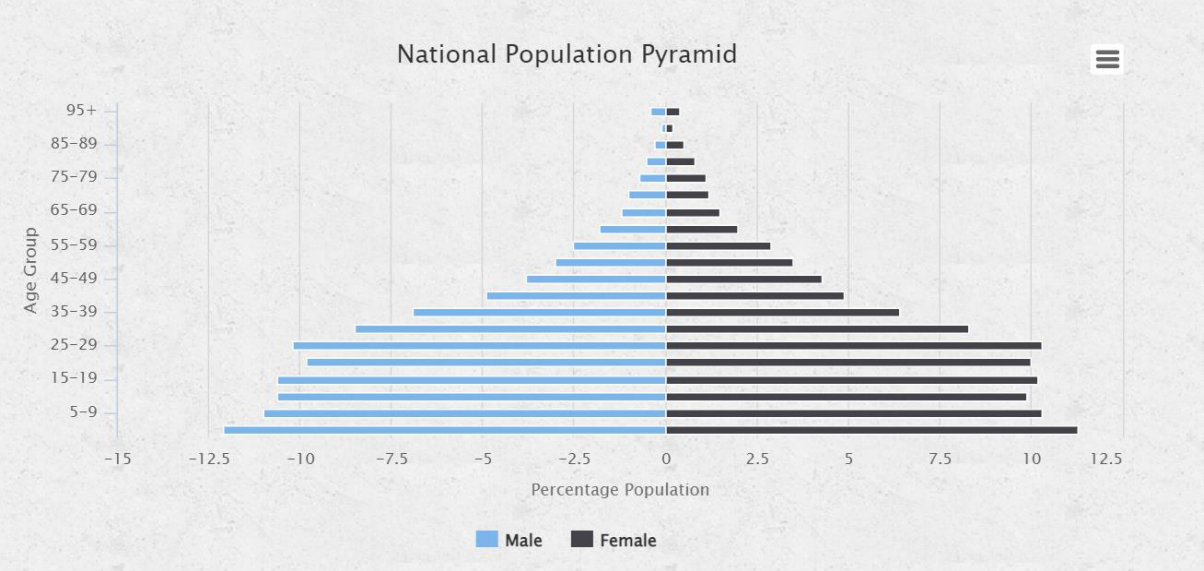


Figure 1.4: Botswana National population pyramid (source: Census Botswana 2022)

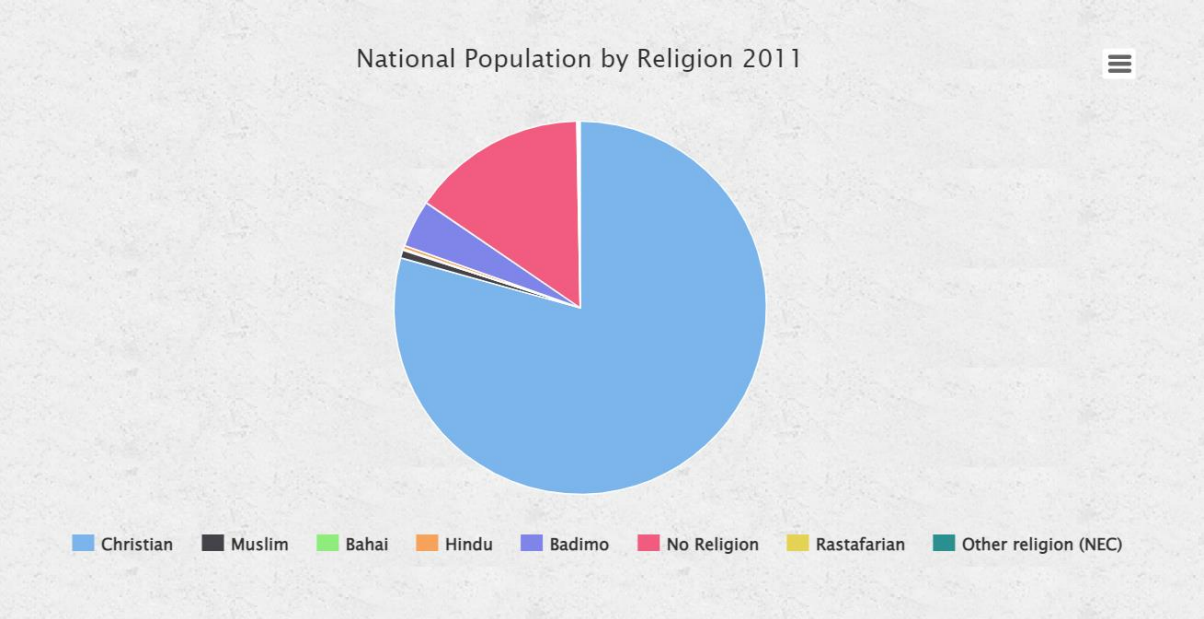


Figure 1.5: Population growth by religion (Source: Census Botswana 2022)

Migration

- The current net migration rate for Botswana in 2022 is **1.244** per 1000 population, a **1.89% decline** from 2021.
- The net migration rate for Botswana in 2021 was **1.268** per 1000 population, a **1.93% decline** from 2020.
- The net migration rate for Botswana in 2020 was **1.293** per 1000 population, a **1.82% decline** from 2019.
- The net migration rate for Botswana in 2019 was **1.317** per 1000 population, a **1.79% decline** from 2018.

(Sources: https://www.macrotrends.net/countries/BWA/botswana/net-migration)

iv. Technological: it is estimated that mobile telephony networks cover at least 95% of the population with varying network capabilities of 2G,3G,4G and 5G. The Economic Recovery and Transformation Plan (ERTP) and the recent Reset Agenda prioritize digital transition as it has the potential to enable high productivity and competitiveness. On the other hand, through the ministry of health e-health strategy which provides a fresh impetus for improving service delivery and achieving health outcomes for all people across all levels: Central, district, facility and community. The strategy influence adoption of recent technologies which include Mhealth concept as well digitisation of all data collection processes. For instance, DHIS 2 and provision of smart cell phones, but it should be noted that in certain areas for easy communication with physicians. Botswana has rolled out WIFI connectivity in every health facility except in remote areas without electricity connection. In remote areas where there is no electricity connection, the government has provided solar panels and chargeable telephones for easy communication.

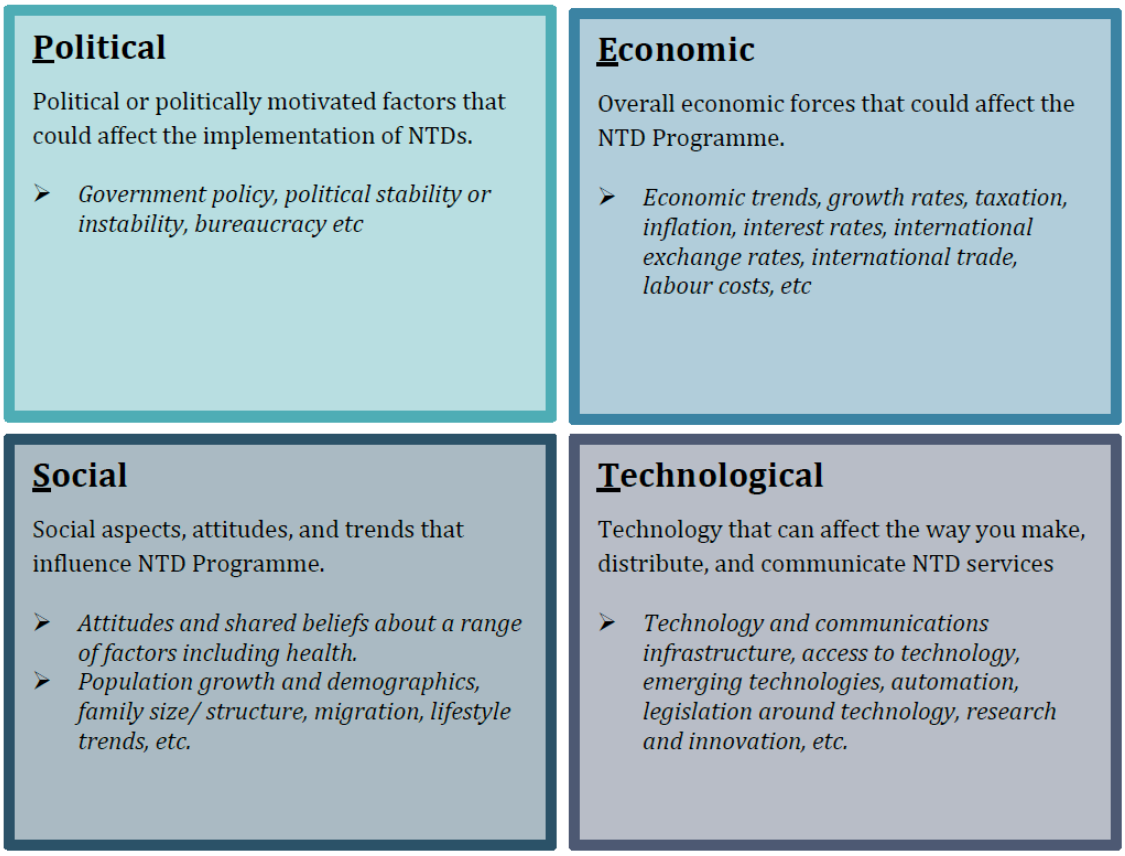
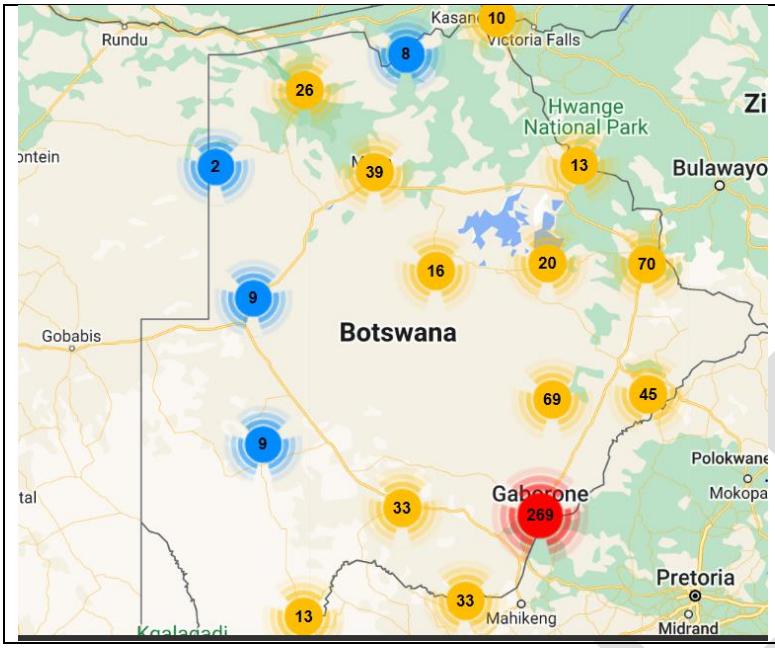


Figure 4 : The PEST analysis

1.2.2. Health Systems Analysis

The health system of Botswana is guided by Essential Health Services Package (EHSP) which has the overall objectives: Attainment of universal coverage of high-quality package of essential health services and to promote a redistribution of health services by providing equitable access, especially in underserved areas, population etc.

Botswana health services are delivered in public, private for-profit, private non-profit and traditional medicine practice settings. The public sector is the main provider of services delivered through a network of health facilities using the primary health care approach. Other health care providers complementing the public sector are faith-based organizations (two district hospitals), mining companies (three hospitals) and a few non-governmental organizations. The health facilities are spread over 27 health districts operated by the district health management teams. Development activities are demand driven, community based and of a level to provide a healthy environment which is a human right.



Health facilities are distributed around the country, across all health districts.

Figure 4.1: Administrative Map Botswana showing distribution of Health Care Facilities.

The health care delivery system is based on the primary health care model with health care being accessible and affordable to all people through a user fee of P5.00. Through a network of health facilities ranging in sophistication from referral hospital at the highest level through district and primary hospitals at the middle level, to health posts and mobile stops at the lowest level, 96% of the urban population lives within 8 km of a health facility. In addition to the network of health facilities, there are over 800 mobile services to populations in remote areas or those outside the 8 km radius of a health facility.

Table 1.4: Percentage of population with access to primary care services.

	Between 8 and 15 km	Between 5 and 8 km	Within 5 km
Urban	n.a.	4	96
Rural	11	17	72
Total population	5	11	84

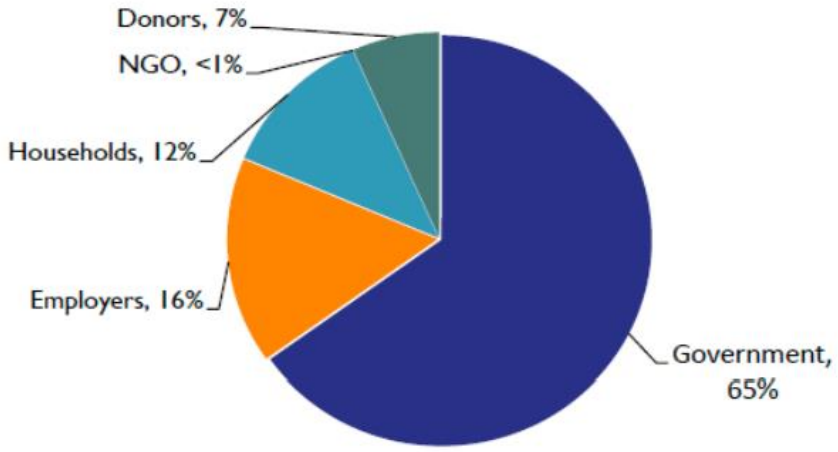
Source: Statistics in brief. Gaborone, Government of Botswana, Central Statistics Office, May 2017

Table 2. Six Health System Building Blocks

Service delivery	Botswana runs a pluralistic health care system (a mix of public, private for profit, non-profit Non-Governmental Organization, and traditional practices). The public sector dominates the health system, with more than 80% of services accessed through a network of public health facilities based on the primary health care model (Republic of Botswana, Ministry of Health 2009, Botswana Health and HIV/AIDS and Public Expenditure Review. 2016, Botswana Budget Brief. 2020). The public health infrastructure is widely distributed with facilities ranging from health posts and mobile stops to tertiary hospitals. The national health delivery system, in line with Botswana's Ministry of Health and Wellness 'Integrated Health Services Plan' (IHSP), consists of six levels: 3 tertiary (referral) hospitals (Francistown, Gaborone, Lobatse), 18 general hospitals, 17 primary hospitals, 318 clinics (104 with beds), 347 health posts, and 973 mobile stops, with services delivered by 830 doctors, and 7427 nurses (Statistics Botswana. 2017). Medical Doctors increased from 888 in 2019 to 906 in 2020 whilst the Nurses increased from 7,663 to 7,679. The health facilities are operated by the Ministry of Health and Wellness (MOH), private institutions, faith-based organisations and mining companies. A doctor to patient ratio is 3.8/10,000 (World Health Organisation. 2018). About 96 percent of the population lives within an eight-kilometre radius of a health centre. The greatest challenge to UHC remains in rural areas, where improved access has not necessarily translated to utilization of high-quality services. Coverage in rural areas is estimated at an average of 89 percent of the population living within the 8km radius to the nearest health facility compared to urban areas with 96% (Republic of Botswana, Central Statistics Office. 2007). The service delivery philosophy is based on providing quality affordable health services to the nation. Health care is delivered through a decentralized model with primary health care being the pillar of the delivery system. Botswana's extensive network of health facilities compliment of preventive, promotive and rehabilitative health services as well as treatment and care of common problems.
Health workforce	Unavailability of qualified staff remains one of the major bottlenecks towards the availability of quality health care in Botswana. The training of health care professionals is provided for by a combination of in-country and out-of-country institutions, with a heavy reliance on out of country arrangements. These health workforce shortages in Botswana have created major gaps in the availability of quality healthcare because of factors such as increased workload partly related to the HIV/AIDS response, emigration and mal distribution of HR, inadequate number of tertiary training institutions, and inadequate plans to attract and retain health workers. Based on the 2015 MoHW establishment register, the distribution of staff posts by type and level of service reveals that an estimated 52 percent (52%) of the health sector workforce allocated to PHC services (if health service staff under the DHMTs, clinics, and most primary hospital services including clinics with maternity wards focus on PHC service delivery). District general hospital and mission hospital staff account for 15 percent of the

	workforce, and national referral hospitals account for 14 percent (14%), (Botswana landscape analysis. 2020). The density of medical doctors is defined as the number of medical doctors, including generalists and specialist medical practitioners per 10,000 people whilst density of Nurses is defined as the number of nursing and midwifery personnel per 10,000 people in a given national and/or subnational area. The total number of public sector Nurses and Medical doctors has been increasing over the years. Medical Doctors increased from 888 in 2019 to 906 in 2020 whilst the Nurses increased from 7,663 to 7,679.
Health information	Availability and quality of data are essential for the evaluation and planning of health programs. Botswana uses three types of electronic health information systems to collect health data. Various efforts have been made by different stakeholders across levels to establish and implement the required Health information systems. WHO, in its CSI guidelines, stated that "effective response to HIV at the country level requires strategic information that is systematically collected and consolidated, analysed and applied". The main electronic systems that are currently in use are as follows: • Integrated Patient Management System (IPMS). This is a proprietary system used to collect patient level data and is available mainly in hospitals and clinics that have internet. Utilization of the system is highly dependent on the availability and speed of the internet. • District Health information Software (DHIS 2). This is open-source software and is mainly used for aggregated data collection and management. It is accessed mainly from DHMT and other clinics that have a government network system. Its use is expanding into collection of client level data using Tracker Capture as in the Malaria and OVC programs. • Patient Information Management System (PIMS) PIMS is a Local Area Network (LAN) system developed to collected patient data at facilities where there is no internet connectivity (Land scape analysis Botswana. 2020). All these systems are used to collect health-related information and none of them collect any financial information on the patient level although IPMS has the functionality for collecting financial information at patient level (Billing and Accounts Receivable module). Development of SOPs for data quality assurance, national monitoring and evaluation plan and development of M&E structures are steps in the right direction for strengthening HIS. Despite MoHW efforts to improve the Information and Communication Technology (ICT) platforms at public health facilities, the existing systems remain fragmented (at both the patient and district levels). The current Health Management Information System (HMIS) is not able to deliver the timely information that is required for decision making and supporting planning, resource allocation, performance management, accountability, oversight, and monitoring and evaluation of the health delivery networks. The lower-level health facilities within a district collect health related information which is later consolidated and submitted to the DHMT. The DHMT in turn consolidate the information received and thereafter send it to the

	National Office. At the DHMT the information received from the health facilities is consolidated and subsequently submitted to the Integrated Disease Surveillance Response (IDSR). NTDs are reported as notifiable diseases and subsequently the appropriate division takes further steps. This system can be strengthened by incorporating some specific NTD variables and consolidating all NTDs data elements into one group to generate a report.
Medical products	Medical products in Botswana are regulated by Botswana Medicines Regulatory Authority (BOMRA) whose primary role is to administer the medicines and related substances act which regulates the supply chain of human and veterinary medicines, medical devices and cosmetics to ensure that they meet the set standards of safety quality and effectiveness. The supply chain management system is managed through department called Central Medical Stores (CMS). There are usually logistics challenges which at times lead to drugs and commodities stock outs. For the supply of some NTDs drugs the country relies on WHO (leprosy medicines) and ministry facilitates distribution to the affected facilities. BOMRA oversees pharmacovigilance and for investigation and analysis of all the reported adverse events (AEs) from health facilities. AEs trainings are incorporated in the MDA trainings.
Health financing	Botswana's rapid economic growth has enabled the country to invest substantially in the health sector. The government is the major source of financing providing 65% of Total Health Spending (THE), employers 16 %, households 12% and donors 7%. Per capita spending on health increased from Int$270 (BWP 348) in 1995 to Int$851(BWP 1491) US$428 in 2013 while THE as a share of GDP was 6.3%. Government health spending as a percentage of total general government expenditure was 12% while household direct out of pocket spending for health (OOPs) was 4.2% of THE8. A nominal cost recovery system of BWP 5 (approximately US$ 0.45) is charged to citizens for outpatient services in public facilities, with exemptions for vulnerable populations. Other additional charges include admission fees, ambulance charges, and charges for private patients and non-citizens (Botswana landscape analysis. 2020). Botswana is committed to health financing evident in the huge public spending on health. In alignment with the Abuja Declaration 2001 (World Health Organisation. 2001), the Government allocates 15% of GDP (USD$756 million, 2018/2019 budget) to health (Ncube *et al*., 2020). It is one of the few countries to meet the Abuja target of 15% of total government expenditure on health. The Ministry of Health was allocated the largest share of 18.7% of the proposed Ministerial recurrent budget, amounting to P10.01 billion in the 2022 National Budget. Botswana has a low out of pocket expenditure and a growing private sector involvement in health financing. In view of the strong financial protection that the government offers to its citizens, there is potential for

	improving utilization of services and high-quality interventions, implying that Universal health coverage (UHC) is a real possibility in Botswana (Land scape analysis Botswana. 2020). Figure 3.2 shows the total health spending by source of financing.  **Source: Botswana Health Accounts 2013/14** **Figure 4.2:** Total Health Spending by source of financing Botswana spends a considerable number of resources on health (in comparison to its neighbours) but there are concerns about how effectively resources are utilized. Currently there is not specific budget for NTDs in the budget allocation to the Ministry of Health and Wellness.
Leadership and governance	The Ministry of Health and wellness (MOHW) is responsible for health sector stewardship, responsible for oversight and coordination of the health service provision, including the formulation of policies, regulations and norms, standards and guidelines for health services (Botswana landscape analysis. 2020). In 2010 primary health care services were relocated from the Ministry of Local Government and Rural Development (MLGRD) to the MOHW, to increase efficiency and to ensure a continuum of care from preventive to curative to rehabilitative services (through more effective referral mechanisms). This reorganization and the relocation of primary health care made the MOHW the country's main public sector health care provider, with more than 80 percent of people receiving care from public facilities and programs. As part of the devolution of authority, there are 27 District Health management Teams (DHMTs), responsible for the planning, implementation, management, and provision of primary health care services, in addition to the monitoring and evaluation of all services from the primary level (Community Based Services, Primary Hospitals, and Primary Health Centres/Clinics) to district hospitals. The DHMT's network of health facilities include, the District and Primary Hospitals, clinics, health posts and mobile stops, as well as community-based health prevention and health promotion services (Land scape analysis Botswana. 2020). All these facilities are good platforms for the accelerated

	control and elimination of NTD in Botswana once NTDs are integrated in the NHS. Health service delivery in the country is pluralistic. There are public, private for profit, private non-profit and traditional medicine practice. Within public sector, the Ministry of Health (MOH) is responsible for the provision of health services. The ministry is mandated with oversight and delivery of health services for Batswana. It is responsible for the formulation of policies, regulations, norms standards and guidelines of health services. The ministry is also a major provider of health services through a wide range of health facilities and management structures. MOH provides primary health care services through District Health Management Teams (DHMTs). DHMTs are responsible for running a network of health facilities, hospitals, clinics, health posts and mobile stops as well as community-based preventative and promotive services. The NTD program at national level is housed under disease control division with an appointed National Focal Person. The current NTD implementation is guided and supported by WHO using the appropriate strategies for NTD control and management. **Reforms that are conducted in the country.** The Central Medical Stores (CMS) is responsible for the supply chain management of all health commodities including medicines in the public sector. As at August 2018, the average availability of vital drugs at public health facilities was at 84.7 percent against a 97 percent target.10 In view of the fact that availability of drugs continues to be one of the challenges facing Botswana's health care system, one of the strategies put in place to improve availability of drugs, medicines and medical supplies in health facilities (hospitals, clinics and health posts) across the country over the past three years, was to grant authority to District Health Management Teams (DHMTs) to procure items that are out of stock at the Central Medical Stores (CMS) from the private market through micro procurement until a permanent solution is put in place (Land scape analysis Botswana. 2020). These reforms make it easy for NTD control to find space in the National Health System once fully mainstreamed. The existing conditions of health reforms and Primary Health Care (PHC) are supportive of NTD control activities. With the exceptions of a National NTD main plan that is being reviewed and updated now. There has not been any national policy on NTD control. The existence of health workers dedicated for NTD control, and the successful implementation of government coordinated MDA rounds in Eswatini over the past years, explains that NTDs are included in the health sector strategic plan, although there has not been specific funding allocation for NTDs control from the fiscus. Currently the NTD programme has no unique structure as a control programme. There is no special unit dedicated for the NTD programme coordination. This shows an existing gap in the leadership for the control of NTDs. There is a need

	for an NTD Unit with the coordinator (director) to run the integrated NTD control and elimination activities and to report to the higher authorities. According to the guidelines on import procedures for medicines, the Ministry of Health in Botswana has a responsibility of assuring the quality, safety and efficacy of medicinal products used nationally. Thus, it is responsible for pharmacovigilance and for investigation, analysis, and reporting of serious adverse events (SAEs). This function is implemented under the Pharmacy Department. Until now, there has not been a flow of communication between the Pharmacy departments (pharmacovigilance unit) during the implementation of MDAs. The staff within this unit have not been aware of when and where mass drug administration was being planned and do, they have not been fully participating in investigation and reporting of SAEs. The NTD programme has not been that visible to the extent of mobilizing for multi-stakeholders' collaboration. The major school-based activity on NTDs has been the annual rounds of school-based mass drug administration for schistosomiasis and soil transmitted helminthiasis targeting school age children. There is no information existing on the inclusion of NTD control in the primary school curriculum. Ministry of Agriculture and Education are key ministries in the control of NTDs. The local University and other national research institutions are involved in health care in general and NTD control. The Department of veterinary services under ministry of agriculture, provide details on on-going activities/programmes relating to zoonotic diseases of public health significance in the country (rabies, plague, animal trypanosomiasis, etc.)

Section 1.3. Gap Assessment

Neglected tropical diseases of public health significance in Botswana include Schistosomiasis (SCH), Soil Transmitted Helminthiasis (STHs), Trachoma, snake bite envenomation, rabies, Scabies and leprosy. Now, the current data shows that Botswana is endemic for STH and SCH in certain parts of the country. There are suspected cases of trachoma in the country and the mapping for trachoma will commence soon. Mapping for *S. mansion* was done using both circulating cathodic antigen (CCA-POC) and Kato Katz. There was a huge, marked discrepancy in the results between the two methods at each data collection site with the highest prevalence being recorded by CCA-POC in areas where Kato Katz could not pick any infection (MOH 2015). This creates a need for confirmatory survey to validate the results and precisely inform on population requiring intervention and national policy on diagnosis of SCH. An effort to confirm the results will contribute immensely towards disease knowledge generation required for action.

Human African Trypanosomiasis (HAT) used to be endemic in the Northwestern part of the country, but it is no longer of public health importance. A few other tropical diseases than those

mentioned have been recorded in various parts of Botswana but are of a magnitude that does not warrant deliberate control programmes. Such diseases tend to be concentrated in the northern part of the country where the moisture conditions of the 20 000 km2 Okavango delta present a favourable environment for their proliferation and transmission.

The routine health information system provides data on all conditions and diseases seen both in outpatient and inpatient departments of the public health system network. The prevalence and distribution of the diseases therefore vary from time to time, depending on the rainfall and water flow pattern. With the envisaged expansion of irrigation farming in the Okavango delta, prevalence rates for waterborne NTDs may increase. The control of such diseases has been integrated into the primary health care services of the districts in which they occur but monitoring of, and vigilance for, such diseases are continued.

Section 1.4. Programme Context Analysis

1.4.1. Current NTD Programme Organization and Status

The current results of NTDs in the country were obtained from the 2014 to 2015 regional mapping project. Botswana conducted the mapping exercise in 2015. Table 3 provides background context under which PC-NTDs intervention are implemented.

Table 3: National population data, schools, and health facilities at district level

#	District	No of villages	Total population	Under 5	5 to 14 (school age)	No. of primary schools	No. of peripheral health facilities	
							Referral hospitals	IU level (District hospitals)
1	BOTETI		47604	11081	14153	28		
2	CHOBE		18797	3140	3661	11		
3	FRANCISTOWN		134676	25621	31789	23	1	
4	GABORONE		365023	43569	52966	68	1	
5	GANTSI		30579	6617	8258	23		
6	GOODHOPE		Merged to Lobatse					
7	KGALAGADI NORTH		24316	6452	8753	17		
8	JWANENG		Merged too Southern					
9	SOUTHERN		116303	24920	32192	78		
10	KGALAGADI SOUTH		20815	4760	6179	25		
11	KGATLENG		68792	12438	16080	38		
12	KWENENG		140915	30905	40408	111		
13	KWENENG WEST		Merged to Keening					
14	LOBATSE		57024	11444	14706	21	1	
15	MABUTSANE		Merged too Southern					
16	MAHALAPYE		80061	19065	24709	54		
17	NGAMI		66127	14503	17140	48		
18	NORTHEAST		27290	6647	9231	43		
19	OKAVANGO		37549	10755	13972	24		
20	GREATER PHIKWE		85621	17429	22785	46		

21	SEROWE/PALAPYE		123317	25949	33613	72		
22	SOUTHEAST		Merged Gaborone					
23	TUTUME		56030	14517	19152	65		
	TOTAL		2346179	289813	369746	812		

Schistosomiasis

Schistosomiasis is a neglected tropical disease (NTD) caused by infections with worms. Schistosomiasis is caused by 5 species of trematode: *Schistosoma genesis*, *S. haematobium*, *S. japonicum*, *S. mansion* and *S. Mekong*. The predominant causative organisms are *S. haematobium* and *S. mansoni*. People are infected by schistosomes transmitted during contact with water contaminated with human excreta containing parasite eggs. A snail host must be present in the water to allow the parasite to complete its life cycle. Groups at risk for schistosomiasis are pre-school aged children (pre-SAC), school-aged children (SAC), adults in certain occupational groups, women who frequently get in contact with infected water for domestic activities and entire communities in high-risk areas. The disease manifests in intestinal and urogenital forms.

Intestinal schistosomiasis results in diarrhoea and blood in stools; enlargement of the liver, the spleen and portal hypertension are common in advanced cases. Urogenital schistosomiasis is characterized by the presence of blood in the urine. Chronic infection results in fibrosis of the bladder and ureter that can evolve to hydronephrosis and create conditions for bladder cancer. In women, urogenital schistosomiasis may cause female genital schistosomiasis characterised by vaginal bleeding, pain during sexual intercourse, ectopic pregnancy, abortion, secondary STI and HIV infection through lesions created by the inflammatory hypersensitive immunological responses to the schistosome eggs trapped in the vaginal mucosa. Thus, urogenital schistosomiasis is a risk factor for HIV transmission. (WHO, 2022).

Schistosomiasis is a highly prevalent helminthiasis among the poorest populations, caused by infection with trematode worms of the genus Schistosoma. According to The Global Burden of Diseases, Injuries, and Risk Factors Study 2017 (GDB-2017 2018), an estimated 143.8 million (95% Uncertainty Interval [UI]: 131.7 – 155.5 million) people are affected, mainly in Africa (Graaff-Teixeira *et al*., 2021).

New guidelines for human schistosomiasis control and elimination

In February 2022, WHO issued a new guideline for the control and elimination of human schistosomiasis. WHO recommends an integrated approach, combining extension of PC to all people at risk from 2 years of age in communities with a ≥10% prevalence, treatment in health facilities, snail control and WASH to control and eliminate schistosomiasis as a public health problem. The availability of praziquantel in health facilities and treatment of all infected individuals is also recommended. The number of people treated in health facilities should be reported separately from PC. The guideline also provides recommendations on verification of the interruption of schistosomiasis transmission.

Global situation of schistosomiasis in 2021

In 2021, PC for schistosomiasis was required in 51 countries, for a total of 251.4 million people: 136 million SAC and 115.4 million adults.

Global target: Targeted for elimination as a public health problem.

Indicator: Number of countries validated for elimination as a public health problem (currently defined as <1% proportion of heavy intensity schistosomiasis infections).

ENDEMICITY OF SCHISTOSOMIASIS IN BOTSWANA AND INTERVENTION STRATEGIES

Historical perspective

Botswana is endemic for both *S. mansoni* and *S. haematobium* (Doumenge *et al*., 1987). The intermediate host snails responsible for transmission of *S. mansoni* and *S. haematobium* in Botswana are *Biomphalaria pfeifferi* and *Bulinus globosus*. *S. mansoni* is present in North-West District particularly along the Okavango River, marshlands, and in the villages along the Chobe River. Studies have shown that *Bulinus globosus* and *Biomphalaria pfeifferi* occur throughout Okavango Delta area and are intermediate hosts for schistosome parasites of man and livestock (Brown *et al*., 1992, Chimbari *et al*., 2020). Notably, *Biomphalaria pfeifferi*, the snail intermediate host for the parasite causing human intestinal schistosomiasis, *Schistosoma mansoni*, is one of the most common snail species in both the permanent and seasonal parts of the Okavango Delta and in the rivers flowing from this delta into eastern Ngamiland, in north–eastern Botswana (Figures 4.1 and 2; Gear *et al*., 1980; Brown *et al*., 1992; Appleton *et al*., 2008).

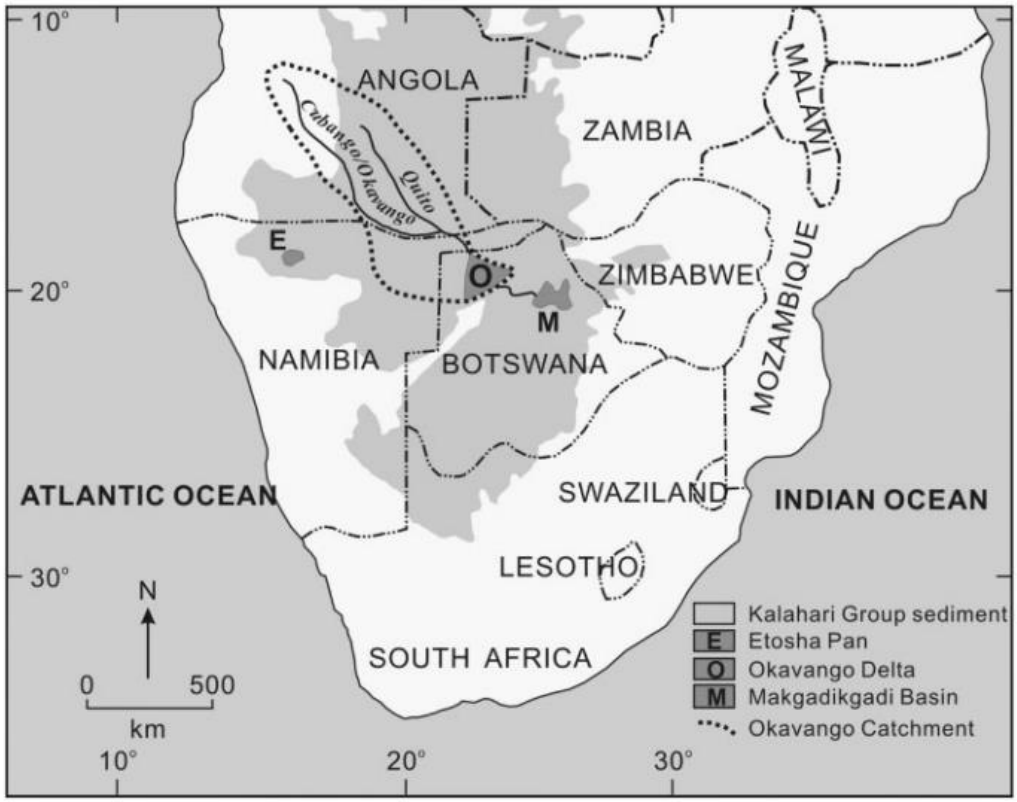


Figure 4.3: Map of southern Africa showing the position of the Okavango Delta (O) in Botswana and its catchment in south–eastern Angola**.**

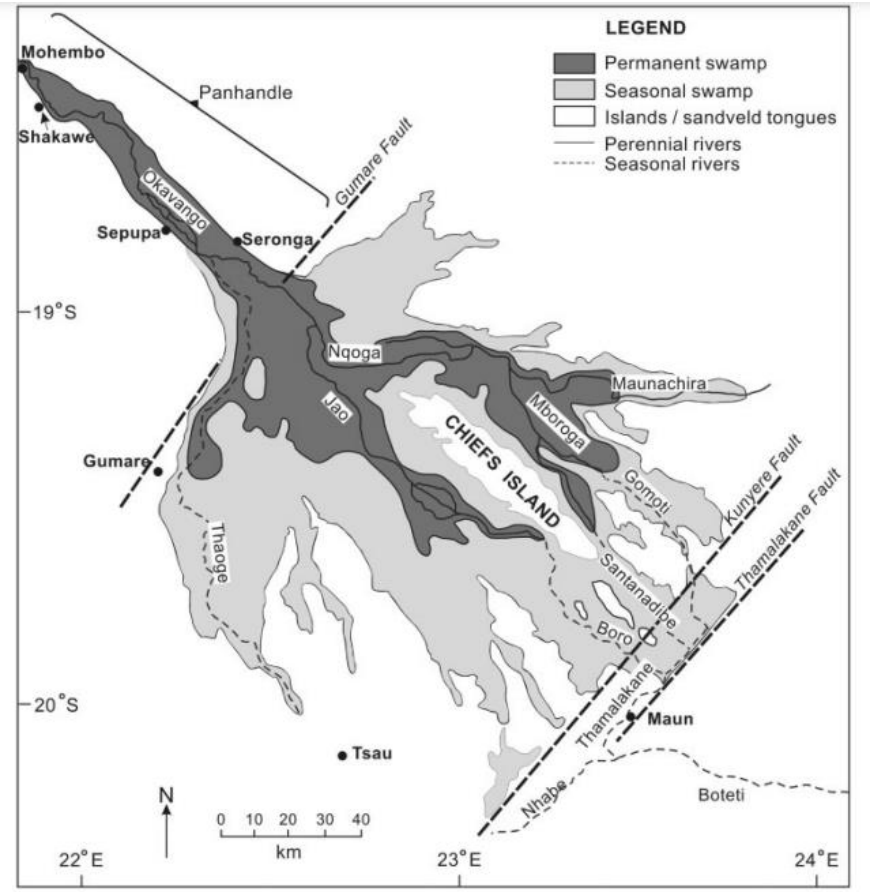


Figure 4.4: Map of the Okavango Delta, showing Maun in relation to the fault lines**.**

The first cases of schistosomiasis were reported in Botswana in 1929 (Doumenge *et al*., 1987, Sokolow *et al*., 2016). By 1955 a broad-scale survey revealed sporadic endemicity of *Schistosoma haematobium* throughout the country, with specific hotspots in locations known to have high immigration of workers from schistosome-endemic regions of South Africa (Doumenge *et al*., 1987). *S. mansoni* was reported in Botswana as early as 1965 (Doumenge *et al*., 1987), with very few anecdotal reports of sporadic *S. mansoni* cases before then (Doumenge *et al*., 1987). This schistosome species is present in North-West District particularly along the Okavango River and marshlands, and in the villages along the Chobe River (Travel Doctor Network 2022).

S. haematobium has been reported along the Limpopo River valley and its tributaries. Localized risk has been reported in Mabule (on the Molopo River), Kanye, and the north eastern areas of Southern District; Lobatse, Otse, Ramotswa, and Gaborone in South-East District; Molepolole and the southeastern areas of Kweneng District; Mochudi and southern areas of Kgatleng District; Xhumo, Nata and areas extending north between the Limpopo River and Palapye (Central District); Francistown (North-East District); Tsau, Maun, Kavimba, Kasane, and Pandamatenga (North-West District), (Travel Doctor Network 2022).

On a larger scale, there has been no evidence of a national-scale schistosomiasis control program in Botswana in the 1950-1978. The first national survey in Botswana was conducted between 1976 and 1978. The results showed an overall country-level prevalence for schistosomiasis of 14.7% (Doumenge *et al*., 1987). In 1985, Andersen *et al* reassessed the schistosomiasis problem in Ngamiland and especially in Maun area. 552 primary school children and 213 adult labourers were examined with urinalysis and rectal snip. Of the pupils 80.3% were found positive for *S. mansoni* and 1.4% for *S. haematobium*; of the labourers 35.7% were infected with *S. mansoni* and 0.5% with *S. haematobium* (Andersen *et al.*, 1985).

These results confirm endemicity of both intestinal and urinary schistosomiasis in Botswana. The most recent schistosomiasis countrywide estimates in Botswana report 12.1% (with a confidence interval of 5.9-27.7%), with *S. haematobium* estimated at 9.4% prevalence and *S. mansoni* at 2.8% countrywide (Lai *et al*., 2015), indicating little overall change in prevalence at the national scale from a prevalence of 14.7% reported in 1987 by Doumenge *et al*. Appleton and colleagues predicted a period of wetter years in the decades after the turn of the millennium and another schistosomiasis outbreak in the Okavango by the year 2020 (Appleton *et al*., 2008). In 2020, Chimbari *et al* conducted a retrospective study and utilised snail survey data previously collected from the Thamalakane River in Maun between June 2009 and July 2012. A total of 3 563 freshwater snails were collected from 10 sentinel sites along Thamalakane River. The snails collected were *Bulinus globosus, Biomphalaria pfeifferi, Lymnaea natalensis, Bellamya capillata, Pila occidentalis* and *Lanistes ovum*. *Bulinus globosus* snails were more abundant than *B. pfeifferi.* None of the intermediate host snails (IHS) collected shed cercariae. The absence of infected IHS suggests that there was no active transmission of schistosomiasis during the study period. Furthermore, the presence of *B. globosus* and *B. Pfeifferi* in the Thamalakane River suggests the potential risks of *Schistosoma haematobium* and *S. mansoni* infection when transmission conditions become conducive (Chimbari *et al*., 2020). Thus, the observed abundance of these snails in the Maun, Okavango Delta confirm potential endemicity of urinary and intestinal schistosomiasis in Botswana.

On 9 July 2016, an outbreak of schistosomiasis, which affected dozens of school children at Maradu Primary School in Francistown, Botswana was reported. Although this was reportedly controlled, according to Dr. Gobezie Solomon, coordinator of the District Health Management Team (DHMT) of Greater Francistown, this incident demonstrate presence and ongoing transmission of Schistosomiasis in Botswana.

In 2022, Christos Kokaliaris *et al*., predicted the Effect of preventive chemotherapy with praziquantel on schistosomiasis among school-aged children in sub-Saharan Africa using a spatiotemporal modelling. Botswana is predicted to have reduced the prevalence of schistosomiasis from 12·5% in 2010 to 7·2% in 2014, and 5·0% in 2019 (Table 3.1). What is important also is the predicted respective species prevalence distribution from baseline 2010 through 2014 to 2019. Kokaliaris predicted in 2010 the prevalence of *S. haematobium* was.

10.6 % and that for *S. mansoni* was 2.1%.

Table 3.1: The effects of Preventive chemotherapy on the prevalence of schistosomiasis in Sub-Saharan Africa.

	2010				2014				2019			
	Population (in 1000s)	Schistosomiasis (%)	*S haematobium* (%)	*S mansoni* (%)	Population (in 1000s)	Schistosomiasis (%)	*S haematobium* (%)	*S mansoni* (%)	Population (in 1000s)	Schistosomiasis (%)	*S haematobium* (%)	*S mansoni* (%)
Angola	5321	32·2% (21·4–41·3)	26·6% (16·4–36·4)	6·0% (4·0–16·9)	6488	19·6% (12·8–31·9)	14·9% (8·7–26·8)	4·8% (3·0–10·5)	7721	12·9% (7·5–23·1)	9·7% (5·2–18·6)	2·8% (1·8–8·8)
Benin	2366	36·7% (33·1–41·8)	34·3% (30·8–39·2)	3·4% (2·6–5·1)	2689	21·0% (18·6–24·7)	19·1% (16·5–22·8)	2·4% (1·8–3·3)	3037	12·6% (10·9–15·7)	11·7% (10·0–14·7)	1·0% (0·7–1·5)
Botswana	407	12·5% (7·7–19·8)	10·6% (5·9–17·4)	2·1% (1·0–4·3)	435	7·2% (4·6–12·8)	5·5% (2·8–10·4)	1·8% (0·9–3·5)	474	5·0% (2·6–9·8)	3·7% (1·7–8·4)	1·2% (0·6–2·9)
Burkina Faso	4444	17·5% (14·2–21·3)	15·7% (12·6–19·7)	1·9% (1·2–3·2)	5178	5·7% (4·5–7·7)	4·8% (3·7–6·6)	1·0% (0·6–1·8)	5900	4·0% (3·0–5·5)	3·4% (2·6–4·7)	0·5% (0·3–1·2)
Burundi	2256	4·8% (3·3–7·8)	1·7% (0·6–4·8)	3·1% (2·3–4·4)	2669	2·7% (1·9–4·3)	0·5% (0·2–1·8)	2·0% (1·5–3·0)	3211	1·5% (1·0–2·2)	0·3% (0·1–1·2)	1·1% (0·8–1·6)
Cameroon	5191	15·5% (13·6–17·8)	10·6% (9·3–12·6)	5·4% (4·4–6·9)	5977	9·1% (7·8–10·7)	4·9% (4·2–6·2)	4·2% (3·5–5·5)	6746	5·0% (4·3–6·1)	2·9% (2·3–3·5)	2·1% (1·6–2·9)
Central African Republic	1204	44·6% (34·1–57)	25·7% (17·1–38·8)	24·3% (17·1–35·2)	1304	33·4% (24·9–45·7)	14·4% (8·0–25·2)	21·0% (14·9–32·4)	1369	28·2% (19·9–40·7)	11·2% (5·3–22·4)	18·5% (12·7–29·1)
Chad	3361	40·9% (37·0–45·3)	37·9% (34·0–42·4)	4·9% (3·6–7·1)	3949	27·1% (24·3–31·1)	23·8% (20·9–27·3)	4·3% (3·0–6·2)	4514	20·1% (17·8–22·5)	18·0% (15·7–20·4)	2·6% (1·8–3·9)
Congo	1008	7·8% (6·1–10·5)	6·9% (5·3–9·9)	0·8% (0·5–1·4)	1186	3·8% (2·9–5·6)	3·2% (2·3–4·8)	0·6% (0·3–1·4)	1362	2·2% (1·6–3·2)	1·8% (1·3–2·9)	0·3% (0·2–0·7)
Côte d'Ivoire	5228	21·5% (20–23·4)	12·5% (11·0–14·1)	10·3% (9·2–11·8)	5747	13·7% (12·6–14·9)	5·7% (4·9–6·5)	8·5% (7·6–9·4)	6341	9·6% (8·7–10·8)	4·1% (3·4–5)	5·7% (5–6·7)
Democratic Republic of the Congo	18004	24·6% (22·4–26·8)	15·3% (13·5–17·4)	11·2% (9·7–13·2)	21646	17·9% (16·1–19·7)	8·2% (7·3–9·5)	10·4% (9·1–12·2)	25684	10·3% (9·3–11·8)	4·9% (4·3–5·8)	5·7% (4·7–6·7)
Djibouti	165	13·9% (1·3–56·7)	10·8% (1·0–54·5)	0·9% (0·0–20·8)	163	6·0% (0·5–43·1)	4·0% (0·2–35·9)	0·6% (0·0–19·4)	169	4·0% (0·4–32·7)	3·0% (0·2–30·1)	0·4% (0–9·9)
Equatorial Guinea	281	3·7% (1·9–8·3)	2·0% (1·0–4·5)	1·6% (0·5–4·9)	344	2·0% (1·0–4·3)	0·7% (0·3–1·6)	1·3% (0·5–3·2)	414	1·5% (0·6–3·3)	0·5% (0·2–1·4)	0·8% (0·3–2·7)

Source: Christos Kokaliaris *et al.*, 2022

Schistosomiasis distribution following National mapping (2015)

In 2015, Botswana, with support from WHO, conducted a national schistosomiasis and STH survey (Table 4.2) to plan intervention strategies. During the survey, *Schistosoma mansoni* was diagnosed mapped using both the Kato-Katz technique (Katz *et al*., 1972) and the Point of Care Circulating Cathodic Antigen (POC-CCA). *S. haematobium* was diagnosed using the urine filtration and urinalysis dip stick test. The Urinalysis dip stick measures blood in urine which is an indirect measure of *S. haematobium* infection and morbidity. Apparently, there is limited data from the National schistosomiasis and STH survey conducted in 2015. The existing data for the National survey conducted in 2015 is summarized in table 3.2.

Table 3. 2: The 2015 national survey schistosomiasis prevalence data based on macrohematuria test for *S. hematobium*, Kato-Katz technique and POC- CCA for *S. mansoni*.

District	No of schools surveyed	No of students surveyed	Prevalence (%) of *S hematobium* based on haematuria	Prevalence (%) of *S mansoni* based on (POC-CCA)	No positive by Kato Katz technique	*Prevalence (%) of S. Mansoni* based on (Kato-Katz)	SCH prevalence (%) considered*	Annual MDA or Test and Treat strategy**
Bobirwa	5	248	6.5	61.7	0	0.0	61.7	Annual
Boteti	5	240	10.4	47.5	0	0.0	47.5	Annual
Chobe	5	247	18.2	37.4	26	10.5	37.4	Annual
Francistown	7	346	10.4	73.3	1	0.3	73.3	Annual
Gaborone	5	207	12.6	74.3	0	0.0	74.3	Annual
Gantsi	9	447	11.4	54.6	0	0.0	54.6	Annual
Goodhope	5	202	16.3	9.8	0	0.0	16.3	Annual
Kgatleng	5	244	13.5	48.0	0	0.0	48.0	Annual
Kgalagadi North	5	229	12.7	5.1	0	0.0	12.7	Annual
Kgalagadi South	5	246	6.1	13.9	0	0.0	13.9	Annual
Kweneng East	3	145	15.2	36.1	0	0.0	36.1	Annual
Kweneng West	4	201	10.4	2.6	0	0.0	10.4	Annual
Lobatse	5	248	8.9	26.0	0	0.0	26.0	Annual
Mahalapye	5	229	5.7	18.6	0	0.0	18.6	Annual
Southern	20	977	12.1	26.9	0	0.0	26.9	Annual
Okavango	6	307	2.3	4.0	0	0.0	4.0	test and treat
Ngamiland	5	247	3.2	49.5	0	0.0	49.5	Annual
Northeast	5	249	6.8	60.3	0	0.0	60.3	Annual
Selibe Phikwe	5	245	11.8	26.7	0	0.0	11.8	Annual
Serowe	10	495	5.0	6.2	2	0.3	6.2	Test and treat
Southeast	4	188	13.8	8.1	0	0.0	13.8	Annual
Tutume	5	249	16.9	51.8	0	0.0	51.8	Annual
Total	**133**	**6 436**						

* The highest prevalence among haematuria, POC-CCA and Kato Katz was considered. This is because there is no individual data for participants included in the study.

** The annual MDA or test and treat strategies were based on current WHO guidelines for schistosomiasis elimination which is dependent on prevalence as follows: Prevalence ≥ 10% = annual MDA strategy, Prevalence < 10% = Test and Treat strategy (WHO, 2022).

Observations made from the summary results of the national survey conducted in 2015 presented in Table 3.2:

***S. haematobium* (urinary schistosomiasis)**

- Prevalence of *S. haematobium* based on urine filtration technique is missing.

- Microhaematuria (blood in urine) results are presented as percentages per district but there is no overall percentage of microhaematuria to give an estimate of the national prevalence of *S. haematobium* as determined by microhaeaturia. This is because individual participant data is missing.

***S. mansoni* (intestinal schistosomiasis)**

- Prevalence data by district is given based on POC-CCA but there is not overall (national prevalence) of *S. mansoni* based on POC-CCA since individual data is missing.

- *S. mansoni* prevalence by district is given based on the Kato Katz technique. However, there is not overall (national) prevalence since individual data is missing.

- **Endemicity of *S. haematobium* in Botswana**
- In deciding *S. haematobium* endemicity in Botswana, reliance was made on the urinalysis dip stick (haematuria) (Table 3.2).

- **Combined schistosomiasis prevalence**
- Using the individual persons' results for *S. haematobium* and *S. mansoni*, schistosomiasis infection status based on either *S. mansoni* positive, *S. haematobium* or both positive, would cumulatively suggest the prevalence of schistosomiasis. This classification is important when planning intervention strategies.
- Based on combined schistosome prevalence, the distribution of the disease is presented in Figure 4.5. These results are based on the POC-CCA.

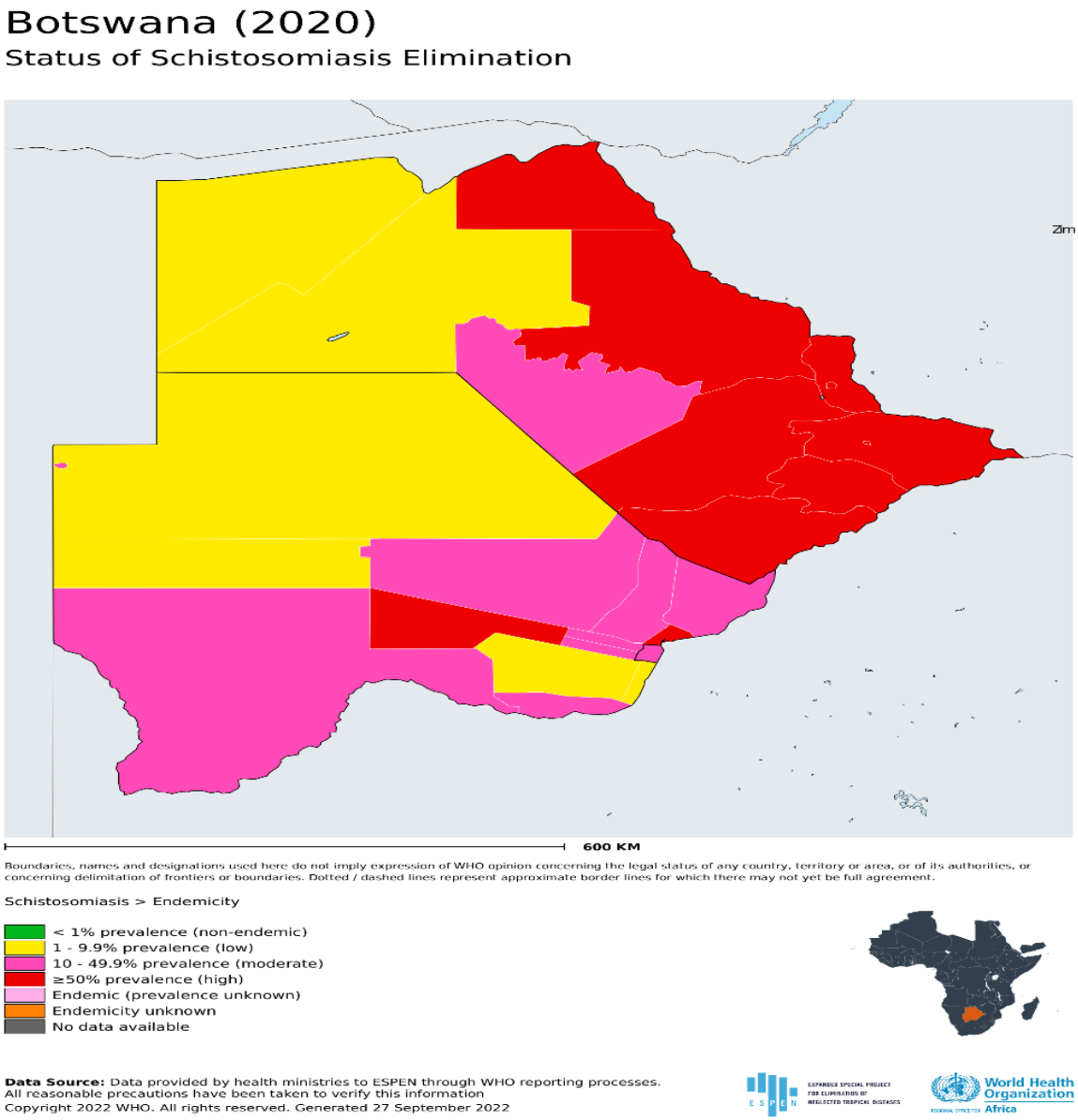


Figure 4.5: Classification of districts in Botswana based on schistosomiasis prevalence (Source: ESPEN 2020)

Based on ESPEN technical support in data analysis, following mapping of schistosomiasis in Botswana in 2015, Figure 4.6, describes the endemicity status of schistosomiasis in Botswana. The prevalence of schistosomiasis kept on increasing from. The percentage of districts with prevalence of ≥50% was 38 in 2016 and 2017. However, with delay in MDA implementation, the percentage of districts with high prevalence increased to 41% in both 2020 and 2021 (Figure 4.6).

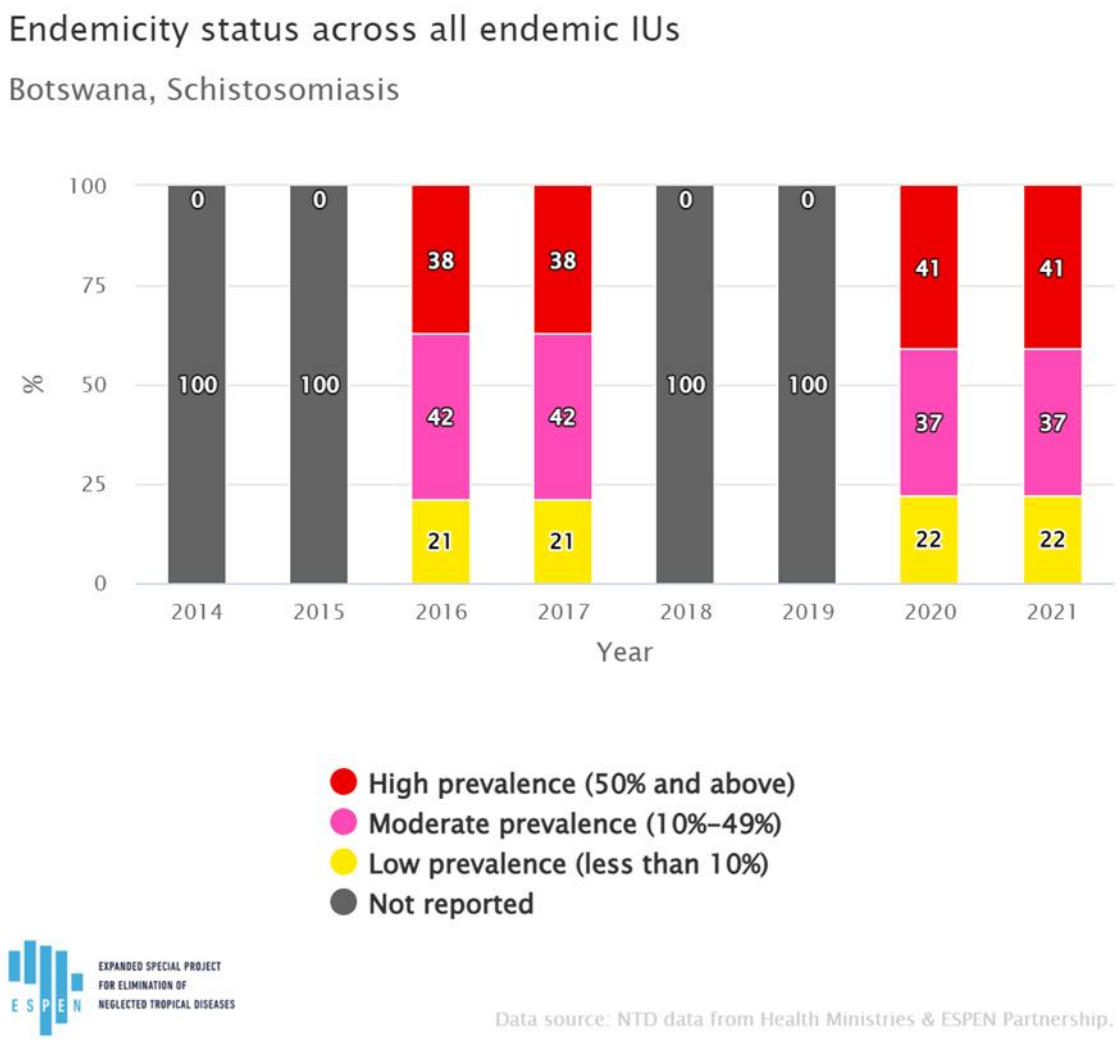


Figure 4.6: Schistosomiasis endemicity status across all endemic implementation units

Proposed treatment intervention based on 2015 national survey data.

To establish the treatment intervention strategies for schistosomiasis based on the available data as presented in Table 4.2, the highest prevalence observed from the three tests, Microhaematuria, for *S. haematobium*, POC-CCA or the Kato Katz for *S. mansoni*, were considered per district since there was limited data to estimate combined (cumulative) *S. haematobium* and *S. mansoni* infection and hence combined prevalence data.

Schistosomiasis Control in Botswana

Historical perspective

Since 1983, Botswana integrated control of shistosomiasis into the primary health care services and this has kept the disease under control in the country.

The Botswana National Bilharziasis Survey found 24.4% of the primary schoolchildren from Maun that it surveyed in 1976–1978 to be excreting schistosome eggs in their faeces (Rudo, 1979). Sibiya *et al*. (1976) reported prevalence ranging from 12.9% to 69.7% depending on the school surveyed. Prevalence among pupils of standard 7 at selected schools had risen as high as 80.3% by 1983 (estimated in rectal-snip surveys; Andersen *et al*., 1985) and to 80.5% by 1985–1986 (estimated in surveys based on Kato–Katz smears; Ali and Byskov, 1986). As a result of these surveys, in which cases of severe schistosome-attributable morbidity were seen, intestinal schistosomiasis was declared notifiable, and a chemotherapy-based control programme was introduced in Ngamiland district in 1985 (Ali and Byskov, 1986; Friis and Byskov, 1989). In addition, schistosomiasis was included in health education programmes (Sibiya, 1986). Prevalence subsequently declined.

During the 1970s and 1980s, transmission of *S. mansoni* was not confined to Maun and its environs but also occurred over a wider area, encompassing much of Ngamiland district (now divided into Ngami and Okavango districts). It extended into the Cuando River floodplain and the wetlands of eastern Caprivi. Several of the sites in Ngamiland where transmission occurred lie, like Maun, on the edge of the seasonal delta, and, although some showed prevalence as high as 40%–50%, the epidemic documented above was confined to the Maun area.

The community-based control programme set up in Ngamiland district in 1985 was a result of the high levels of transmission observed (Ali *et al.*, 1989). It was supported by the World Health Organization and the Edna McConnell-Clark Foundation (New York). Its aim was to reduce *S. mansoni* prevalence among schoolchildren by at least 75% and severe infections (defined as 100 eggs/g faeces) by at least 90%. A district-wide survey in 1986 estimated an overall prevalence among schoolchildren of 28.7%, with 4.1% of subjects harbouring heavy infections (WHO, 1993). Repeat surveys showed that the corresponding overall prevalence had dropped to 8.4% (0.2% of subjects with heavy infections) by 1989, and to 6.7% (with only 0.01% of subjects with heavy infections) by 1991 (WHO, 1993; Nuttall *et al*., 1995). District-level prevalence continued to fall to 7.8% by 1997 and to 2.0% by 2001. The control programme was stopped in 1993, when it became clear that prevalence of *S. mansoni* infection were remaining below 10% and intestinal schistosomiasis was no longer a public-health problem in the district (Appleton *et al*., 2008).

The surveys and the treatment-based control programme were coupled with increased health education and targeted efforts at improving the coverage of a piped water supply and sanitation, all aiming at the control of transmission.

The integrated transmission-control efforts were supported by a strong drive at developing infrastructure, so that, in terms of housing, communication, commercial centres and general socio–economic development, Maun has moved quickly towards becoming a de-facto town, with corresponding changes in the habits of the population. These factors, which may have contributed to the very low prevalence of *S. mansoni* infection observed, may also serve to decrease the risk of a resurgence in such infection after any future increase in floods (Appleton *et al*., 2008). Table 3.3 describes the Prevalence of *Schistosoma mansoni* infection recorded amongst primary schoolchildren in the vicinity of Maun (Appleton *et al*., 20008).

Table 3.3: Prevalence of Schistosoma mansoni infection recorded amongst primary schoolchildren in the vicinity of Maun.

Year of survey	Prevalence (%)	Locality	Reference
1949	0	Maun	De Meillon (1956)
1953	<1	Maun	C. F. Hansford (unpubl. obs.)
1956	0	Maun	Pitchford (1958)
1965	13.0*	Maun	Geldenhuys *et al.* (1967)
1976	12.9–69.7	Maun	Sibiya *et al.* (1976)
1976	60–70†	Maun	Pitchford and Wolstenholme (1977)
1976–1978	24.4	Maun	Rudo (1979)
1983	80.3	Maun	Andersen *et al.* (1985)
1985–1986	80.5	Matlapaneng	Friis and Byskov (1987)
1986	45.0	Matlapana	Anon. (1986)
1997	2.2	Matlapana	S. S. Mokgweetsinyana (unpubl. obs.)
2001	0	Matlapana	S. S. Mokgweetsinyana (unpubl. obs.)

*Erroneously reported as 3.1% by Anon. (1986) and Nuttall *et al.* (1995).
†Cited as personal communication from the Regional Medical Officer, Maun.

The role of the WASH sector leading to declining schistosomiasis in Botswana

The water and sanitation situation in Botswana is impressive: 96% of the population has access to improved water and 63% has access to improved sanitation in 2014. Four decades of civilian leadership, progressive politics, political stability, and strong economic activities based on diamond/mineral mining and tourism has made Botswana one of the most stable economies in Africa (The World Factbook. 2013-14).

The swift control of an outbreak of schistosomiasis in Francis Town as reported on the 9th of July 2016 shows the effectiveness of integration of schistosomiasis into the primary health care services, a strategy undertaken by Botswana since 1983.

Implementation of the national schistosomiasis control programme following the national survey conducted in 2015 and WHO guidelines.

In line with WHO recommendations, guidelines and with a goal to contribute towards the global target: Elimination of schistosomiasis as a public health problem by 2030, Botswana mapped schistosomiasis prevalence nationwide in 2015 and in 2021 the country launched the national MDA for schistosomiasis. Notable is the technical and financial support from ESPEN through WHO Botswana Country Office.

For the single year when MDA was implemented in Botswana, the coverage of preventive chemotherapy is shown in Figure 4.7. It should be noted that the MDA programme targeted the school age children.

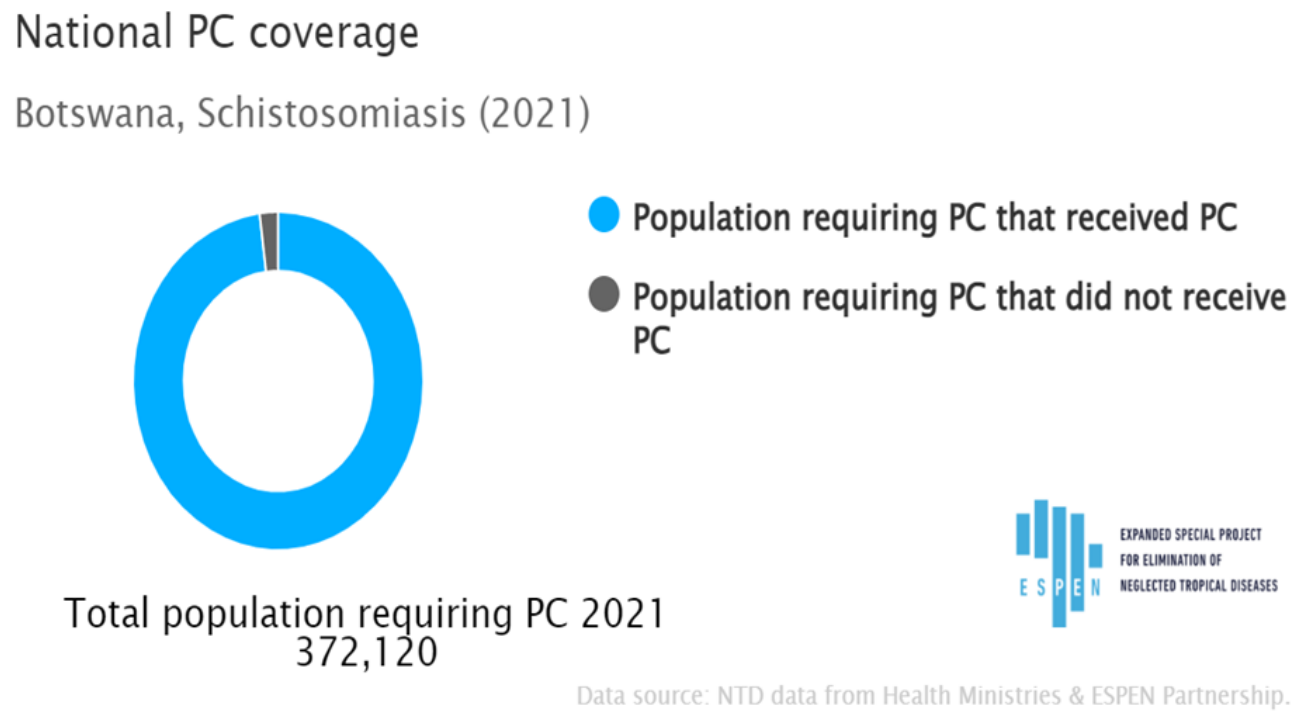


Figure 4.7: National Preventive chemotherapy coverage (2021) (Source: ESPEN)

Figure 4.8 describes the Preventive chemotherapy coverage trends over time following mapping of schistosomiasis in 2015. Fig.4.8 also shows the effect of a delay in MDA (implemented in 2021) implementation after the national survey has been conducted in 2015. During the years 2016 and 2017, the number of districts requiring treatment were 24. However, with delayed MDA and sustained transmission of schistosomiasis, in 2020 and 2021, the number of districts requiring treatment increased to 27 (all districts in Botswana).

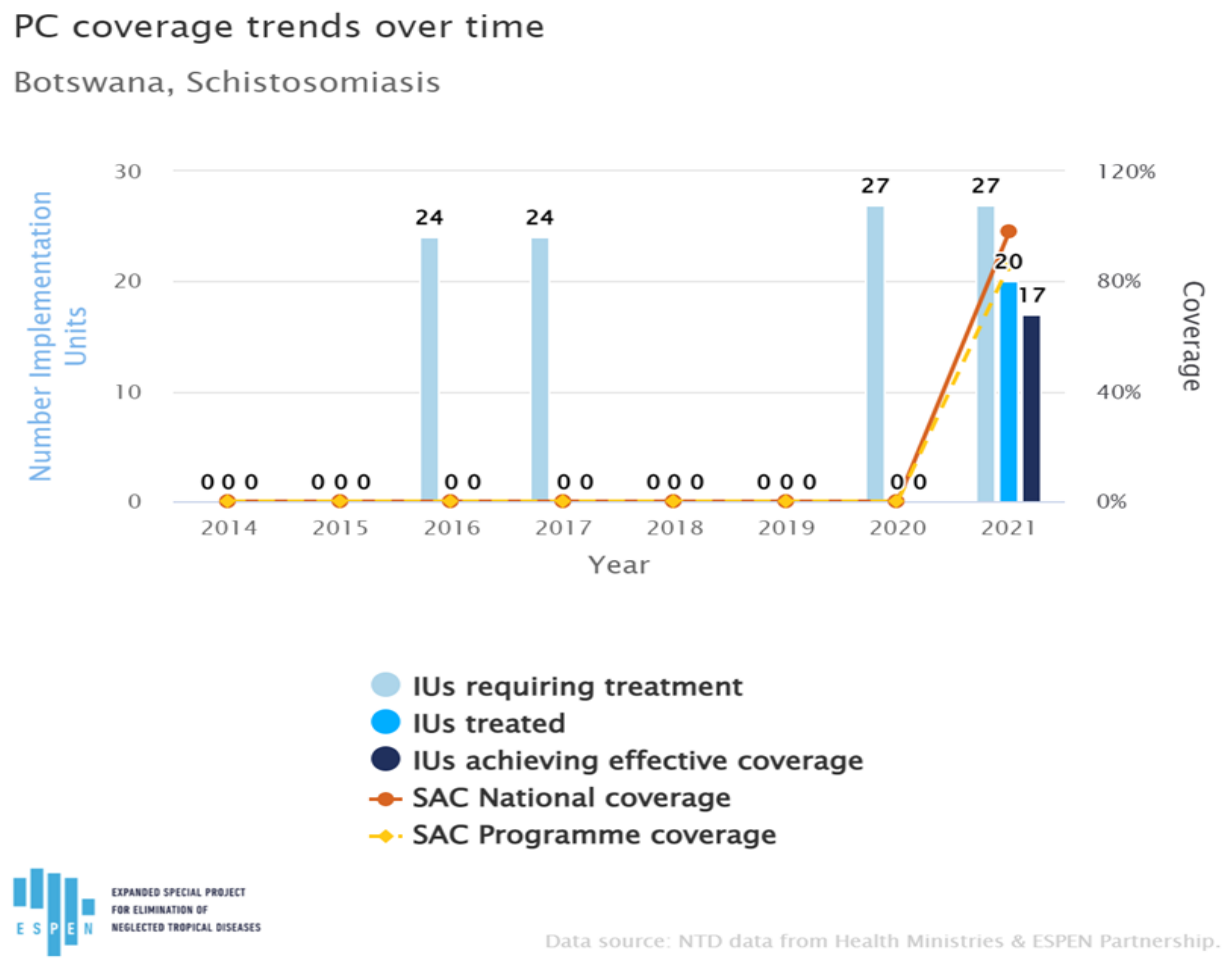


Figure 4.8: PC Coverage trends over time

Figure 4.9 describes the Status of National Schistosomiasis elimination programme based on data from ESPEN (2021). The map shows the need for greater community engagement for improvement of medicines uptake and the importance of Universal health coverage leaving no one out of the intervention programme.

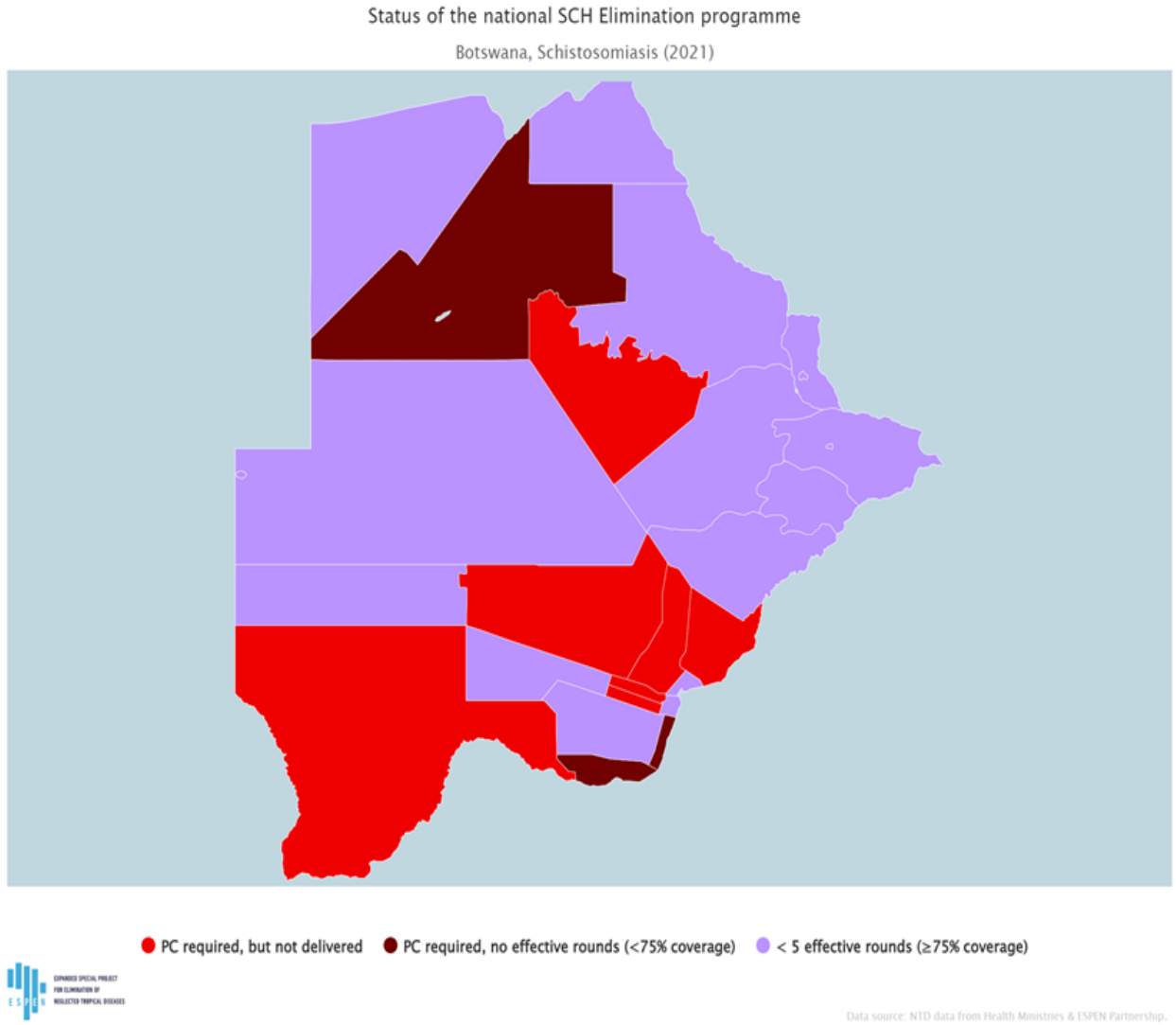


Figure 4.9: Status of National Schistosomiasis programme as at 2021 (Source: ESPEN 2021)

Soil Transmitted helminthiasis (STH)

STH are caused by *Ascaris lumbricoides* (roundworms), *Trichuris trichiura* (whip worms), *Necator americanus* and *Ancylostoma duodenale* (hookworms) and are transmitted by contact with soil infected by human excreta. Groups at risk for STH are pre-SAC, SAC and women of reproductive age (WRA), who are need of micronutrients. STH adversely affect nutritional status and impairs cognitive development in children.

PC for STH was required in 91 countries, for 260.6 million pre-SAC and 653.7 million SAC. In addition, 108 million adolescent girls and 138.8 million pregnant and lactating women are estimated to require deworming to prevent STH (WHO, 2022).

Global Target for STH

Elimination as a public health problem.

Target: Number of countries validated for elimination as a public health problem (defined as <2% proportion of soil-transmitted helminth infections of moderate and heavy intensity due to *Ascaris lumbricoides, Trichuris trichuria, Necator americanus* and *Ancylostoma duodenale*).

The burden of STH in Botswana

Studies to determine the burden of STH, namely hookworms in Botswana date back to 1985 when Stool specimens from a sample of schoolchildren at six schools in Kweneng District were examined for hookworm infection, using the brine flotation method. Necator americanus was the only hookworm identified. The western part of the district forms part of the Kalahari Desert. In four villages of Kweneng 90%, 88%, 88% and 86% of the children were found infected. In two villages in the eastern non-desert part, only 13% and 9% were infected. Most infections were light (K F Michaelsen, 1985).

The First National survey of STH in Botswana (2015)

The National survey was conducted in 2015 with the aim to provide data for strategic planning of STH control in Botswana. Infestations of soil-transmitted helminth (STH) were observed to be widespread throughout Botswana (WHO, 2019). However, the prevalence was generally low. The baseline prevalence of hookworms ranged from 0.5% – 23.0%. That for *Ascaris lumbricoides* ranged from 0.3% to 20.2%. The prevalence of *Trichuris trichiura* ranged from 0.1% to 27.9%.

STH control informed by the National survey conducted in Botswana in 2015.

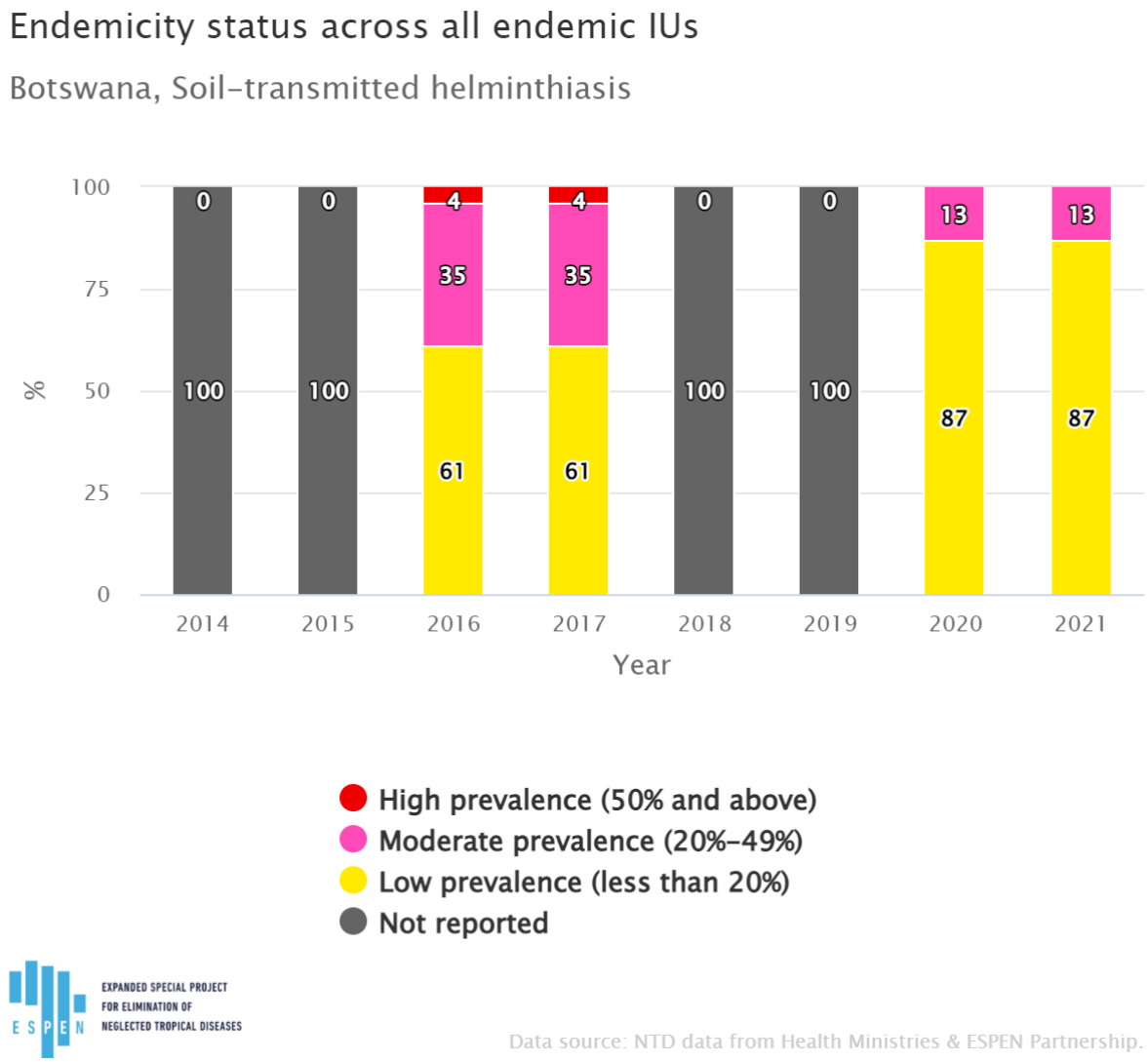


Figure 4.10: Endemicity status across all districts in Botswana (2014-2021)

Mid-term review survey

A midterm review survey was conducted in 2021 evaluation of the impact of the mass drug administration (MDA) on Soil-Transmitted Helminths (STH) will be conducted in 2024. The review was conducted under the project 'Accelerating the Elimination of Neglected Tropical

Diseases in Botswana', funded by the Japanese Government and targeting an estimated population of 140,000 children between 6 and 14 years old (WHO.2021).

The overall mid-term survey, combined STH prevalence for the 59 schools was 21.9%. The most common STH species at mid-term was *A. lumbricoides* (17.8%) followed by Hookworms (4.8 %). *T. trichiura* was not detected at mid-term (0%). The overall mean intensity of infection at baseline was 1502.3 epg for hookworms, 204.1 epg for *A. lumbricoides*, and 346.8 epg for *T. trichiura*. At mid-term, the mean intensity of infection was 91.5 epg for hookworms, 44.3 epg for *A. lumbricoides* and 0.0 epg for *T. trichiura*.

Table 3. 4: Prevalence of Soil-transmitted helminths (Hookworm, Ascaris lumbricoides and Trichris trichiura) among 10-14 year SAC, 2015

#	District	No. of Schools	No. of students surveyed	No. positive	Hookworm		No. positive	*A. lumbricoides*		No. positive	*T. trichiura*	
					Prevalence	95% CI		Prevalence	95% CI		Prevalence	95% CI
1	Bobirwa	5	218	0	0.0%	0	0	0.0%	0	1	0.5%	0.9
2	Boteti	5	212	0	0.0%	0	2	0.9%	1.3	0	0.0%	0
3	Chobe	5	247	8	3.2%	2.2	37	15.0%	4.5	69	27.9%	5.6
4	Francistown	7	288	2	0.7%	1.0	38	13.2%	3.9	0	0.0%	0
5	Gaborone	4	200	0	0.0%	0.0	2	1.0%	1.4	0	0.0%	0
6	Gantsi	9	362	54	14.9%		17	4.7%		0	0.0%	
7	Goodhope	5	197	0	0.0%	0	7	3.6%	2.6	0	0.0%	0
8	Kgatleng	5	243	1	0.4%	0.8	26	10.7%	3.9	0	0.0%	0
9	Kgalagadi North	5	228	12	5.3%	2.9	10	4.4%	2.7	0	0.0%	0
10	Kgalagadi South	5	246	6	2.4%	1.9	0	0.0%	0	0	0.0%	0
11	Kweneng East	3	144	0	0.0%	0	1	0.7%	1.4	0	0.0%	0
12	Kweneng West	4	196	3	1.5%	1.7	2	1.0%	1.4	0	0.0%	0
13	Lobatse	5	238	4	1.7%	1.6	0	0.0%	0.0	0	0.0%	0
14	Mahalapye	5	231	40	17.3%	4.9	1	0.4%	0.8	0	0.0%	0
15	Okavango	6	307	72	23.5%	4.7	40	13.0%	3.8	1	0.3%	0.6
16	Ngamiland	5	238	11	4.6%	2.7	30	12.6%	4.2	0	0.0%	0.0
17	Northeast	5	205	1	0.5%	1.0	2	1.0%	1.4	0	0.0%	0.0
18	Selibe Phikwe	5	218	3	1.4%	1.6	44	20.2%	5.3	0	0.0%	0.0

19	Serowe/Palapye	10	488	24	4.9%	2.2	49	10.0%	4.7	0	0.0%	0.0
20	Southern	16	734	17	2.3%		2	0.3%		1	0.1%	
21	Southeast	4	188	0	0.0%	0	0	0.0%	0	0	0.0%	0.0
22	Tutume	5	251	0	0.0%	0	11	4.4%	2.5	13	5.2%	2.8

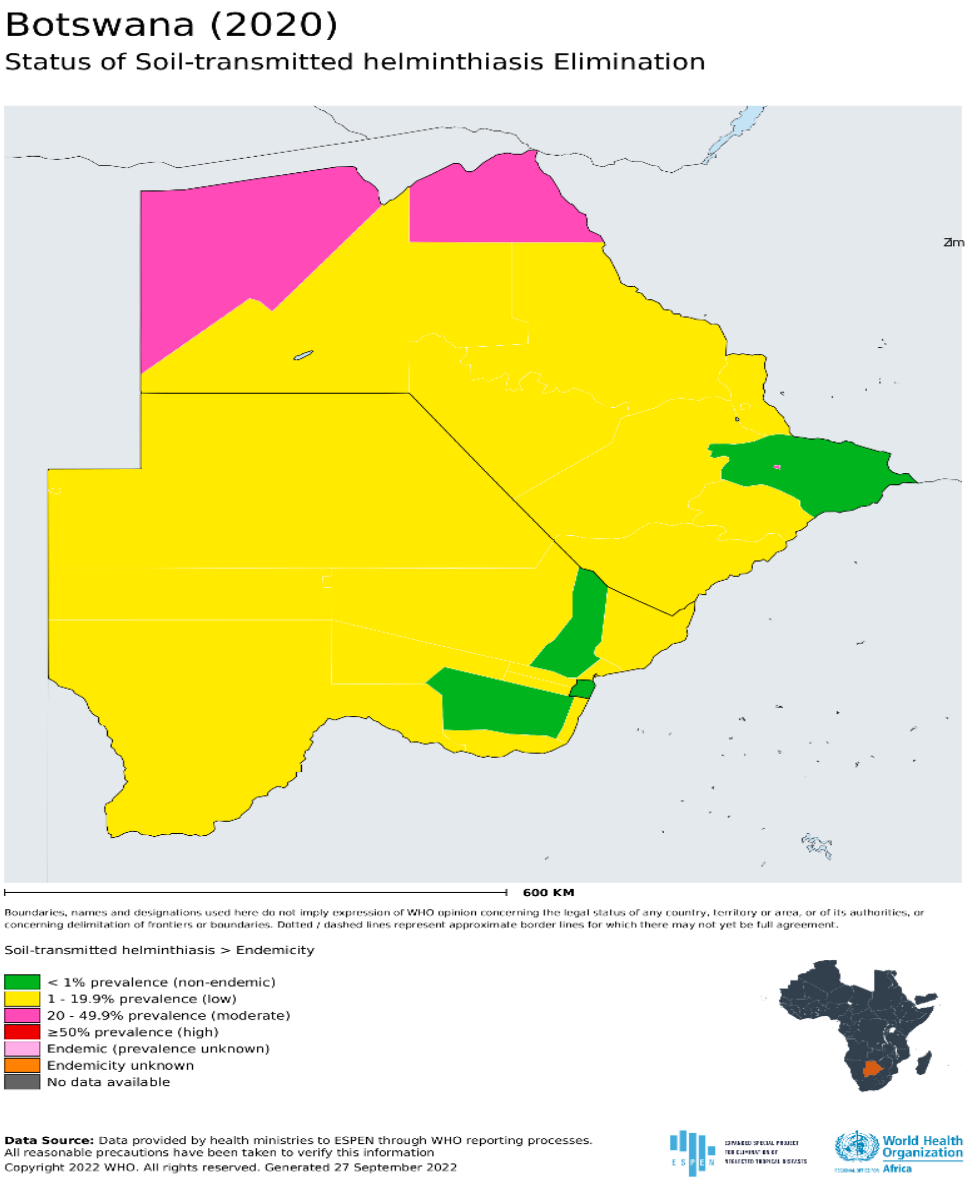


Figure 4.11: STH endemicity in Botswana

Control of Soil transmitted helminthiasis in Botswana

Following mapping of STH in 2015 the first MDA round for STH was launched in Botswana in 2018. This first phase covered 5 districts including Selibe Phikwe, Jwaneng, Mahalapye, Ngami, Okavango targeting primary school children aged 5-14 years. The second phase MDA round was conducted from 25th February to 1st March 2019, and this covered 4 districts namely Tsabong, Mabutsane, Lobatse and Chobe. About 30,000 children have been

successfully treated. The third round of MDA was to take place in November 2019 after which post treatment surveillance to measure the impact was conducted in 2021 (WHO, 2021). The MDA is part of the planned interventions following the 2015 NTDs mapping exercise conducted in Botswana.

Figure 4.12 shows Preventive Chemotherapy (PC) coverage trends over time.

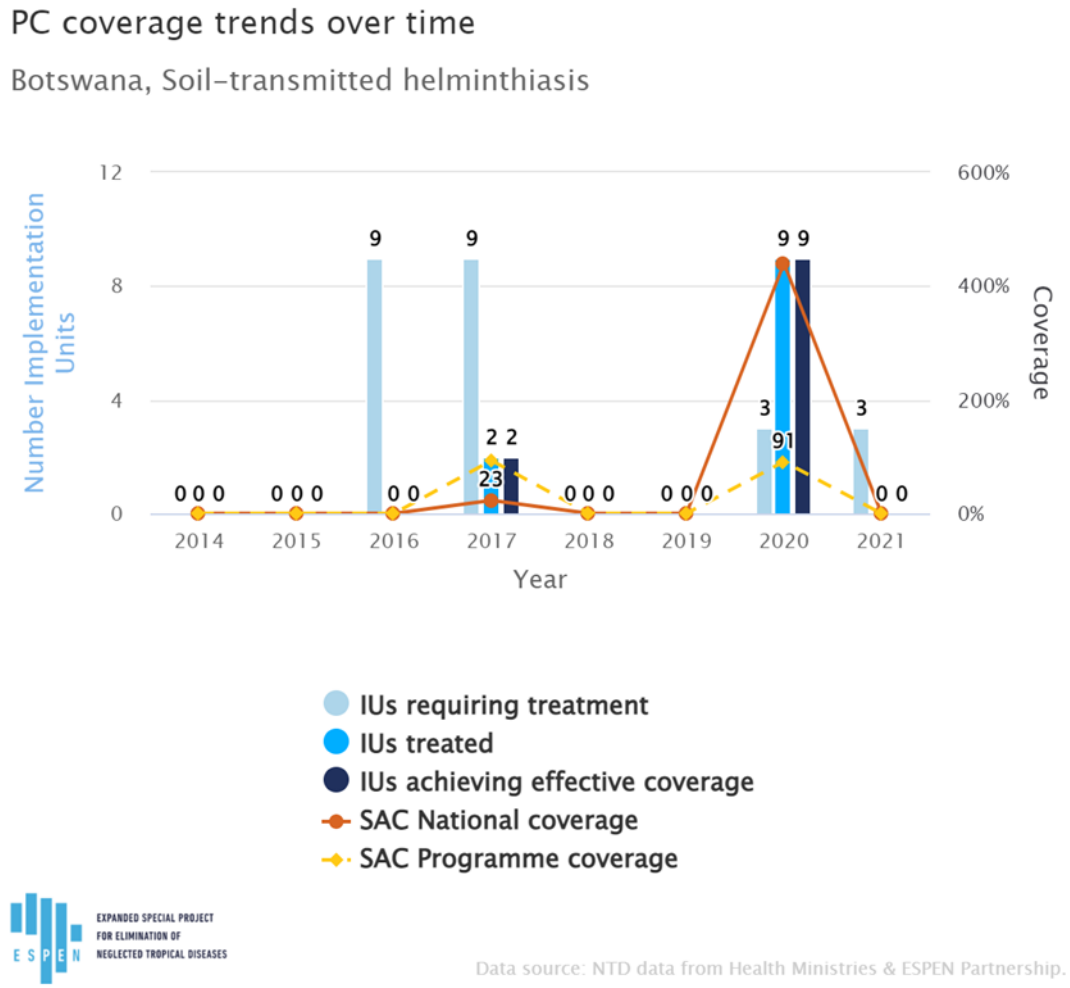


Figure 4.12: Preventive Chemotherapy coverage trends for STH over time

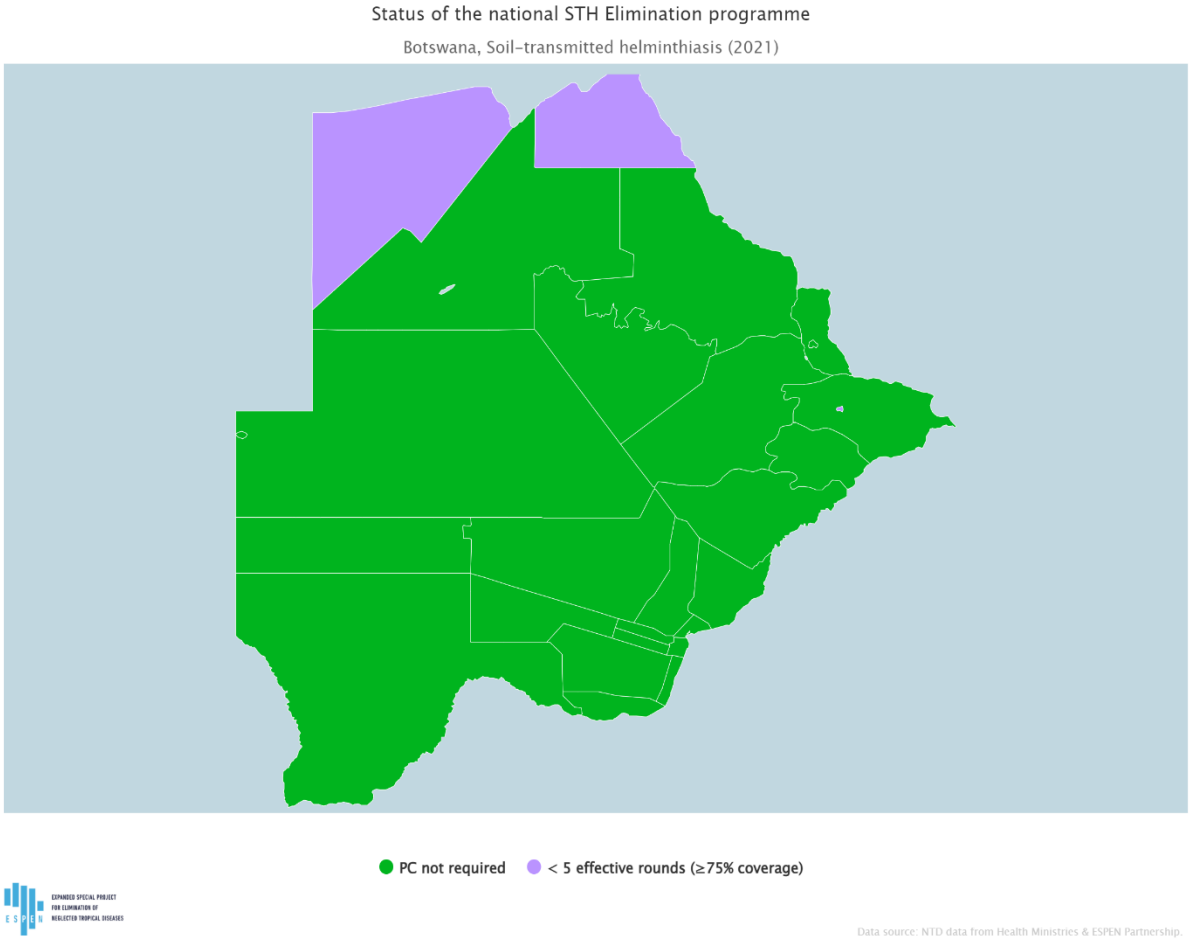


Figure 4.13: Status of the National STH elimination programme in Botswana (ESPEN 2021)

Trachoma

Trachoma is a blinding eye disease caused by repeated and prolonged infection with the bacterium *Chlamydia trachomatis* (Mabey *et al.,* 2002, NTD Road Map, 2021). Trachoma infection is transmitted from infected to healthy person during contact of infected eye discharge though hands, clothing, fomites, and excreta (Mabey *et al*., 2002, NTD Road Map, 2021). Repeated episodes of infection can scar the eyelids and cause eyelashes to turn inwards and rub the surface of the eye (trichiasis). This causes pain and may permanently damage the cornea, resulting in irreversible visual impairment or blindness. Infection is spread through personal contact (e.g., hands, clothes, bedding) or by flies through contact with ocular or nasal discharge of infected individuals; risk factors for transmission include inadequate hygiene, crowded households, inadequate access to water and lack of sanitation. Musca sorbens, eye-seeking fly, are the vector for active trachoma infection (Emerson *et al*., 2001). It is a significant global public health problem. Trachoma causes a considerable economic burden for individuals and communities in terms of lost productivity (about US$ 2.9–8 billion).

Burden

About 137 million people at risk of trachoma requiring A, F and E components of the SAFE strategy in 2020. About 2.5 million people requiring surgery for trachomatous trichiasis in 2019 (NTD Road Map. 2021). Trachoma is a public health problem in 44 countries and is responsible for blinding or visually impairing 1.9 million people.1 The number of people at risk of trachoma has decreased by 91% from 1.5 billion in 2002 to about 137 million in 2020. The number of people requiring surgery has reduced by 68% from 7.6 million in 2002 to 2.5 million in 2019.

Global target

Elimination as a public health problem.

Indicator: Number of countries validated for elimination as a public health problem (defined as (i) a prevalence of trachomatous trichiasis "unknown to the health system" of <0.2% in ≥15-year-olds in each formerly endemic district; (ii) a prevalence of trachomatous inflammation—follicular in children aged 1–9 years of <5% in each formerly endemic district; and (iii) written evidence that the health system is able to identify and manage incident cases of trachomatous trichiasis, using defined strategies, with evidence of appropriate financial resources to implement those strategies)

Botswana Situational analysis on trachoma

Trachoma is among the PC NTD diseases listed in Botswana. However, the country has not had an active trachoma control programme ever since because no data is currently available for Botswana (Smith *et al*., 2013). Although the disease was suspected to be endemic in most

areas with inadequate safe water (Smith *et al*., 2013), there is no data reported specifically on trachoma in Botswana. The disease is included under Blindness unit, Public Health department; currently the statistics do not specify trachoma. Thus, there is no specific statistical data for its existence. Mapping is needed to rule out the disease in the country. Figure 16 below shows the districts in which trachoma was suspected in Botswana based on the rapid trachoma mapping exercise conducted in 2008. **These results compel the country to undertake a well-planned and systematic national trachoma survey to determine endemicity, the affected population as well as the population at risk of infection.**

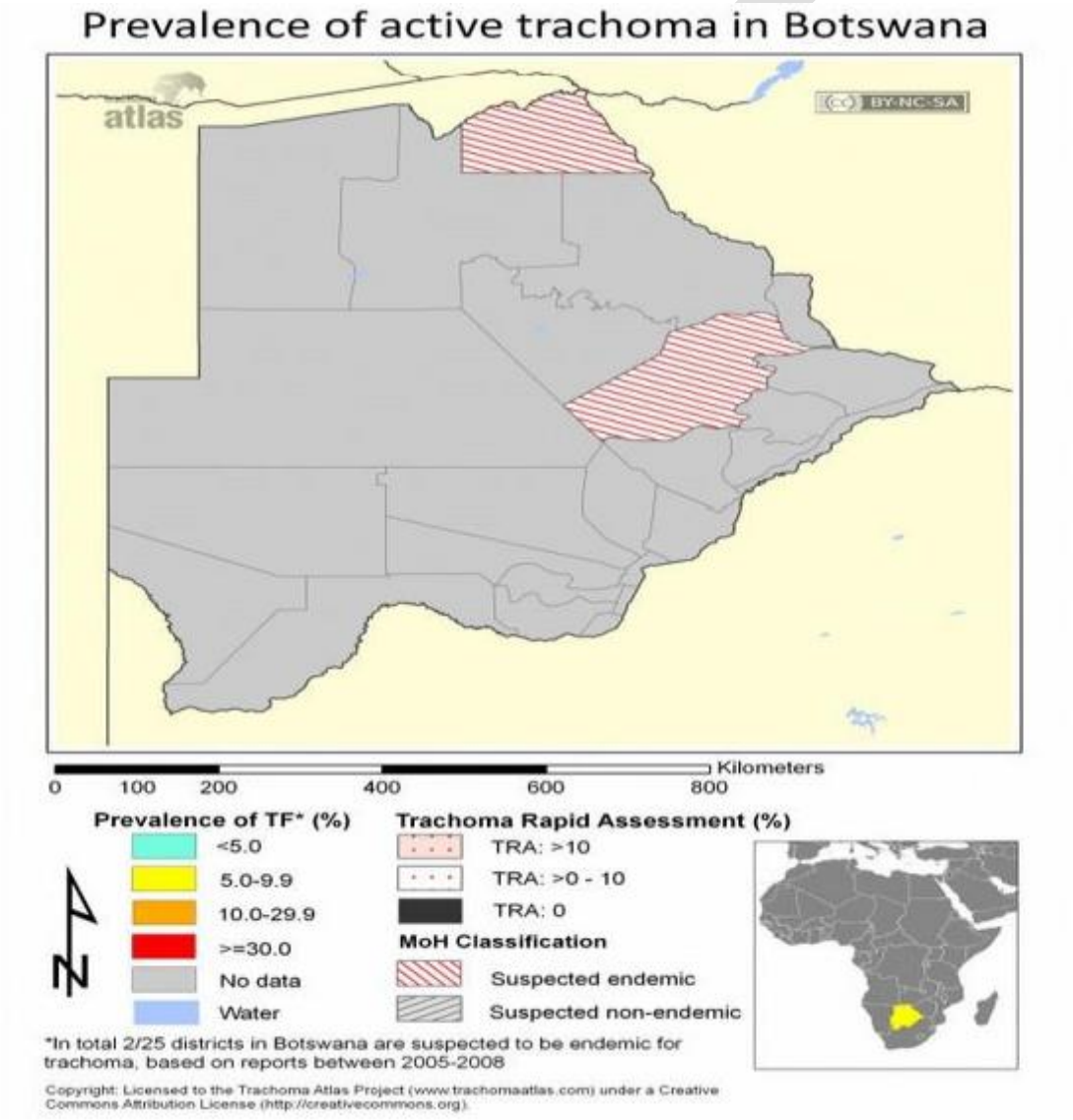


Figure 4.14: Results of the rapid trachoma assessment survey conducted in Botswana: Map courtesy of the Global Atlas of Trachoma.

Lymphatic filariasis

Lymphatic filariasis is caused by infection with the filarial parasites *Wuchereria bancrofti, Brugia malayi* and *B. timori*. People who are physically impaired by the disease may live for years with disability, stigmatization and mental health co-morbidity.

Global target

Elimination as a public health problem

Indicator: Number of countries validated for elimination as a public health problem (defined as infection sustained below transmission assessment survey thresholds for at least four years after stopping mass drug administration; availability of essential package of care in all areas of known patients).

According to WHO guidelines, the mapping unit for LF is a district. Only 6 districts were suspected to be endemic for LF were surveyed. The suspected districts are Okavango, Ngami, Chobe, Tutume, Northeast and Bobirwa. In each district, at least 2 villages with the highest score of cases associated with LF (hydrocele, and elephantiasis). The scoring was done using a combination of expert opinion, knowledge from community and their leaders and on data from health facilities.

The survey began with a village with the highest score of LF symptoms and was done using ICT card test. The survey involved 50-100 adults, balanced by sex, ≥15 years old and resident for more than 10 years in the village. If at least 2 out of the first 50 people gave a positive test, examination was stopped and the whole district considered LF endemic. Otherwise testing continued until all the 50-100 individuals were examined. In case it was not possible to get the 100 eligible people in the first village, the survey continued in a neighbouring village. In districts where there was no LF associated pathology or no known malaria endemicity, at least 2 villages were randomly selected from the district and surveyed as above, ensuring that the two villages were at least 25 km apart. In cases where the district bordered highly endemic district(s) or where there was substantial evidence of clinical disease, additional villages were surveyed before concluding that LF is indeed absent. Any district where at least 1/100 (1%) was positive, such a district was to be declared endemic for LF, hence requiring intervention. The second selected village only needed to be surveyed if ICT positivity rate in the first village was ≤1%. The survey was always first carried out in a more LF probable endemic village. Based on the results from the 6 suspected districts which were mapped Botswana was declared LF non- endemic (figure 4.15). Thus, LF is no longer considered an endemic NTD in Botswana.

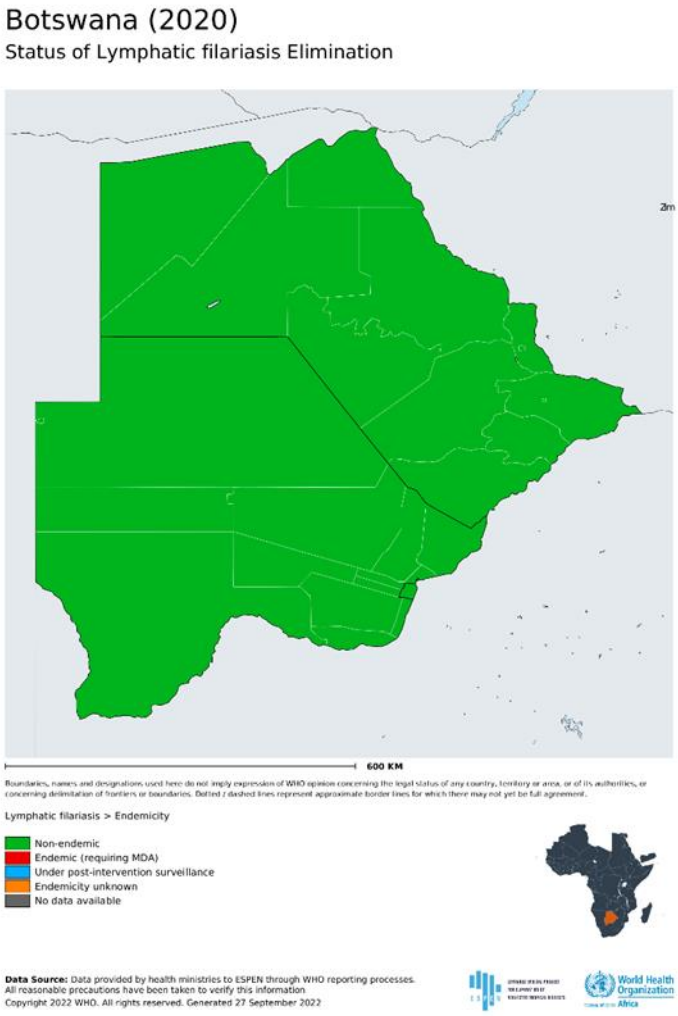


Fig. 4.15: Endemicity of Lymphatic filariasis in Botswana

Leprosy

Leprosy (Hansen's disease) is a communicable disease caused by the bacillus *Mycobacterium leprae*; the incubation period is long (average of 5 or more years). Untreated leprosy can lead to impairment, disabilities and exclusion (NTD Road Map 2021). The disease affects the skin and peripheral nerves and can cause permanent damage to the skin, nerves, face, hands and feet; untreated leprosy can lead to impairment, disabilities and exclusion. Infection is likely transmitted by droplets from the nose and mouth during prolonged close contact with untreated leprosy patients. Diagnosis of leprosy is mainly clinical. Stigma and discrimination play a major role in leprosy; overcoming them is important to reach zero leprosy. As with other NTDs, the occurrence of leprosy is often related to poor socioeconomic conditions.

Global burden

2Global target

Targeted for Elimination (interruption of transmission) by 2030**26** new leprosy patients were diagnosed globally in 2019. Of these **10 813** new leprosy patients had grade 2 disability and **1**
Indicator: Number of countries with zero new autochthonous leprosy cases81 new paediatric cases diagnosed with leprosy in 2019 (2021-2030 NTD Road Map). In 2019, leprosy was that needs to be treated with chemoprophylaxis to reach a 70% reduction in incidence by 2030.

Preventive Chemotherapy:

Post-exposure prophylaxis administered to all contacts of detected and consenting cases (single-dose rifampicin reduces the risk of leprosy among contacts by 60%2). As with other NTDs, the occurrence of leprosy is often related to poor socioeconomic conditions.

WASH: Access to clean water for wound care and routine self-care including daily soaking of hands and feet to prevent secondary disabilities; ensure hygiene, water and sanitation in health care facilities.

Case management

Patient management include, (i) early detection of cases is important to contain the spread of infection and prevent disabilities (ii) Multidrug therapy (MDT) lasting 6 to 12 months combines dapsone, rifampicin and clofazimine, (iii) Periodic monitoring, detection and treatment of immunological reactions (Type 1 and 2) and nerve damage (iv), management of adverse drug reactions, (v) counselling and psychological first aid, (vi) Prevention of disability,(vii) wound care and management of disability including self-care and (viii)rehabilitation to optimize functioning of the individual in the community.

Actions required to meet 2030 sub-targets:

- Update country guidelines to include use of single-dose rifampicin for post-exposure prophylaxis for contacts, advance research on new preventive approaches.

- Continue investment into research for diagnostics for disease and infection; develop surveillance strategies, systems and guidelines for case-finding and treatment; ensure resources for validation.

- Ensure medicines supply, including access to MDT, prophylactic drugs, second-line treatments and medicines to treat reactions; monitor adverse events (pharmacovigilance) and resistance.

- Ensure capacity for case-finding (screening, diagnosis), treatment and surveillance; integrate with primary care, skin and other NTDs, TB and/or other programmes where appropriate.
- Combat stigmatization and discrimination to ensure access to services and inclusion in society; ensure human rights of leprosy-affected persons are respected.

To further accelerate elimination efforts, new approaches are being proposed. These include early case finding through contact tracing and mass dermatology consultation promptly detect cases while prevention is targeted through Vaccination and Leprosy Post Exposure Prophylaxis (WHO AFRO (2018).

Historical perspective of leprosy in Botswana

A baseline survey to establish the point prevalence of leprosy was carried out in July and August 1991 in northern Botswana, where cases of leprosy have existed over the years. A total of 799 contacts of 127 index cases and 8235 school children from 18 schools were clinically screened for leprosy. In all, 44 active cases of leprosy were registered and started on multidrug therapy recommended by World Health Organization. Of these cases, 32% were newly identified during the survey. Due to the moderate outcome, surveillance and control of leprosy has been integrated with existing TB control programme. This is the first time ever a systematic attempt was made to establish a programme for control of leprosy in Botswana (Kumaresan et al., 1993).

During July-August 1991, health workers conducted leprosy screening in Ngami, Okavango, Chobe, Boteti, and Mahalapye in northern Botswana to determine the point prevalence of leprosy. They screened 799 contacts of 127 index cases and 6235 school children from 9 secondary and 9 primary schools. During the contact survey, they detected 42 active cases of leprosy, whom they started on multidrug therapy. Only 2 students had active leprosy (paucibacillary cases). They lived in Okavango sub-district. The health workers also started them on multidrug therapy. The surveys identified 14 (32%) new leprosy cases. Multibacillary leprosy was more common than paucibacillary leprosy (68% vs. 32%). Most cases (84%) were older than 25 years old. Most leprosy cases lived in Ngami and Okavango sub-districts (43% and 41%, respectively). The point prevalence of registered leprosy cases on multidrug therapy in the 5 sub-districts in northern Botswana was 0.18/1000. Since the surveys showed that leprosy prevalence is low, surveillance and control of leprosy activities have been integrated into the existing tuberculosis control program. This integration was the first time that a leprosy control program has been systematically attempted in Botswana (Kumaresan et al., 1993).

Currently, leprosy in Botswana is reported in the following districts: Ngami, Okavango, Boteti, Mahalapye, and the prevalence remains less than 1 case per 10 00 population. Though the prevalence might be very low, case finding of Leprosy is still a challenge as many health care

workers suspicion index to detect the disease is low. Leprosy like other Neglected tropical diseases has experienced a gradual reduction in funding and, research (WHO AFRO. 2018).

Rabies

Rabies is caused by infection with the rabies virus and other lyssaviruses. Infection causes progressive and fatal inflammation of the brain and spinal cord. About 40% of rabies victims are children aged under 15 years.

Infection causes progressive and fatal inflammation of the brain and spinal cord; there are two clinical presentations of rabies:

- furious rabies (80% of cases) in which hyperactivity and excitable behaviour are exhibited and death occurs within a few days; and
- paralytic rabies (20% of cases, often misdiagnosed) in which the muscles gradually become paralysed and eventual coma and death result (NTD Road Map. 2021).

The rabies virus is transmitted to humans mainly through the bites of domestic dogs (up to 99%) but also by various other mammals (such as bats). About 40% of rabies victims are children aged under 15 years.

Global burden

In Southern Africa, 4 genotypes of the lyssavirus, which cause rabies, are endemic. The most common is Genotype 1 (Rabies virus, RABV). Others are Genotype 2 (Lagos bat virus, LBV), Genotype 3 (Mokola virus, MOKV) and Genotype 4 (Duvenhage virus, DUVV). Human infections are mostly due to the canine biotype of RABV (Rupprecht et al., 2008).

Dog-transmitted human rabies is present or suspected in 89 countries, mostly in Africa and Asia. About 29 million people received post exposure prophylaxis and 29 000 deaths Occurred in 2015 (Hampson et al., 2015).

Global target

Elimination as a public health problem by 2030

Indicator: Number of countries having achieved zero human deaths from rabies

Interventions for rabies

Mass vaccination of dogs (vaccinating 70% of dog populations in high-risk areas) is a cost–effective and recognized measure to break the rabies transmission cycle. The intervention can also be conducted through dog population management. Post-exposure prophylaxis (PEP) with the rabies vaccine as well as rabies immunoglobulin for category III exposures is needed.

immediately after exposure to a potentially rabid animal including thorough wound washing. Timely diagnosis and accurate risk assessment of wound and bite circumstances are important. Education is crucial, especially for children, to prevent deaths from rabies, e.g., how to avoid being bitten and what to do in the event of a bite. Pre-exposure vaccination is recommended for people at high risk of exposure to the rabies virus, e.g., laboratory staff working with the rabies virus, veterinarians and animal handlers (NTD Road map.2021).

Case management

Post-exposure prophylaxis (PEP) with the rabies vaccine as well as rabies immunoglobulin for category III exposures is needed immediately after exposure to a potentially rabid animal. Thorough wound washing.

Global target:

Elimination as a public health problem by 2030.

***Actions required to meet 2030 sub-targets*:**

- Improve forecasting of demand for rabies vaccine and immunoglobulin to ensure adequate supply in facilities and develop innovative approaches for delivery to ensure timely access to post-exposure prophylaxis and dog vaccination.
- Build national capacity of health workers (e.g., rabies exposure assessment, diagnosis, administration of post-exposure prophylaxis) and for dog management (e.g. mass dog vaccination).
- Strengthen and institutionalize surveillance for rabies; improve country compliance with reporting to ensure data availability.

Rabies situational analysis in Botswana

Rabies is a notifiable disease in Botswana and is commonly known as Molafo. A national case definition is provided, which includes suspected, probable and confirmed rabies cases.

Moagabo et al., 2009 conducted a longitudinal study of animal and human rabies covering 18 years from 1989 to 2006 retrospectively in order to highlight the epidemiological features and trends of the disease in Botswana. Over the 18-year period, a total of 4 306 brain specimens

collected from various species of animals including human beings with clinical signs consistent with rabies were submitted to the National Veterinary Laboratory in Gaborone for confirmatory diagnosis. Of the samples submitted, 2419 cases were found to be positive for lyssavirus antigen; this presents an overall prevalence rate of 56.18 +/- 1.48%. About 85.7% (2 074/2 419) of the cases were from domestic animals, 14.2% (343/2 419) cases were from wild animals and two cases (0.1%) were from human beings. During the first half of the study (1989-1997) the prevalence rate of the disease was estimated at 62.79 +/- 1.85% (1645/2620 positive) whereas during the second half (1998-2006) it was estimated at 45.91 +/- 2.38% (774/1686 positive). Ruminant rabies accounted for 79.99% (50.92% bovine, 928.40% caprine and 0.67% ovine) whereas canine (domestic dog) and feline (domestic cat) accounted for 16.01 and 0.87%, respectively. Equine rabies accounted for 3.13% with 1.35 and 1.78%, respectively, for horses and donkeys. Jackal rabies accounted for more than 60% of the total cases in wild animals (Moagabo *et al.*, 2009).

Data on cases diagnosed by the Botswana National Veterinary Laboratory between 2000 and 2010 were analysed. An average of 35 cases per year was detected in ruminants during this study period. Cases of rabies (340) in ruminants were concentrated in the northern part of Botswana (88.7% of all cases). The Northeast District had the highest proportion of affected ruminants (0.029%) and 77.6% of these cases were in the peri-urban villages clustered around Francistown. Livestock from farms in peri-urban villages (OR 10.6; 95% CI 4.2, 26.9), free-roaming livestock (OR 3.1), dogs attacking livestock (OR 3.1) and the presence of herding dogs (OR 4.5) were all significantly associated with a history of rabies in ruminants. iv Farmers who could name at least one clinical sign of rabies in cattle were 5.7 times (95% CI 3.1, 10.5) more likely to have reported a case of rabies than those not knowing any clinical signs; however, most farmers knew the clinical signs of rabies in dogs. This highlights the need for further education on the disease, including methods to recognise and control it in the farming community, as well as in the general public (Benjamin Ditsele. 2016).

Management and control of Rabies in Botswana

In Botswana the management of rabies in animals, as with other veterinary diseases, is through the Ministry of Agriculture by the DVS. Rabies surveillance in Botswana is mostly passive as the DVS response is only based on reporting by the farmers or dog owners. The same is true on wildlife rabies surveillance. Although rabies in humans is managed by the Ministry of Health (MoH), testing of human brain specimens for rabies is conducted by the DVS. Wild animals are managed by the Department of Wildlife and National Parks (DWNP) through game reserves and national parks as well as in areas outside protected zones where specific hunting licenses are given to the public. However, reactive disease investigation in wildlife is carried out by the DVS, especially when livestock are threatened. Human and wildlife rabies surveillance in Botswana is not built into the national disease surveillance system and therefore are not effectively implemented with little to no coordination between the veterinary, human health and wildlife departments (WHO, 2013a). Rabies is maintained in two epidemiological cycles: an urban and a sylvatic cycle. The urban rabies cycle has been reported to predominate

in African countries (Moagabo et al., 2009), however in Botswana, where the government has intensively and effectively campaigned against dog rabies, it is likely that the sylvatic rabies predominates (Moagabo et al., 2009). The sylvatic rabies cycle can be relatively stable occurring as a slow-moving epidemic with often one and occasionally up to three wildlife species being responsible for perpetuating a particular strain of rabies (CFSPH, 2009). Rabies is a notifiable disease in Botswana and all dog and cat owners are obligated by law to immunise their animals annually against the disease. Those who do not comply stand to face severe penalties which may include imprisonment, significant fines or having their animal(s) destroyed without compensation. To facilitate the control of rabies, the Government of Botswana provides free rabies immunisations to dogs and cats through campaigns implemented by the DVS every winter in urban areas, villages, farms and cattle posts. However, lack of a national identification system for dogs and cats makes it hard to monitor vaccination status of dogs and cats. Immunisation of dogs and cats at the cattle posts is usually undertaken simultaneously with cattle vaccinations against anthrax, black quarter and brucellosis. Stray dogs are usually not a problem at cattle posts, compared to in towns and villages. The vaccine used is Rabisin® produced by Pfizer which is designed to induce antibodies lasting for three years, however in Botswana its annual usage is designed to counteract the less than optimum coverage attained during vaccination campaigns and to induce high levels of protective titres (Tremlett, 1993). Some pet owners, however, prefer to visit a private veterinarian for the vaccination of their pet(s) against rabies. The owners of all immunised dogs and cats receive a vaccination certificate which is necessary for international, national and zonal movements of their pets. Depending about rabies in an area, the local DVS office may destroy unvaccinated and stray dogs and cats immediately following a vaccination campaign. In addition, the population control of dogs and cats in cities, towns and major villages is the responsibility of the local municipality who have specific by-laws authorizing these activities. However, enforcement of these laws has been challenging. Despite these efforts to curb rabies in dogs, it is a continuing battle to control the disease due to the roles played by either stray dogs or the sylvatic rabies cycle (Tremlett, 1993). Furthermore, there are some challenges encountered including vaccine efficacy (old vaccines), rural residents who own packs of dogs for hunting purposes who may refuse to vaccinate them because of a belief that the rabies vaccine renders their dogs powerless and a lack of road-access to rural areas which negatively impacts upon the vaccination coverage (Tremlett, 1993). In the event a dog or cat bites a human or is reported to have signs indicative of rabies, a record of its vaccination history must be produced by the owner and the animal must be restrained and monitored for 10 days. If signs of rabies are observed or the animal dies, the brain is removed, and specimens sent to the laboratory and the medical doctors treating the bitten human informed. If no signs of rabies are observed in the animal, then it is released back to its owner (Tremlett, 1993). Stray animals or wild animals suspected of rabies are destroyed immediately and appropriate samples taken and sent to the laboratory for confirmatory diagnosis (Tremlett, 1993).

Human rabies surveillance in Botswana is currently not operating effectively, since there is no coordination between the veterinary, health and wildlife departments. Furthermore, human rabies surveillance is not integrated into any other national disease surveillance system. The National Veterinary Laboratory in Gaborone is responsible for the laboratory confirmation of rabies in humans and animals via the fluorescent antibody test (FAT) and mouse inoculation test (MIT), which receives the brain samples together with a case history and a symptomatic description (Rupprecht et al., 2008, SEARG. 2013, https://apps.who.int/rabies/epidemiology/Rabies_CP_Botswana_09_2014.pdf).

On average less than 200 cases of rabies are diagnosed in domestic and wild animals in Botswana annually, with most cases recorded in the eastern part of the country. The most common animals are cattle, goats and dogs. Among wildlife it is by far the jackal. In recent years there has been a shift from more numbers of infected dogs being reported than of rabid cattle and goats (Sehularo, K. 1995, http://www.searg.info/doku.php?id=meetings, https://apps.who.int/rabies/epidemiology/Rabies_CP_Botswana_09_2014.pdf).

According to the data submitted to SEARG, in 2012 a total of 71 cases of animal rabies were laboratory confirmed, of which 50 were dogs, 21 other domestic animals and 0 wildlife. In 2011, there were a total of 49, with 32 dogs found positive, 15 other domestic animals and 2 wildlife (SEARG. 2013). Data submitted to the OIE for 2011 is slightly different with 31 positive cases of rabies in dogs (OIE World Animal Health Information System. Botswana, 2011).

Scabies

Scabies is one of the most common infectious skin conditions in the world, caused by a microscopic mite – *Sarcoptes scabiei var. hominis* – that burrow into the skin and lays eggs, eventually triggering a host immune response that leads to intense itching and rash mite (Chosidow. 2006, Agyei *et al.,* 2020). Distribution is worldwide with an estimated global incidence of 300 million with Indonesia, China, Timor-Leste, Vanuatu and Fiji having the greatest burden of disease (Agyei *et al.,* 2020). Individuals of all age groups can be affected but it tends to occur more frequently among the elderly, adolescents and young children (Karimkhani *et al*., 2017). Spread is aided by close contact and predisposing factors including overcrowding, immune-compromised status, malnutrition, poor hygiene, multiple sexual partners and late diagnosis (Walton SF and Currie BJ., 2007). Infestation with the 0.3 to 0.5mm long female mite is initiated by close skin contact of about 10 to 15 minutes during which the mite is transferred to the new host. The mite tunnels into the stratum corneum of the skin depositing faeces and about 3 eggs per day. These eggs are transformed into larvae within 3 to 10 days and then subsequently into nymphs that mature into adults. Following mating, the male dies but the fertilized female lives for about 4 weeks depositing eggs (Agyei *et al.*, 2020).

Symptoms of infestation, manifested by a host immune response that leads to intense itching and rash itching. These are mediated by an allergic reaction to the mite´s faeces deposited in the burrows. Previously exposed individuals tended to develop symptoms within days due to prior sensitization. First time infestations may take 4 to 6 weeks as they mount an immune-mediated antigen-specific delayed hypersensitivity reaction (Bhat *et al*., 2017).
Scabies infestation may result in secondary bacterial infection, leading to more serious complications such as nephritis, Crusted scabies, severe soft tissue infections, septicaemia, kidney disease rheumatic fever and sepsis (Hay *et al*., 2012, James *et al*., 2022, Agyei *et al*., 2020, NTD Road Map 2021).

Classical scabies (also known as simple scabies) affects the web spaces in-between the digits, volar aspect of wrist, elbows, breasts and external genitalia with the scalp, face, neck, palms and soles usually spared; these areas may be involved especially in young children and immunocompromised (Agyei *et al.,* 2020).

Given that scabies transmission occurs with person-to person contact, scabies is particularly prevalent in resource-poor conditions and among children and is associated with insufficient access to health-care subsidies. Scabies can occur in any setting but over the past century has become less prevalent in temperate regions and is more common in tropical, humid regions. The greatest DALYs from scabies are in tropical regions in East Asia, Southeast Asia, Oceania, tropical Latin America, and South Asia, Southern sub-Saharan Africa, especially in children, adolescents, and the elderly (Karimkhani *et al*., 2017). Figure 4.6 shows world regions with scabies including 195 countries and territories, among which Botswana has been identified

(Karimkhani *et al*., 2017). Prevalence studies have reported high prevalence of scabies in hot, tropical areas where overcrowding facilitates the rapid spread of the scabies mite (Romani *et al*., 2015a, Kearns *et al*., 2013, Worth *et al*. 2012, Romani *et al*., 2015b).

Panel: **Global Burden of Disease regions and countries within each region**

East Asia
China, North Korea, and Taiwan (province of China)

Oceania
American Samoa, Federated States of Micronesia, Fiji, Guam, Marshall Islands, Northern Mariana Islands, Papua New Guinea, Samoa, Solomon Islands, Tonga, and Vanuatu

Southeast Asia
Cambodia, Indonesia, Laos, Malaysia, Maldives, Mauritius, Myanmar, Philippines, Sri Lanka, Seychelles, Thailand, Timor-Leste, and Vietnam

South Asia
Bangladesh, Bhutan, India, Nepal, and Pakistan

Central Asia
Armenia, Azerbaijan, Georgia, Kazakhstan, Kyrgyzstan, Mongolia, Tajikistan, Turkmenistan, and Uzbekistan

Central Europe
Albania, Bosnia and Herzegovina, Bulgaria, Croatia, Czech Republic, Hungary, Macedonia, Poland, Romania, Serbia, Slovakia, and Slovenia

Eastern Europe
Belarus, Estonia, Latvia, Lithuania, Moldova, Russia, and Ukraine

North Africa and Middle East
Afghanistan, Algeria, Bahrain, Egypt, Iran, Iraq, Jordan, Kuwait, Lebanon, Libya, Morocco, Palestine, Oman, Qatar, Saudi Arabia, Sudan, Syria, Tunisia, Turkey, United Arab Emirates, and Yemen

Western sub-Saharan Africa
Benin, Burkina Faso, Cameroon, Cape Verde, Chad, Côte d'Ivoire, The Gambia, Ghana, Guinea, Guinea-Bissau, Liberia, Mali, Mauritania, Niger, Nigeria, São Tomé and Príncipe, Senegal, Sierra Leone, and Togo

Southern sub-Saharan Africa
Botswana, Lesotho, Namibia, South Africa, Swaziland, and Zimbabwe

Eastern sub-Saharan Africa
Burundi, Comoros, Djibouti, Eritrea, Ethiopia, Kenya, Madagascar, Malawi, Mozambique, Rwanda, Somalia, South Sudan, Tanzania, Uganda, and Zambia

Central sub-Saharan Africa
Angola, Central African Republic, Congo (Brazzaville), Democratic Republic of the Congo, Equatorial Guinea, and Gabon

Tropical Latin America
Brazil and Paraguay

Andean Latin America
Bolivia, Ecuador, and Peru

Central Latin America
Colombia, Costa Rica, El Salvador, Guatemala, Honduras, Mexico, Nicaragua, Panama, and Venezuela

Caribbean
Antigua and Barbuda, The Bahamas, Barbados, Belize, Bermuda, Cuba, Dominica, Dominican Republic, Grenada, Guyana, Haiti, Jamaica, Puerto Rico, Saint Lucia, Saint Vincent and the Grenadines, Suriname, Trinidad and Tobago, and Virgin Islands

Western Europe
Andorra, Austria, Belgium, Cyprus, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Israel, Italy, Luxembourg, Malta, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland, and UK

Southern Latin America
Argentina, Chile, and Uruguay

North America
Canada, Greenland, and USA

Asia Pacific
Brunei, Japan, Singapore, and South Korea

Australasia
Australia and New Zealand

Figure 4.16: World regions with scabies including 195 countries and territories (Karimkhani *et al*., 2017).

Recognition of scabies on the global health agenda would increase awareness, education, and research into diagnosis, treatment, and prevention. In recognition, WHO recently formally designated scabies as a neglected tropical disease (WHO, 2017)

Global Burden of disease

About 200 million people are affected by scabies any time. About 4.5 dallies Darlys all ages in 2017. The burden of disease is particularly high in India, the Pacific Islands, and in Australia among Indigenous communities. In 2017, scabies was included in the World Health Organization's list of neglected tropical diseases (https://www.medicinesdevelopment.com/diseases/scabies). However**,** accurate data on incidence and prevalence are not available although the disease is endemic across all continents with the highest burden being in Asia. Botswana, like many other countries had not contacted a systematic national mapping for scabies to determine the burden disease and identify endemic districts. This is a gap that must be filled by conducting a national mapping of scabies. Results of the mapping survey will inform intervention strategies for Botswana.

Global target

Scabies is targeted for control.

Global Indicator: Number of countries having incorporated scabies management in the universal health coverage package of care.

Interventions

Topical agents (applied to the skin) such as permethrin and benzyl benzoate, are generally considered to constitute first-line treatment of classical scabies, with oral ivermectin being reserved for recurrent, difficult-to-treat cases, or crusted scabies. Most authorities however recommend the use of both topical and systemic agents simultaneously (Thomas *et al*., 2015). Various scabicides such as 5% permethrin cream, 1% lindane cream, 5 to10% sulphur and malathion are available. Some authorities recommend the use of keratolytic agents such as 6% salicylic acid prior to application of scabicides to allow better penetration. Galenicals and home-based treatments such as neem and tea tree oil have been used with varying success. Scabicides should be applied to all skin areas after bathing and left in contact with the skin for 24 hours. Finger and toe nails should also be trimmed and the topical scabicide applied to the subungual area as this site tends to harbour mites for re-infestation (Agyei *et al*., 2020)

The biggest drawback to using topical agents is their need to cover and remain on the entire body for between eight to 24 hours, depending on the agent and the severity of the infestation. Ivermectin therapy is approved for use in only a handful of countries and so is not accessible to most people in need. In addition, ivermectin has a short half-life, which usually results in the need to administer a second dose to ensure mites hatching from eggs are eliminated.

Mass drug administration (MDA) using oral ivermectin and topical scabicides is recommended. WASH related hygiene measures may be helpful as part of the response to institutional outbreaks. Hygiene also measures reduce the risk of secondary infection in infested individuals.

Botswana situational analysis of Scabies

Figure 4.6 shows world regions with scabies including 195 countries and territories, among which Botswana has been identified (Karimkhani *et al*., 2017). Regardless of the data showing reports of Scabies outbreaks in some areas in Botswana, there has not been any systematic mapping for scabies in Botswana to inform policy and intervention strategies.

Gaps

- Whilst scabies has been listed among the WHO NTD portfolio, mapping of scabies in Botswanan population to enhance understanding of disease incidence and prevalence has not been conducted. Thus, epidemiological data is not currently available in Botswana. Mapping is therefore needed to determine endemicity of scabies in Botswana and estimate the national burden of the disease.

- Medicines for mass drug administration including Ivermectin are not readily available in peripheral health facilities that serve hard to reach populations which are likely to experience the disease due to crowdedness.
- Treatment guidelines and routine diagnosis and treatment scabies have not been developed.
- Health workers have inadequate skills for clinical diagnosis and treatment of scabies.

Snake bites and envenoming

Snakebite is a major cause of mortality and morbidity in many areas, particularly in the rural tropics, and is a major public health problem around the world. It also imposes significant economic burdens on snakebite victims due to treatment-related expenses and lost productivity (NTD Road Map 2021). Venomous snakebites affect millions of people worldwide annually and are a significant source of mortality (Gutiérrez et al., 2017). Venomous snakebites can result in life-threatening medical emergencies. These include significant paralysis, which can cause breathing problems, bleeding disorders, which can result in lethal haemorrhage, irreversible kidney failure, and severe local tissue destruction, which can result in permanent disability and amputation. In many countries, effective treatment for snakebite envenoming is currently unavailable. When treatment is available, the cost can be prohibitively expensive. Long term consequences of poor treatment can push vulnerable poor people deeper into debt and poverty (Hardy DL. 1994). Preventing and treating the problem is complex and requires collaboration among the fields of public health, medicine, ecology, and laboratory science. Venomous snakebite was reinstated in 2017 as an NTD in response to antivenom shortages and advocacy from researchers and international NGOs (Chippaux JP. 2017, Bagcchi S. 2017). In 1998, Chippaux estimated that over 100,000 deaths were caused by venomous snakebites (Chippaux JP.1998). In 2008, Kasturiratne and colleagues used the Global Burden of Diseases, Injuries, and Risk Factors Study (GBD) framework to capture regional trends and found that venomous snakebites total between 20,000 and 94,000 annual deaths globally (Kasturiratne *et al., 2008*). While both studies were formative in establishing venomous snakebite as an underappreciated cause of death, the studies relied on fragmentary literature reviews and highly heterogeneous data sources. Regional meta-analyses have also been conducted in sub-Saharan Africa and the Americas using national health reporting systems, hospital records, and household surveys (Chippaux JP. 2011, Chippaux JP. 2017). In India, verbal autopsy surveys, which are interviews that retrospectively ascertain the cause of death and can be scaled up to the population level, have been used to estimate the mortality burden in detail (Mohapatra *et al.*, 2011, Dandona *et al.*, 2018). Each of these studies has shown venomous snakebites to be a major source of disease burden. The GBD is a major effort to collect and incorporate all available data for 369 causes of disease and injury and 87 risk factors from published literature, registries, vital registration systems, verbal autopsies, and hospital records to produce comparable estimates of burden at the global, regional, and national levels (Vos *et al*., 2019).

In 2019, the World Health Organization (WHO) set a target to reduce to 50% the number of deaths and cases of venomous snakebite by 2030 (WHO.2019).

The risk of death by snakebite is highest in developing regions.

Venomous snakes are found around the world, but the people most at-risk live-in poor, rural regions of Africa and southern Asia, where access to treatment often is limited. Not all bites

result in venom being injected (envenoming), but those that do can kill or permanently disable a person.

Burden

An estimated 5.4 million snake bites occurred in 2019. Of these 2.7 million envenoming were registered, resulting in 400 000 permanent disabilities and 130 000 deaths. Figure 4.17 shows the distribution of snake bites by continent and the number of deaths due envenoming that fail to receive timely treatment.

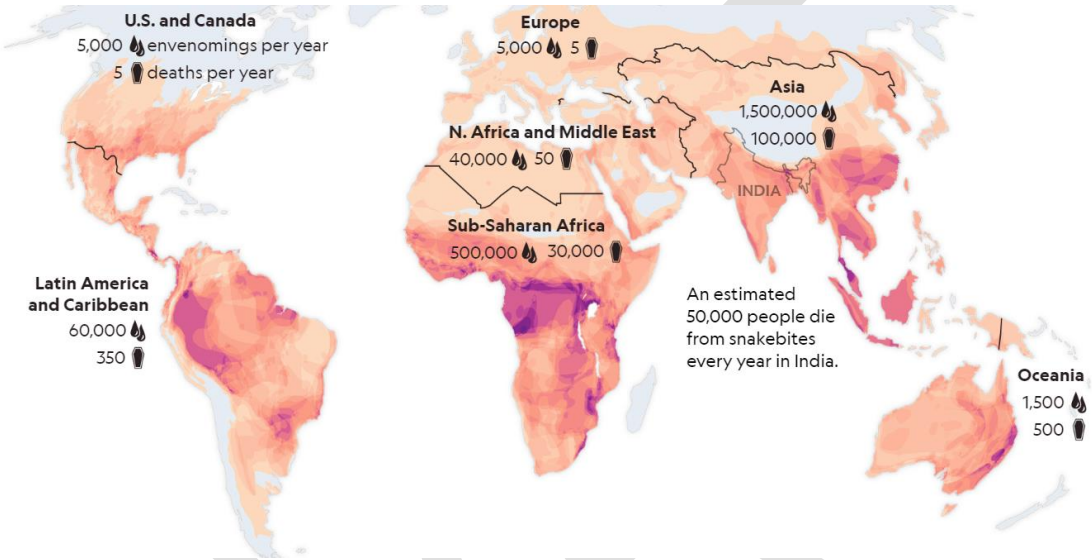


Figure 4.17: Distribution of snake bites and deaths due to envenoming by continent.

Global target

Nake bite envenoming is targeted for control.

Global indicator

Number of countries having achieved reduction of mortality by 50%

Challenges/gaps

At present Botswana has no capacity to produce snake venoms of adequate quality for antivenom manufacture, and many manufacturers rely on common commercial sources.

The general lack of regulatory capacity for the control of antivenoms results in an inability to assess the quality and appropriateness of the antivenoms.

Poor data on the number and type of snake bites have led to difficulty in estimating needs, and deficient distribution policies have further contributed to manufacturers reducing or stopping production or increasing the prices of antivenoms globally but finally affecting the developing countries including Botswana where snake bite and envenoming are common threats to human life.

There's a severe shortage of antivenoms more broadly: The number of vials in circulation is less than 5 percent of the one million to two million needed yearly in sub-Saharan Africa. And even if effective antivenoms such as Inoserp were widely available, high risk rural African populations—whose earnings may be no more than a few dollars a day—cannot afford it. Hospitals and pharmacies might charge $80 to $120 or more a vial, and most snakebite victims require several vials (https://www.nationalgeographic.com/animals/article/snakebites-neglected-health-crisis-africa). This phenomenon is not uncommon in Botswana.

The antivenom available may not be reliable. Botswana is not yet producing its own antivenom, thus, its reliance on imports places it in a position where it has no choice but to procure the antivenom available and not necessarily specific for the venoms in the country. Antivenoms differ with region, as climatic conditions do also differ.

Even if the antivenom is available, some medical staff do not know how to administer it. There is a need to build capacity among local health workers so that appropriate diagnosis and patient management can be enhanced.

In most resource poor communities, some people aren't taken to a hospital at all. Families may seek help instead from traditional healers, who may apply leaves or ash from burned animal bones, or tie a tourniquet around the bitten limb, which can dangerously restrict blood flow. Community Health education must be prioritised. Such health seeking behaviour is also characteristic in Botswana rural settings.

Snake bites records and reports are not updated in many countries as also is the case in Botswana. Table 4.6 shows the reported number of snake bites and deaths related to envenoming by district in Botswana for the period from 2018-2022.

Mycetoma, chromoblastomycosis and other deep mycoses (chromoblastomycosis and other deep mycoses)

Chromoblastomycosis and other deep mycoses are chronic fungal infections of the skin and subcutaneous tissue caused by a group of fungi. They are transmitted by traumatic inoculation of relevant microorganisms through broken skin. Chromoblastomycosis (CBM) is a chronic fungal infection of the skin and subcutaneous tissue caused by a group of fungi; the three most common species are *Fonsecaea pedrosoi, Cladophialophora carrionii* and *Phialophora verrucose*; other deep skin mycoses affecting vulnerable populations in tropical countries, are paracoccidioidomycosis (PCM, caused by *Paracoccidioides* spp.) and sporotrichosis (ST, caused by *Sporothrix* spp.). CBM causes lesions that are clinically polymorphic, the most frequent being nodular, verrucous and tumoral; ST causes skin lesions that are commonly single nodules or ulcers or chains of nodules; PCM is a respiratory infection, although lymph nodes, skin and mucous membrane lesions are the commonest site for dissemination in the bloodstream, which can occur in otherwise healthy people. CBM, PCM and ST are transmitted by traumatic inoculation of relevant microorganisms through broken skin (NTD Road Map 2021-2030).

Strategic Interventions

Case management

Treatment depends on the causative organisms: - bacterial: long-term antibiotic combinations - fungal: combined antifungals (mainly itraconazole) and surgery (from local excision to debridement to amputation). Wound care including cleaning, dressing, disinfecting should be done.

WASH

Personal hygiene and self-care of the affected limbs to avoid secondary infections.

WHO 2030 target and milestones.

By 2030, a target of 15 countries should have included mycetoma, chromoblastomycosis, sporotrichosis and/or paracoccidioidomycosis in national control programmes and surveillance systems.

Currently there are no surveillance protocols, surveillance systems or standard indicators. There is also no M&E system for monitoring and evaluation of mycetoma. There is also no donation of medicines. Countries procure and manage their supply system; availability and affordability of antifungal medicines remain low.

1.4.2. NTD Programme Performance

The PCN NTDs that have been mapped in the country include schistosomiasis and soil transmitted helminthiasis.

Impact assessment for schistosomiasis

The mainstay for the control of schistosomiasis and other NTDs including STH is Mass Drug Administration using medicines donated by WHO. Since only one MDA round was implemented in Botswana in 2021, the country is not yet eligible to conduct mid-term review of the intervention or to implement impact assessment.

Soil transmitted helminthiasis

The mid-term review showed a marked decline in the number of districts with STH. Truichris trichiura was not detected at midterm review, thus demonstrating that the MDA rounds had managed to reduce the burden of STH.

The overall mid-term survey, combined STH prevalence for the 59 schools was 21.9%. The most common STH species at mid-term was A. lumbricoides (17.8%) followed by Hookworms (4.8 %). *T. trichiura* was not detected at mid-term (0%).

The overall mean intensity of infection at baseline was 1502.3 epg for hookworms, 204.1 epg for *A. lumbricoides*, and 346.8 epg for *T. trichiura*. At mid-term, the mean intensity of infection was 91.5 epg for hookworms, 44.3 epg for *A. lumbricoides* and 0.0 epg for *T. trichiura*.

Schistosomiasis (both intestinal and urogenital forms), soil-transmitted helminth (STH) infections and Lymphatic filariasis are believed to be endemic in Botswana. Following the Gaborone mapping workshop in 2015, Botswana developed a mapping plan that highlighted lack of data on the burden and distribution of SCH and STH throughout the country while LF data was needed in a total of 6 Districts bordering Zambia and Zimbabwe.

In the past year however, Botswana enthusiastically embraced the current global momentum to control and eliminate NTDs, and invested human resources, time, and great effort towards the current WHO/AFRO-supported mapping in order to address conclusively the problem of schistosomiasis, STH and LF in the country. As such, this first ever nationwide survey was urgently needed in order to inform policy on SCH, STH and LF control programme implementation, including maximizing efficiency and minimizing drug wastage during chemotherapy interventions.

With the availability of mapping tools, kits, equipment and funding, Botswana was ready to conduct mapping in the targeted Districts. The mapping survey was conducted between **22nd June 2015 - 10th July 2015,** using the Kato-Katz technique for detection of S. mansoni and STH in stool samples; point-of-contact circulating cathodic antigen (POC-CCA) test for S. mansoni antigen in urine; hematuria dipstick test and urine filtration tests for S. haematobium detection; and immunochromatographic test (ICT) for detection of LF antigens in fingerstck blood. The survey included over 6,000 pupils aged 10-14 years from 137 schools, representing a minimum of 3 schools in each of the 27 Districts (implementation units). All children found to be positive for schistosomiasis, either by Kato-Katz or POC-CCA (for S. mansoni) or by filtration (for S. haematobium) were treated with praziquantel (40 mg/Kg body weight), and those positive for any STH were treated with albendazole (400mg). No serious adverse reactions were encountered.

Whilst we have mapped SCH in all districts the discrepancies of the CCA-POC and Kato Katz results demand that there be a remapping exercise using appropriate tools to validate the results. This explains why in Table 5 shows that all 27 districts were mapped for SCH but still indicating 27 districts are remaining to be mapped.

Table 5: NTD mapping status

Endemic NTD	Total # Districts	No. of endemic districts	No. of districts mapped or known endemicity status.	No. of districts remaining to be mapped or assessed for endemicity status.
SCH	27	19	27	0
STH	27	10	16	11
TRA	27	-	-	-
LEP	27	3	3	24
TAENIA	27	3	27	0
Scabies	27	1	1	26

NTD CO-ENDEMICITY STATUS

Botswana NTD endemicity status is based mainly on Schistosomiasis and STH that have been considerably mapped at national level in the country. Other NTDs are yet to be mapped. Trachoma has just been mapped but the results are still being analysed.

Overall, based on these results, SCH & STH overlap in most districts. There could be a challenge of co-morbidity among populations with co-infection from SCH & STH. Over the period, the MDA for SCH & STH were conducted separately rather than following integrated approach.

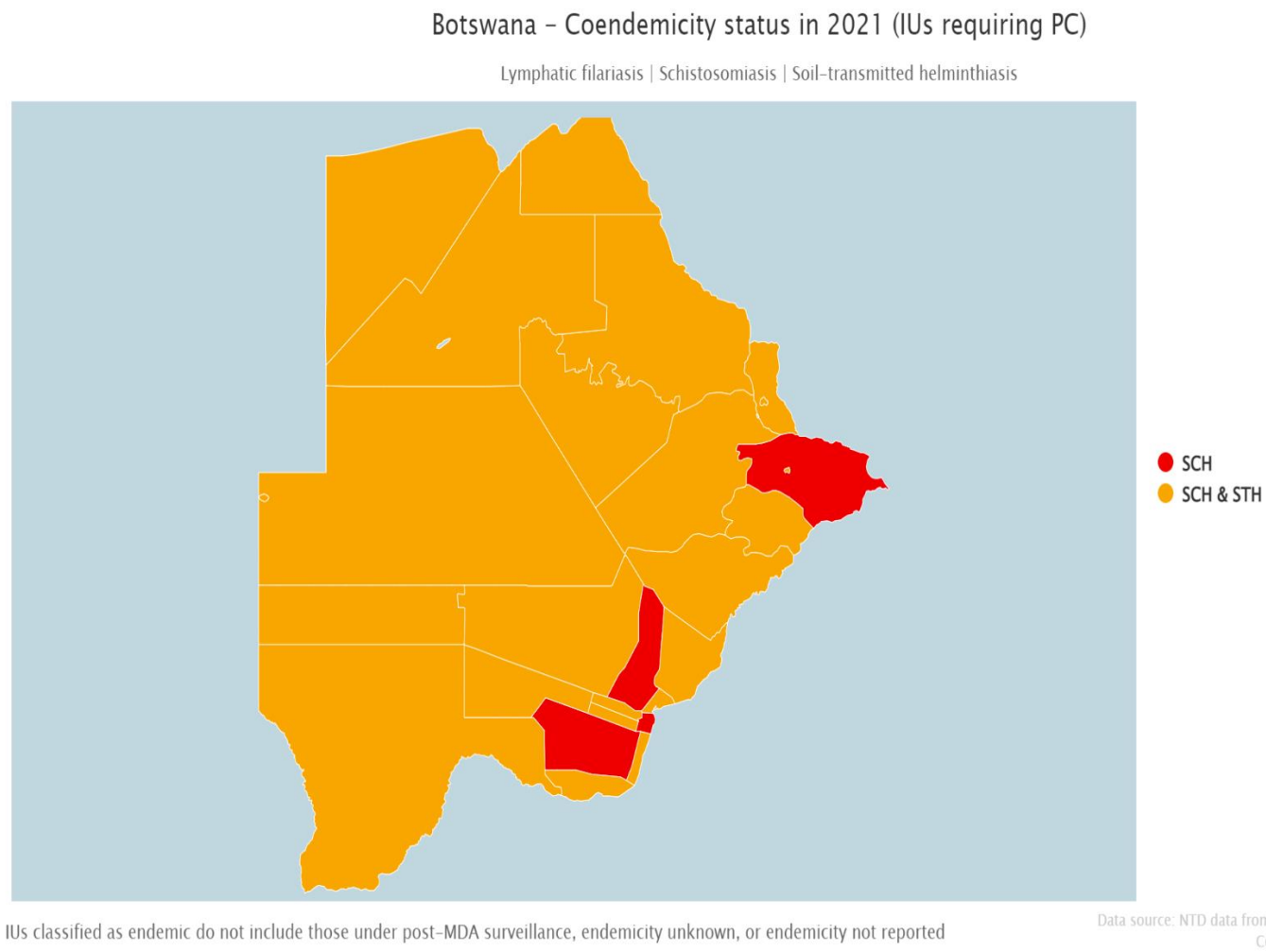


Fig 5: NTD Co-endemicity Status in Botswana (ESPEN 2021).

1.4.3 Performance of the other programmes that are closely related to NTD programme.

Vector control

The global threat of emerging and ongoing vector borne diseases demanded a refined global emphasis on vector management to eliminate vector borne diseases, including vector borne NTDs. WHO released the Global Vector Control and Response Strategy, 2017-2030 to guide member countries on deployment of vector control in a more coordinated approach named the integrated vector management (IVM). WHO defines IVM as a rational decision-making process for the optimal use of resources for vector control. The approach seeks to improve the efficacy, cost-effectiveness, ecological soundness, and sustainability of disease-vector control. IVM is also evidence-based, adaptive and multi-sectoral approach to vector control. Successful deployment of IVM is heavily dependent on five (5) key elements described on the table below.

Table 5.1: Principles of IVM

Key element	Description and activities
1. Advocacy, social mobilisation and legislation	1. Mobilization of all stakeholders and development of appropriate vector control policies to guide actions. 2. Principles of IVM promoted and integrated into policies. 3. Regulatory and legislative framework for vector control and safeguard of the environment and human health. 4. Community engagement and empowerment to increase sustainability
2. Intra- and inter-sectoral collaboration	Collaboration within the health sector and with other sectors (establish coordination mechanism / strengthen channel of communication); Planning and decision making delegated at the lowest possible level
3. Integrated approach	1. Rational use of available resources by addressing several VBDs diseases. 2. Integrating chemical and non-chemical vector control methods. 3. Integrating with other disease control methods.
4. Evidence-based decision making	Strategies are adapted to local vector ecology and disease epidemiology and are guided by operational research, surveillance and monitoring and evaluation.
5. Capacity building	Availability of infrastructure, financial and human resources at central and local level to implement IVM strategies

IVM is not another programme with its own staff or structure, but rather a strategy that should be built onto the existing structures while strengthening linkages between partners and systems. The primary stakeholders of IVM are the communities that will benefit from improved vector borne disease control. Other entities with a direct stake in IVM are sectors including health, agriculture, environment, commerce and local government, which often share responsibility for planning, implementation and evaluation. In addition, stakeholders in field implementation include private sector, water and sanitation, tourism and agriculture, civil society organizations, education and research institutions, national and international organizations among others.

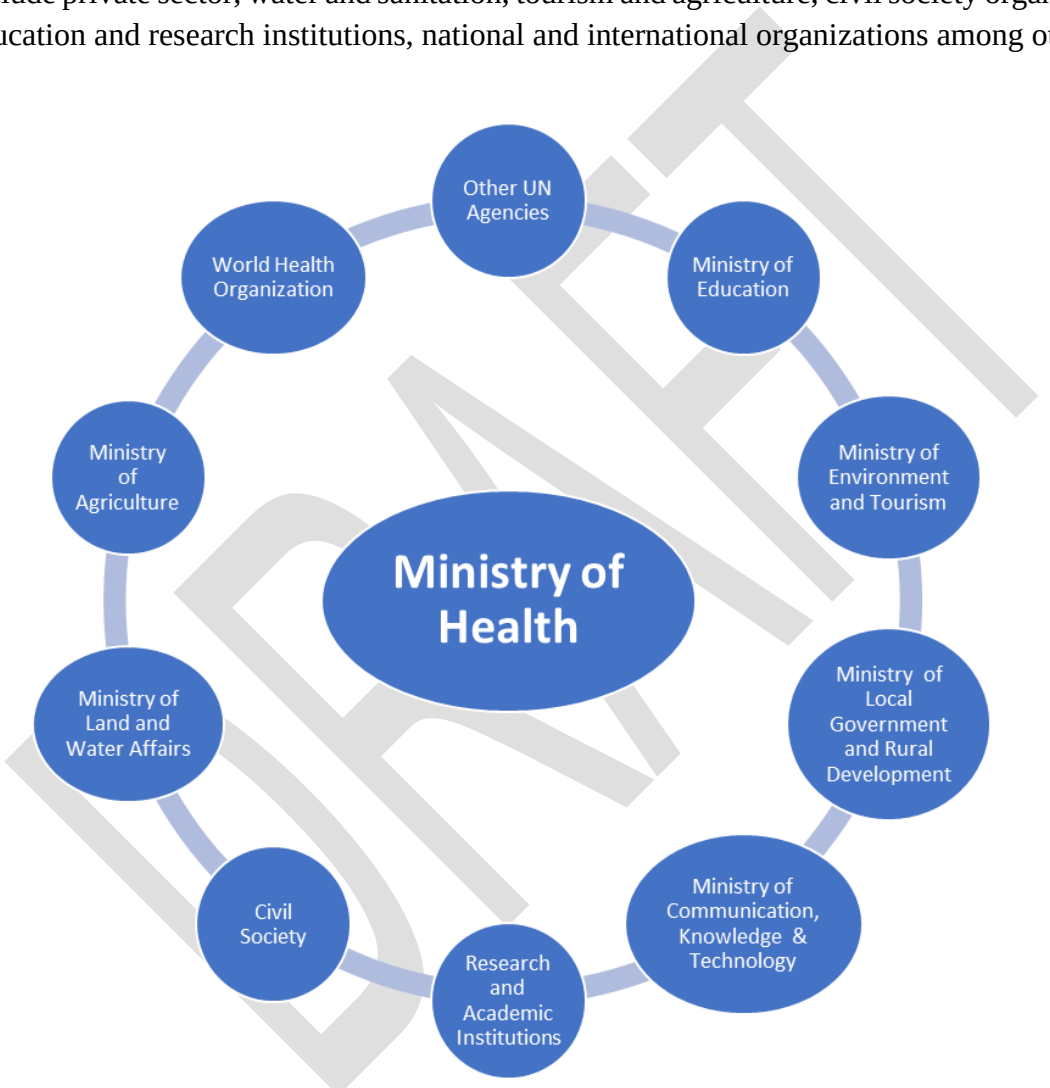


Fig 5.1: Existing entities with potential for partnerships in IVM

Botswana has a history of vector control as a strategy to prevent transmission of malaria that dates to 1950s. A National Malaria Programme was established in 1974 and still active in coordinating among others, the implementation of malaria vector control across the country. The key interventions for controlling malaria vector mosquitoes in Botswana are indoor residual spraying (IRS); an intervention that involves treating inner surfaces of dwelling

structures with a residual insecticide to kill malaria mosquitoes that come to contact with the treated surfaces. Long Lasting Insecticidal Nets (LLINs) are a new generation of bed nets, pre-treated with residual insecticides, also used to protect communities in areas prone to malaria transmission. There are also ongoing efforts to scale up larviciding to complement IRS and LLINs as Botswana accelerates towards attainment of malaria elimination by year 2025. Larviciding involves treating waterbodies supporting breeding of mosquitoes with an environmentally sound agent, highly specific to juvenile stages of mosquito called larvae. This intervention, if implemented according to guidelines alongside IRS and/or LLINs yields public health benefits in curtailing the transmission of malaria. Larviciding is a component of larval source management; a strategy that encompasses all interventions that alter vector breeding habitats to render them unsuitable for breeding of vectors like mosquitoes and molluscs. Larval source management provides an opportunity for an integrated approach especially for malaria and schistosomiasis. Malaria and vector borne NTDs endemic to Botswana are also WASH related, providing more opportunities to integrate interventions that have potential to control multiple diseases.

In 2000, Ministry of Agriculture commenced and led the tsetse fly (*Glossina morsitans centralis*) control programme by prophylactic treatment of cattle, aerial spraying of the Okavango Delta with chemicals, Sterile Insect Technique and target barrier (traps). The current surveillance system in Botswana has not detected presence of tsetsefly nor diseases transmitted by tsetse, i.e. sleeping sickness in humans (Human African Trypanosomiasis - HAT) and nagana in cattle. Success of tsetse fly control in Botswana is credited to a well-coordinated national and regional approach to implement IVM strategy and political commitment to the course.

Key challenge among others in Botswana is vertical programming, especially on malaria vector control as it limits stakeholder engagement and participation, especially recipient communities. This is evidenced by persistently low coverage of key interventions; especially IRS in the targeted communities of Okavango, Ngami, Chobe, Tutume, Boteti, Bobirwa and Palapye Districts as the country has never achieved the national target of 85% operational coverage, recommended for attainment of public health impact from the intervention. The deployment of LLINs use is also suboptimal as there are no mechanisms to ensure continuous use and care by communities.

Table 6. Vectors and Associated NTDs

Activity	Mosquitoes		Other Vectors			
	LF	Malaria	Schisto	HAT	Trachoma	
ITN	X	X		X	X	
IRS	X	X			X	
Space spraying	X	X		X	X	
Larviciding	X	X	X			
Traps				X	X	
Prevention/treatment of breeding sites	X	X	X		X	
WASH	X	X	X		X	

One-Health

One Health is an integrated, unifying approach that aims to sustainably balance and optimize the health of people, animals and ecosystems. It recognizes the health of humans, domestic and wild animals, plants, and the wider environment (including ecosystems) are closely linked and inter-dependent. The approach mobilizes multiple sectors, disciplines and communities at varying levels of society to work together to foster well-being and tackle threats to health and ecosystems, while addressing the collective need for clean water, energy and air, safe and nutritious food, acting on climate change, and contributing to sustainable development (Erkyihun and Alemayehu, 2022, WHO, 2021). Alternatively: One Health is defined as an approach to achieve better health outcomes for humans, animals, and the environment through collaborative and interdisciplinary efforts. Increasingly, the One Health framework is being applied to the management, control, and elimination of neglected tropical diseases (NTDs) (Peterson *et al.*, 2021).

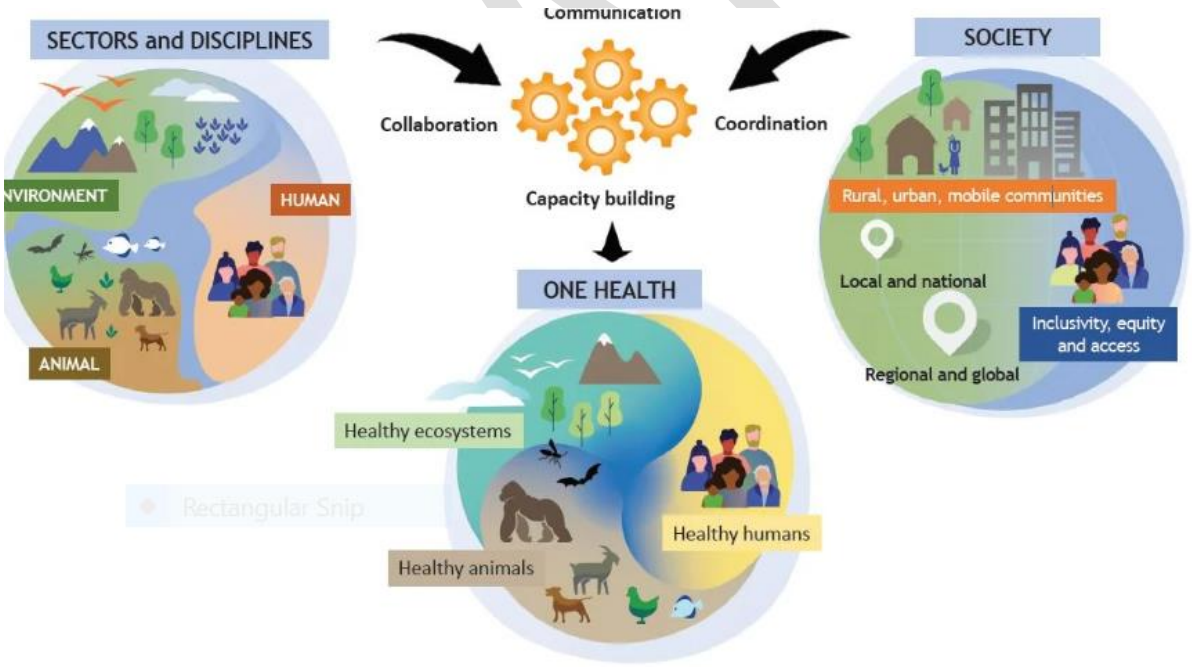


Figure 5.2: One health concept

NTDs continue to cause hardship and harm to over one billion people world- wide, burdening individuals, families and communities who are already marginalized and disadvantaged. Taking a one health approach that recognizes the relationship between human, animal, and environmental health is key to sustainably addressing NTDs.

Application of One health approach in Botswana for the control of NTDs

Rabies control is a model for One Health implementation, as its proven methodologies demonstrate the effectiveness of collaboration at the human-animal interface, including at community and municipal level (Tidman *et al*., 2022). There is considerable global commitment to the elimination of dog-mediated rabies. In 2018, the Food and Agriculture Organization of the United Nations (FAO), World Organization for Animal Health (OIE), World Health Organisation (WHO) (the Tripartite) and the Global Alliance for Rabies Control (GARC) developed Zero by 30: The Global Strategic Plan to end human deaths from dog-mediated rabies by 2030 (Zero by 30) (https://www.oie.int/en/ document/zero_by_30_final_130618/). Central to this comprehensive strategy is a One Health approach which recognizes the intimate links between human, animal and environmental health, and promotes intersectoral collaboration to tackle public health challenges. A One Health approach is at the heart of the United Against Rabies (UAR) forum, which seeks to accelerate the sustained effort needed to deliver on the vision set out in **Zero by 30 (**Tidman *et al*., 2022). The UAR Forum was announced by the Directors-General of Food and Agriculture Organization (FAO), OIE and WHO (the Tripartite) in September 2020, building on the progress made during the implementation of Phase 1 (start up: 2018–2020) of Zero by 30 (https://www.who. int/publications/i/item/WHO-UCN-NTD-VVE-2021.1).

In Botswana Rabies is the only zoonotic NTD that is targeted for elimination as a public health problem, and this will be realised by having achieved zero human deaths from rabies in the country (WHO, 2020).

In Botswana the management of rabies in animals, as with other veterinary diseases, is through the Ministry of Agriculture by the DVS. Rabies surveillance in Botswana is mostly passive as the DVS response is only based on reporting by the farmers or dog owners. The same is true on wildlife rabies surveillance. Although rabies in humans is managed by the Ministry of Health (MoH), testing of human brain specimens for rabies is conducted by the DVS. Wild animals are managed by the Department of Wildlife and National Parks (DWNP) through game reserves and national parks as well as in areas outside protected zones where specific hunting licenses are given to the public. Human and wildlife rabies surveillance in Botswana is not built into the national disease surveillance system and therefore are not effectively implemented with little to no coordination between the veterinary, human health and wildlife departments (WHO, 2013a). Thus, a one health approach is naturally being implemented in Botswana.

What is unique about the control of rabies in Botswana is that rabies is a notifiable disease, and all dog and cat owners are obligated by law to immunise their animals annually against the disease. To facilitate the control of rabies, the Government of Botswana provides free rabies immunisations to dogs and cats through campaigns implemented by the DVS every winter in

urban areas, villages, farms and cattle posts. Immunisation of dogs and cats at the cattle posts is usually undertaken simultaneously with cattle vaccinations against anthrax, black quarter and brucellosis. Notable is that rabies control following a one health approach in Botswana has been an ongoing programme with considerable commitment of the Government of Botswana as shown by its sustained support of the routine immunization of domestic animals including dogs. This should be considered in the concept of NTD control since rabies is an NTD.

Key activities conducted include importation of anti-rabies vaccines and Government initiated routine immunization. Provision of by-laws and punishment for failure to vaccinate domestic animals makes it possible for the NTDs to leverage on this well thriving programme. Perhaps what is critical is to blend in the concept of NTDs control and elimination through mainstreaming the disease which the Government has prioritized (creating opportunities for NTDs).

WASH

Botswana has government agencies dedicated to improving WASH conditions: The Ministry of Land Management, Water and Sanitation Services and The Ministry of Health. This Ministry has worked with the U.N. to participate in the Water Global Analysis and Assessment of Sanitation and Drinking Water (GLAAS) survey. Furthermore, since 2000, Botswana has improved basic sanitation by 25% according to UNICEF.

More than 88% had access to adequate toilets in Botswana in 2020. Most toilets in Botswana are Western flush style, though latrines are also more common. Western-style toilets are less common in rural areas and up to 32.62% are practice open defecation.

Clean water in Botswana mainly comes from ground sources, such as rivers and dams. Rates of water access are relatively high in urban areas (99.5%) compared to 84.1% in rural areas. Limited infrastructure to secure the water forces many women into the laborious and time-consuming task of retrieving the water.

With increased access comes increased demand, which is hampered by decreasing rainfall and the high cost of sanitation. This demand also puts pressure on infrastructure systems and threatens Access to clean water. To resolve this demand, government agencies and schools have started water recycling facilities. One such facility started by the Ministry of Agriculture recycles water from the Gaborone city sewage. It uses this water for “gardening and brick making,” reducing the need for clean water for these activities.

Role of multisectoral collaboration including WASH improvement in control and elimination of *S. mansoni* in Botswana

A historical example where the improvement of WASH played a role in the control of schistosomiasis in Botswana was observed as early as 1987 where an integrated approach to the control of schistosomiasis epidemic in Muan District included increased health education and targeted efforts at improving the coverage of a piped water supply and sanitation, all aiming at the control of transmission (Appleton *et al*., 2008). The integrated transmission-control efforts were supported by a strong drive at developing infrastructure, so that, in terms of housing, communication, commercial centres and general socio–economic development, Maun has moved quickly towards becoming a de-facto town (although still formally classified as a village), with corresponding changes in the habits of the population. These factors, which may have contributed to the very low prevalence of *S. mansoni* infection recently observed, may also serve to decrease the risk of a resurgence in such infection after any future increase in floods (Appleton *et al.*, 2008). Repeat surveys showed that the corresponding overall prevalence had dropped to 8.4% (0.2% of subjects with heavy infections) by 1989, and to 6.7% (with only 0.01% of subjects with heavy infections) by 1991 (WHO, 1993; Nuttall et al., 1995). District-level prevalence continued to fall to 7.8% by 1997 and to 2.0% by 2001 (unpublished observation). The control programme was stopped in 1993, when it became clear that prevalence of *S. mansoni* infection were remaining below 10% and intestinal schistosomiasis was no longer a public-health problem in the district (Appleton *et al*., 2008).

BOTSWNA PHARMACOVIGILANCE

The World Health Organization (WHO) defines pharmacovigilance as the "science and activities related to the detection, assessment, understanding and prevention of adverse effects or any other possible drug-related problems". Encompassed within this definition are multiple elements relating to the safety of medication, including the reporting of substandard and falsified (SF) medicines, medication errors, drug abuse and misuse, exposure to drugs during pregnancy and breastfeeding, therapeutic ineffectiveness, occupational exposure, off-label use, ecopharmacovigilance (environmental pollution), medical devices and diagnostics, overdose, and suspected transmission of infectious agents via medicines. It is the science and activities relating to the detection, assessment, understanding and prevention of adverse effects or any other possible drug-related problems. Pharmacovigilance is closely linked to drug regulation.

The major aims of pharmacovigilance are:

1. Early detection of unknown adverse reactions and interactions.
2. Detection of increases in frequency of known adverse reactions.
3. Identification of risk factors and possible mechanisms

4. Estimation of quantitative aspects of benefit/risk analysis and dissemination of information needed to improve medicine prescribing and regulation.

The specific aims of pharmacovigilance are to:

1. Improve patient care and safety in relation to the use of medicines and all medical and paramedical interventions,
2. Improve public health and safety in relation to the use of medicines,
3. Contribute to the assessment of benefit, harm, effectiveness and risk of medicines, encouraging their safe, rational and more effective (including cost-effective) use, and
4. Promote understanding, education and clinical training in pharmacovigilance and its effective communication to the public.

Botswana Medicines Regulatory Authority (BOMRA) oversees pharmacovigilance and for investigation and analysis of all the reported serious adverse events (SAEs) from health facilities. SAEs trainings are incorporated in the MDA trainings.

Spontaneous reporting of suspected adverse drug reactions is the major source of information in pharmacovigilance. This information can be obtained from a regional or country-wide system for reporting.

Pharmacovigilance reporting form of Botswana

The reporting form contains information on the following elements:

- The patient: age, sex, ethnic origin and brief medical history
- Adverse event: description (nature, location, severity, characteristics), results of investigations and tests, start date, course and outcome.
- Suspected drug(s): name (brand or ingredient name and manufacture), daily dose, route, start/stop dates, indication for use (with drugs, e.g., vaccines, a batch number is important).
- All other drugs used (including self-medication): names, doses, route, start/stop dates.
- Risk factors (e.g., impaired renal function, previous exposure to suspected drug, previous allergies, social drug use).
- Name and address of reporter (to be considered confidential and to be used only for data verification, completion and case follow-up).

The reporting forms will be distributed throughout the target area to healthcare professionals at regular intervals. Telephone, fax and electronic mail or internet can be used for reporting ADR’s.

Who should report?

Professionals working in healthcare are the preferred source of information in pharmacovigilance. These include family practitioners, medical specialists, nurses and pharmacists and pharmacy technicians. Other health workers and family members can play an important role in the stimulation of reporting and in the provision of additional information (e.g., on co-medication and previous drug use). Pharmaceutical manufacturers, applicants and research organizations must ensure that suspected adverse reactions to their products are reported to the competent authority. If adverse reactions are reported directly by patients to the national or local centre, the centre will communicate with their physicians for additional information and data verification.

What to report?

For "new" drugs- report all suspected reactions, including minor ones.

For established or well-known drugs- report all serious or unexpected (unusual) suspected ADRs

- If an increased frequency of a given reaction is observed.
- All suspected ADRs associated with drug-drug, drug-food or drug-food supplements (including herbal or complementary products) interactions.
- ADRS in special fields of interest such as drug abuse and drug use in pregnancy and during lactation.
- When suspected ADRs are associated with drug withdrawals.
- ADRs occurring from overdose or medication error.
- When there is a lack of efficacy or when suspected pharmaceutical defects are observed.

Communications

A bulletin distributed to all healthcare professionals for the dissemination of information. In urgent cases of sufficient importance Dear Doctor letters may alert the profession.

DUTIES AND RESPONSIBILITIES

Doctors, Nurses and other health professionals report any suspected adverse drug reactions, drug interactions and unusual effects immediately. They fill the reporting form and hand over it to the Pharmacy Unit of the health institution or mail directly to DRU.

Pharmacy Unit

Mail the ADR report to DRU. Retain the necessary documentation Make sure availability of reporting form.

Drug Regulatory Unit (DRU)

- Promote reporting.
- Collects reports.
- Give feedback.
- Review the reported ADRs.
- Compile and analyze data collected.
- Promote prevention of ADR and rational use of drugs.
- Collect information on ADR and distribute to health professionals.
- Communicate with the international ADR monitoring center.
- Conduct research on ADR.
- Recommend taking appropriate action.

Drug Advisory Board

Recommend on possible actions to be taken.

NATIONAL PHARMACOVIGILANCE CENTRE, BOTSWANA

ADVERSE REACTIONS REPORTING FORM

I. PATIENT INFORMATION:

Patient identity/Omang number: Age(yrs): Sex(M/F): Weight (kgs): Ethnicity:

II. SUSPECT MEDICATION(S)/VACCINE/HERBAL:

List of drugs being used by the patient (please tick the suspect drug)	Route	Daily Dose	Manufacturer	Date Drug		Reasons for Use
				Started	Stopped	

III. ADVERSE REACTION EXPERIENCED/OBSERVED:

Date of onset of Reaction:	Reaction Subsided after Suspect Drug discontinuation:	Rechallenged?

Description of Adverse Event:
(including laboratory test results)

Outcome:	Recovered Hospitalized Disability Death(D/M/Y) Unknown
Treatment for Reaction:	
Results:	

Other Pre- existing medical conditions: (E.g. Allergies, Pregnancy, Smoking, Alcohol, Hepatic/Renal Dysfunction, others)

Additional Information: (if any)

IV. REPORTER:

Name & Professional Address :

Telephone No. Occupation & Specialty: Health professional: Yes No

Signature: Date:

For office use only:

Received on: Registration No. Received by:

Figure 5.3: National Pharmacovigilance Form for Botswana

Mutual opportunities for collaborating with Pharmacovigilance centres in Botswana

Botswana implemented MDA for schistosomiasis in 2021 being the first round using praziquantel donated by WHO. The country has also implemented 1st round MDA in 2018, 2nd and 3rd round MDAs for STH in 2019. With regards to Preventive chemotherapy for NTDs, a framework will be put in place for collaboration with the Botswana Medicines Regulatory Authority in planning for safe preventive chemotherapy, to establish a process for SAE management and investigation for any MDA related SAE during each round.

Table 7: Summary of intervention information on existing NTD programmes

NTD	Date programme started.	Total districts targeted.	No. districts covered (geographical coverage*)	No. (%) Covered	No. (%) districts with required number of effective treatment rounds	No. (%) districts that have stopped MDA.	Key strategies used.	Key partners
SCH	2021	27	20	74%	27	0	MDA	WHO
LF	-	-	-	-	-	-	-	-
STH	2017	9	9	100%	9	0	MDA	WHO
TRA	-	-	-	-	-	-	-	-
Scabies	-	-	-	-	-	-	-	-
SBE	-	-	-	-	-	-	-	-

Section 1.5: Building on NTD Programme Strengths

Based on Botswana NTD profile, health system, and NTD programme status, a SWOT analysis on NTD programme was conducted and summarized in the table below.

1.5.1. Strengths and Weaknesses

Strengths and weaknesses are internal to the programme or ministry of health—things that you have some control over and can change.

1.5.2. Opportunities and Threats

Opportunities and threats are external- things that are going on outside the programme or ministry of health. You can take advantage of opportunities and protect against threats, but you can't change them.

Swot Analysis

Strengths	WEAKNESES
• Political Commitment • Existence of a skeletal mass of HR with institutional memory of NTD program • Designated focal person for NTD at National level. • Availability of the WHO NTD Road Map • Several mass drug administration campaigns have been conducted. • Mapping surveys have identified burden of some NTDs. • Treatment coverage rates for schistosomiasis and STH diseases are within the agreed targets. • Leprosy has been eliminated as a public health problem (reduction of the prevalence rate to less than one case per 10 000 populations) at national level. • Mapping of STH and SCH	**Weakness** • Lack of a fully functional NTD programme within the ministry of health • Inadequate human resources and logistics required to effectively implement and coordinate NTD activities. • Inadequate domestic funding for the NTD control programme • Lack of harmonized programme policies and interventions • Limited local expertise • Lack of routine surveillance data on NTDs • Limited research on NTDs • Weak Programme coordination at all levels • Insufficient capacity to monitor and evaluate NTD programmes. • Limited interest for NTDs by partners in Botswana
	• National investments in prevention and control of NTDs is stagnant. • Weak engagement of intergovernmental organizations and partners • Competing priorities in the health sector

	• Existence of more Complex emergencies e.g COVID-19 pandemic that divert attention to other health services. • Low socioeconomic conditions • The dearth of resources for the NTD programme.
Opportunities	***Threats***
• Increasing momentum to tackle NTDs. • Government commitment • The 2021-2030 NTD Road Map • Kigali Declaration on NTDs • International investments in prevention and control of NTDs is increasing. • Increasing and broadening collaboration with research and academic institutions, • Donations of sufficient quantities of quality-assured essential medicines for prevention and treatment of NTDs • Availability of safe medicines and diagnostics • Availability of new technologies and tools, including e-health and real-time information technologies	• Emerging pandemics that divert resources Low public awareness • Limited sub-regional collaboration National disasters including cyclones/flooding. • Unregulated traditional medicine/home remedies • Poverty • Climate change • Migration trained health workers

Fig 6: SWOT analysis

1.5.3. Gaps and priorities

Gaps and Priorities for Botswana are shown in Table 8 below.

Table 8: Gaps and priorities

Table 8: Potential gaps and priorities for programmatic action

	Gaps	**Priorities**
Planning,	• NTD programme not properly coordinated. • NTD programme not fully established and lacks human resourcesLimited representation of different sectors in NTD taskforce inhibiting the effectiveness of NTD planning and implementation. • Inconsistencies in funding leading to delays in conducting surveys to establish program performance. • Non integration of the MMDP and rehabilitative services into the mainstream health care system • No specific Budget for NTDs in the national budget or budget allocated to the Ministry of Health • Inadequate Government ownership and commitment for the NTD programme	• Advocacy and establishment of the NTD programme for smooth coordination of NTD programme • Produce terms of reference for the NTD secretariat • Establish NTD programme within the ministry of health for proper coordination and implementation of NTD activities. • Development, adoption and distribution of MMDP tools and plans for case management of NTDs. • Development of joint action plans for NTD programming. • Advocacy for funding from the Government of the Republic of Botswana Create budget line for NTDs at national and advocate for government support. Advocate for Government ownership of the NTD programme and mainstream NTDs in the National Health Strategy

	• Non-integration of Vector Control and WASH strategies to reduce burden of NTD. Data on several endemic and suspected NTDs still lacking	Integrate vector borne NTDs with control of other priority Vector borne diseases such as malaria, HAT. Mainstreaming of NTDs into the National Health System Conduct base-line mapping for NTDs.
Partnership, Coordination and Management	• NTD programme not adequately coordinated. • Coordination mechanisms to strengthen One Health approach are not yet fully established. • NTDs control operating in silos. Inadequate capacity of health workers for NTD programming	• Strengthen coordination and collaboration at all levels. Strengthen advocacy at all levels for NTD programme. Strengthen NTD Programme, multi-sectoral collaboration including WASH and the One Health approach to enhance collaboration. Mainstreaming of NTDs into the National Health System Build capacity of Health workers management and diagnosis of NTDs.
Implementation of interventions	• Unstandardized NTD diagnostics and case definitions	Improve standardization of NTD case definitions and diagnostics

	• Inadequate capacity for NTD diagnosis and reporting • Lack of developed BCC materials to educate and inform endemic communities, e.g., on behavioural changes, MDA scheduling, treatment. • Lack of point-of-care diagnostics usable at community level and in low-resource settings • Limited involvement of communities at risk and affected communities in programme design. • Challenges in servicing hard-to-reach and marginalized population due to poor road networks and seasonal factors • Weaker NDT medicines logistics	Strengthen capacity at all levels for testing and reporting NTDs. • Develop BCC materials for all NTDs. • Integrate people centered NTD services into the mainstream Health System • Establishing a grievance mechanism for all NTDs • Conduct research including evaluation or innovative development of new and efficient NTD diagnostic tools. • Train health workers on community engagement at all levels. Advocate for universal health care services coverage, leaving no one out. Strengthen logistics management for NTD medicines and supplies.
Surveillance (M&E)	• Inadequate data collection tools for NTDs to feed into the HMIS. • Inadequate capacity for surveillance of NTDs M&E for NTDs not fully implemented	• Develop data collection tools for NTDs to feed into the HMIS. • Strengthen surveillance of NTDs • Strengthen M&E for NTDs and reporting of data

PART 2: STRATEGIC AGENDA: PURPOSE AND GOALS

Section 2.1: NTD Programme Mission and Vision

The Botswana 2023-2027 NTD Master Plan, is a multi-year strategic plan with a clear strategic agenda. The major elements of the strategic agenda are Mission, Vision, Guiding principles, Programme Strategic Priorities and Pillars.

Table 9: Mission and Vision

Mission	Accelerate the Elimination and eradication of NTDs to Protect 2 million People in Botswana
Vision	Botswana free of NTDs

Section 2.2: Milestones and Targets

The Botswana overarching and cross-cutting targets, are derived from the NTD Global Roadmap 2021–2030 which will help in integration, coordination, country ownership and equity. Targets for sectors such as WASH, safety, and vector control are based on established targets. Disease-specific targets and milestones for 2023 - 2027 are set for each of the endemic diseases for one of the following: eradication, elimination (interruption of transmission), elimination (as a public health problem) or control.

2.2.1. Targets

Overarching targets

- 90 percent reduction in people requiring NTD interventions by 2030.
- 75 percent reduction in disability adjusted life related to NTDs by 2030
- 100% of districts having eliminated Leprosy.

Cross-cutting TargetsCross cutting targets that will guide overall national programme in Botswana are described in Figure 7.

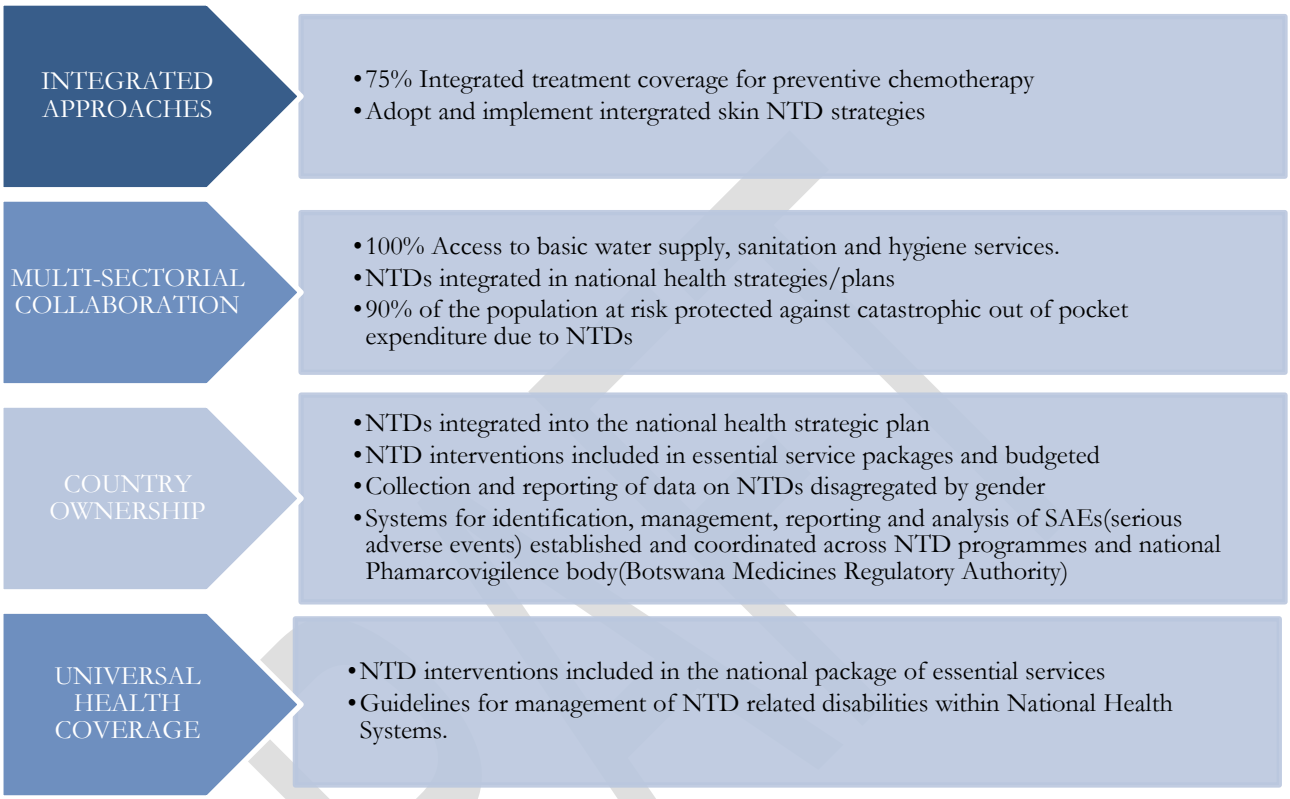


Figure 7: Botswana Cross cutting targets

Table 11: Disease-Specific Targets

National Target	Diseases	Objective	Year	Strategies
Targeted for elimination (interruption of transmission	Leprosy	Achieve zero report of new autochthonous case of leprosy	2027	Active case finding & single dose rifampicin for contacts
Targeted for elimination as a public health problem	Rabies	Achieve zero human death from Dog mediated Rabies	2027	Vaccination, Health education and promotion Case management Surveillance
	Schistosomiasis	Achieve <1% proportion of heavy intensity of SCH infection	2027	Mass Drug Administration Case management Heath Education, snail control
	Soil Transmitted Helminthes	Achieve <2%proportion of STH infection of moderate and heavy intensity	2027	Health Education MDA Case management Surveillance

	Trachoma	To be validated for elimination as a public health problem (defined as (i) a prevalence of trachomatous trichiasis "unknown to the health system" of <0.2% in ≥15-year-olds in each formerly endemic district; (ii) a prevalence of trachomatous inflammation—follicular in children aged 1–9 years of <5% in each formerly endemic district; and (iii) written evidence that the health system is able to identify and manage incident cases of trachomatous trichiasis, using defined strategies, with evidence of appropriate financial resources to implement those strategies)	2027	WASH Health Education Case management MDA Surveillance

Targeted for control	Snake Bites	Achieve reduction of mortality by 50%	2027	Provision of antivenom to all health facilities, Public Health education Case management Surveillance
	Scabies	Scabies management incorporated in the universal coverage package of care	2027	Health Education Case Management WASH Surveillance MDA
	Taeniasis	Intensify control in hyper endemic areas		Health Education Case management Surveillance

2.2.2 Milestones

In order to achieve the overarching, cross-cutting and disease-specific targets as set forth in this strategic plan and given the progress so far made as elucidated in the fore-going sections the following disease specific milestones are set for Botswana NTD programme. (See table below).

Table 12 .1: Schistosomiasis					
Indictors	**2023**	**2024**	**2025**	**2026**	**2027**
Begun implementation of MDA in endemic districts	19 (100%)				
Geographic coverage of SCH MDA	19 (100%)	19 (100%)	19 (100%)	19 (100%)	19 (100%)
Number of districts that have conducted 3-5 years of consecutive treatments with coverage **more than 75%**		19 (100%)	19 (100%)	19 (100%)	19 (100%)
Number of districts Conducted midterm assessment after 3 rounds of MDA			19 (100%)		
Number of IUs Conducted Impact assessment after 5 rounds of MDA					19 (100%)
Number of districts conducting intermediate host snail control in endemic districts		5 (26%)	10 (53%)	15 (79%)	19 (100%)
Elimination of SCH as a public health problem			10 (53%)	15 (79%)	19 (100%)
Validated for elimination of SCH as a public health problem (currently defined as <1% proportion of heavy intensity SCH infections)					1 (100%)

Table 12.2: Milestones for STH					
Indictors	**2023**	**2024**	**2025**	**2026**	**2027**
Completed sub-district (village level) mapping of STH determined STH endemic areas and the at-risk population	11 (100%)				
Implementation of MDA in IUs requiring MDA	100%	100%	100%	100%	100%
100% geographic coverage of STH MDA	100%	100%	100%	100%	100%
Number of IU conducted more than 3rounds of MDA with population coverage greater than 75%				80%	100%
Number of IUs Conducted midterm impact assessment after 3 rounds of MDA				100%	
Number of IUs Conducted Impact assessment after 5 rounds of MDA					100%
Validated for elimination of STH as a public health problem *(*defined as <2% proportion of soil-transmitted helminth infections of moderate and heavy intensity due to *Ascaris lumbricoides, Trichuris trichuria, hookworms*					27(100%)

Table 12.3: Milestone for Trachoma

Table 12.3: Milestones for Trachoma					
Indictors	**2023**	**2024**	**2025**	**2026**	**2027**
Completed mapping of trachoma, determined endemic areas and the at-risk population	27 (100%)				
Begun implementation of MDA in IUs requiring MDA		100%			
Districts achieving 100% geographic coverage of trachoma MDA		100%	100%	100%	100%
Number of IU completed MDA rounds with coverage of ≥80%		100%	100%	100%	100%)
Improve access to high-quality surgery, tracking of outcomes and management of post-surgery trachomatous trichiasis.			50%		100%
Extend partnerships to increase work, specifically on facial cleanliness and environmental improvement to reduce transmission		1 (100%)	1 (100%)	1 (100%)	1 (100%)
Validated for elimination as a public health problem (defined as (i) a prevalence of trachomatous trichiasis "unknown to the health system" of <0.2% in ≥15-year-olds in each formerly endemic district; (ii) a prevalence of trachomatous inflammation—follicular in children aged 1–9 years of <5% in each formerly endemic district; and (iii) written evidence that the health system is able to identify and manage incident cases of trachomatous trichiasis, using defined strategies, with evidence of appropriate financial resources to implement those strategies)					1 (100%)

Table 12.4: Milestones for Scabies					
Indictors	**2023**	**2024**	**2025**	**2026**	**2027**
Mapping to estimate the burden of scabies and identify endemic areas	100%				
Develop local guidelines for implementation of MDA		100%			
Incorporation of scabies management in the minimum package of care	100%	100%	100%	100%	100%
Secure financing for ivermectin and topical treatments		50%	75%	100%	100%
Conduct MDA in communities with scabies outbreak		100%	100%	100%	100%
Establish surveillance for scabies			50%	75%	100%
Number of endemic districts using MDA intervention		50%	75%	100%	100%

stablish case management for scabies in all health facilities		50%	75%	100%	100%

Table 12.5: Milestones for Rabies

Indictors	2023	2024	2025	2026	2027
Ensure timely access to post-exposure prophylaxis rabies vaccine	27(100%)	27(100%)	27(100%)	27(100%)	27(100%)
Number of districts having achieved zero human deaths from rabies	27(100%)	27 (100%)	27 (100%)	27 (100%)	27(100%)
Number of districts with Strengthened and institutionalized surveillance for rabies;	27 (100%)	27 (100%)	27 (100%)	27 (100%)	27(100%)
Number of districts with improved compliance in reporting to ensure data availability.	27 (100%)	27 (100%)	27 (100%)	27 (100%)	27 (100%)
Build national capacity of health workers for rabies exposure assessment, diagnosis, administration of post-exposure prophylaxis, for dog management prophylaxis and mass dog vaccination.		20(100%)	27 (100%)	27 (100%)	27 (100%)

Number of districts ready to provide timely access to post-exposure prophylaxis and dog vaccination.	10 (37%)	20 (74%)	27 (100%)	27 (100%)	27(100%)
Number of districts having reached 70% vaccination coverage of dogs in high-risk areas	20 (74%)	27 (100%)	27 (100%)	27 (100%)	27 (100%)

Table 12.6 Milestones for leprosy

Indictors	**2023**	**2024**	**2025**	**2026**	**2027**
Program review	1 (100%)				
Active case finding of leprosy in endemic districts	20(75%)	20 (75%)	27 (100%)	27 (100%)	27 (100%)
Passive case detection of leprosy in endemic districts	27 (100%)	27 (100%)	27 (100%)	27 (100%0	27 (100%)
Manage all leprosy patients in peripheral health facilities	27 (100%)	27 (100%)	27 (100%)	27 (100%)	27 (100%)
Refer severe and complicated cases	27 (100%)	27 (100%)	27 (100%)	27 (100%)	27 (100%)
Achieved 100% treatment coverage of identified leprosy cases	27 (100%)	27 (100%)	27 (100%)	27 (100%)	27 (100%)
Achieve elimination of leprosy transmission				27 (100%)	27 (100%)

Table 12.7: Milestones for Snakebites envenoming					
Indictors	**2023**	**2024**	**2025**	**2026**	**2027**
Review and revise policies on snake bite management	1 (100%)				
Establish surveillance system for reporting at various level of health system	27 (100%)	27 (100%)	27 (100%)	27 (100%)	27 (100%)
Availability of polyvalent anti-venom at all health care facilities	27 (100%)	27 (100%)	27 (100%)	27 (100%)	27 (100%)
Districts achieving effective case management services at all health facilities	27 (100%)	27 (100%)	27 (100%)	27 (100%)	27 (100%)

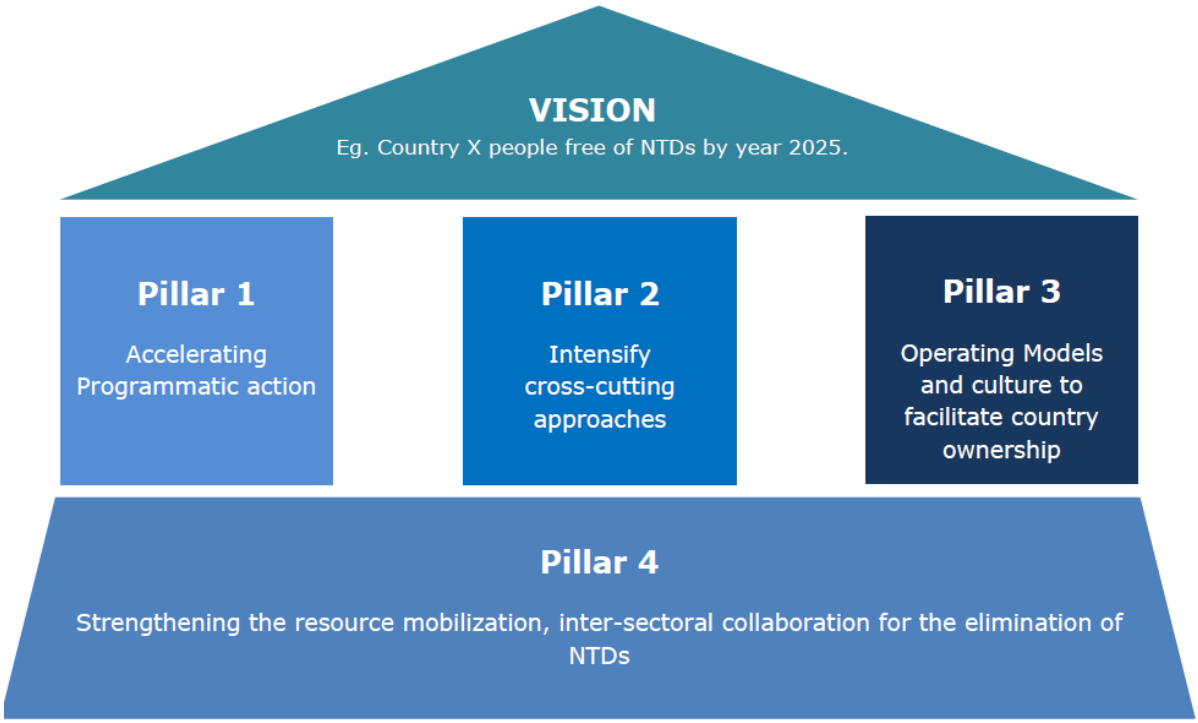
Section 2.3: Guiding Principles

Guiding Principles are a broad philosophy that encompass the beliefs and values of the People of Botswana and guide the programme throughout its life in all circumstances, irrespective of changes in its goals, strategies, or type of work. They create a programme culture where everyone understands what is important.

Table 13: Guiding Principles	National leadership and ownership, • Commitment to collaboration and sharing, • Mutual accountability of national authorities and partners, • Transparency, • Community engagement and participation • Ethical consideration • Gender sensitivity • Safety: 'Do no harm' while providing health benefits

2.4.1. Programme Strategic Pillars

Strategic Pillars are the 3-5 strategic areas that the Botswana NTD programme must win to be successful. The below figures provide an example of programme strategic pillars.



2.4.2. Strategic Priorities

Strategic priorities are the big-picture objectives for Botswana programme. They describe what the programme will do to try to fulfil its mission with reference to the 2030 NTD Roadmap. The priorities are presented for each pillar.

Table 14. Strategic Priorities for the Elimination of Neglected Tropical Diseases

Strategic Pillar	Strategic Priorities
Strategic Pillar 1: **Accelerating programmatic action**	1. Advocate and establish an NTD programme in Botswana for efficient coordination of NTD activities
	2. Scale up integrated preventive chemotherapy to achieve 100% geographic coverage and treatment access for STH, SCH and other endemic PC NTDs (scabies, trachoma?)
	3. Ensure early detection and prompt treatment of targeted case management diseases (e.g. leprosy)

	4. Prioritize and strengthen monitoring and evaluation to track progress and decision making towards the 2030 goals
	5. Ensure timely, safe, and effective supply chain management of quality assured NTD Medicines and other products up to the last mile
	6. Prioritize operational research areas to facilitate NTDs implementation
	7. Strengthen and scale up integrated case-management for PC-NTDs and CM-NTDs (Including Leprosy, LF, skin NTDs, snakebites, Rabies)
Pillar 2: **Intensify cross-cutting approaches.**	1. Strengthen identified platforms with similar delivery strategies and interventions (MDAs, skin NTDs, Morbidity management, SBCC, WASH etc) for integrated approaches across NTDs.
	2. Mainstream delivery platforms within national health system
	3. Integrated NTD planning, implementation, and monitoring
	4. Strengthen multi-sectoral coordination and response (WASH, ONE HEALTH, Min of Education and all the stakeholders)
	5. Support in-country operational research for NTD Programmes in collaboration with academia and research institutions
	6. Strengthen collaboration with other line Ministries and partners in the context of one health approach
Pillar 3: Operating Models and culture to facilitate country ownership.	1. Promote and strengthen country ownership and leadership through organizational structures at national and local government with dedicated funding.
	2. Empower local government and authorities in social mobilization, risk and crisis communication, behavioural change and building local support for NTD interventions.
	3. Strengthen collaboration with other sectors (CSOs and CBOs) 4. Mainstream NTDs into the National Health System 5. Strengthen Pharmaceutical supply chain management system
	6. Ensure the inclusion of NTDs into the MoH Essential Health Care Package.

Pillar 4. Strengthen Resource Mobilization, Coordination and Communication for the elimination of NTDs	1. Promote community involvement and ownership of the program for optimal use of available resources.
	2. Build NTD programme capacity for resource mobilisation
	3. Promote partnership and coordination of NTD programme implementation
	4. Advocate for domestic resource allocation
	5. Improve communication and awareness at the community level for a successful elimination of the endemic NTDs.
	6. Strengthen the integration and linkages of NTD programme and financial plans into sector – wide and national budgetary and financing mechanisms
	7. Promote community engagement and sensitization for MDA compliance.

2.4.3 Programme Strategic Agenda Logic Map

The below figure maps out logically how the programme is working and how it is inter-related.

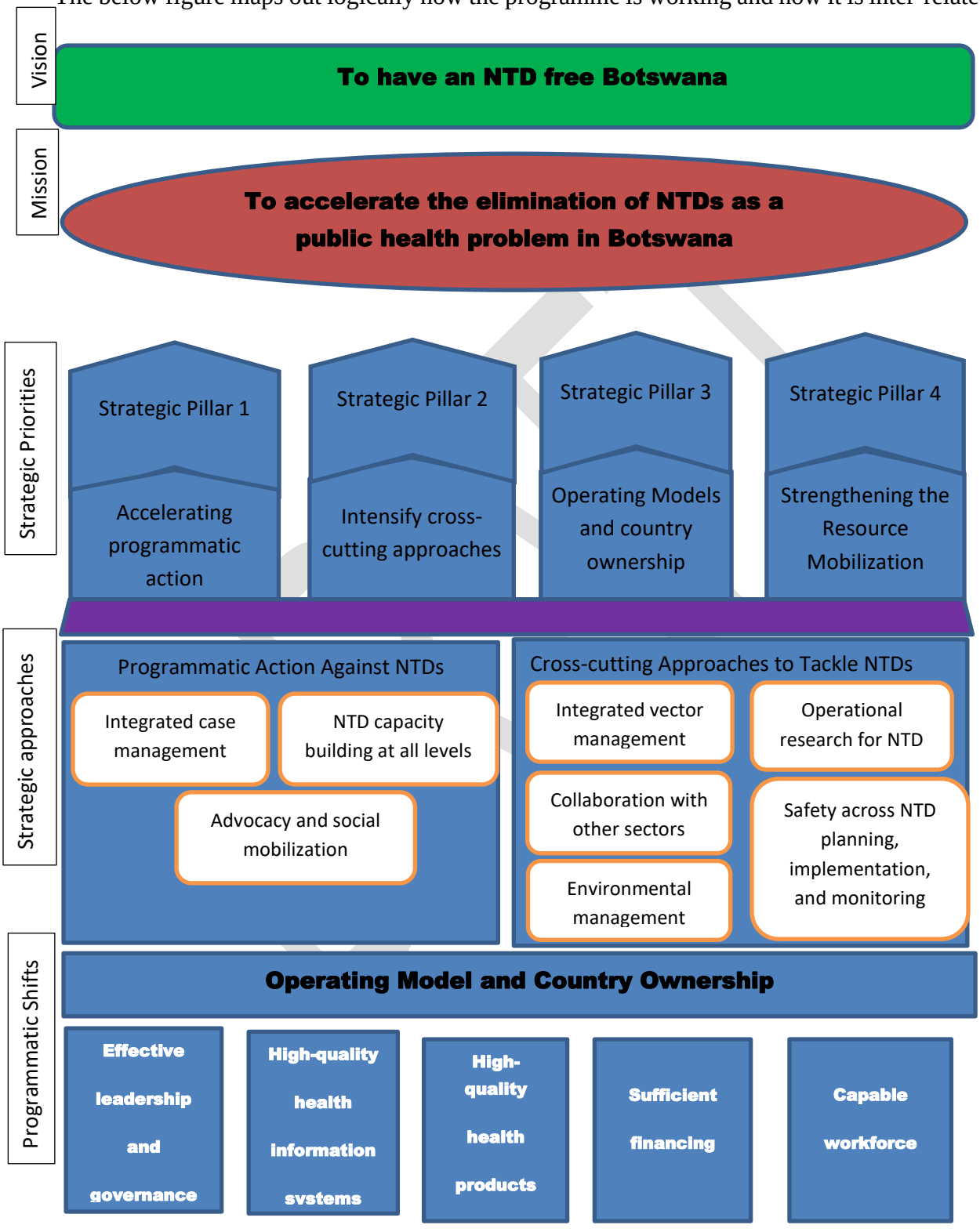


Fig 9. Programme Strategic Agenda Logic Map Template

PART 3: IMPLEMENTING THE STRATEGY: NTD OPERATIONAL FRAMEWORK

In line with the 2021- 2030 NTD Global Roadmap, the Botswana NTD Master Plan is geared towards ensuring three fundamental shifts in the approach to tackling NTDs: **first**, increase accountability for impact by using impact indicators instead of process indicators, as reflected by the targets and milestones in Part II and accelerate programmatic action; **secondly**, move away from siloed, disease-specific programmes by mainstreaming programmes into national health systems and intensifying cross-cutting approaches centred on the needs of people and communities: and **thirdly**, change operating models and culture to facilitate greater national ownership of the programme.

Section 3.1: Strategic priorities and Key Activities			
Table 15.1: Strategic Pillar 1- Accelerating Programmatic Action.			
Strategic Priorities	**Key Activities**	**Time Frame**	**Resources Needed**
Strategic Priority 1: Establish a National NTD Programme	Develop Terms of Reference (TOR) and Organogram for NTD programme	2023	Human, financial and material Resources
	Advocate for the establishment of an NTD Programme	2023	Human, financial and material Resources
	Provide office space and furniture for the establishment of the NTD Programme	2023	Human, financial and material Resources
	Identify competent staff and deploy to the NTD Programme	2023	Human, financial and material Resources
Strategic Priority 2: *Scale up integrated preventive chemotherapy to achieve 100% geographic coverage and treatment access for STH, SCH, Taeniasis and other endemic PC NTDs (scabies, trachoma)*	Produce NTDs training manual for the implementation of integrated Mass Drug Administration for PC-NTDs	2023	Human, financial and material Resources
	Conduct community social mobilization.	Annually 2023-2027	Funding, Fuel, transport, Human resources
	Conduct MDA for SCH and Trachoma in 19 districts not leaving behind pregnant woman and woman of childbearing age (WOCBA)	Annually 2023 -2027	Funding, Fuel, transport, Human resources, medicines
	Conduct MDA for STH in 11 targeted endemic districts not leaving behind pregnant woman and woman of childbearing age (WOCBA)	Annually 2023 -2027	Funding, Fuel, transport, Human resources, medicines
	Conduct MDA for scabies where applicable	Ad hoc 2023 -2027	Funding, Fuel, transport, Human resources, medicines
	Conduct MDA for TRA in endemic districts	Annually2023-2027	Funding, Fuel, transport, Human resources, medicines,

	Enhance advocacy and social mobilization to improve uptake of the MDA campaigns	2023-2027	Human, material &Financial, resources,
	Conduct MDA for Taeniasis, in targeted endemic districts	Annually 2023 -2027	Funding, Fuel, transport, Human resources, medicines
Strategic priority 3: *Ensure early detection and prompt treatment of targeted case management/ IDM NTDs*	Build institutional capacity for laboratory services'	Annually 2023-2027	Expert, funding, consultancy, infrastructure
	Conduct testing and reporting of Rabies, SBE, Scabies and leprosy	annually 2023 - 2027	Expert, funding, lab commodities, medicines
	Train health workers on case management, morbidity management and disability prevention	Annually 2023 -2027	Human resources, accommodation and meals, Funding, guidelines and stationery
	Build national capacity on early detection and notification of NTDs; through IDSR training	2023 -2024	Human resources, Funding, guidelines (rapid assessment tools) and stationery, diagnostic kits and medicines,
	Building capacity of community health care workers, community leaders, teachers and other stakeholders on NTDs	annually 2023 - 2025	Human resources, accommodation and meals, Funding, guidelines and stationery
	Conduct contact tracing for eligible CM cases (leprosy, Scabies etc)	annually 2023 - 2027	Human resources, Funding, guidelines (rapid assessment tools) and stationery, diagnostic kits and medicines,
Strategic priority 4: *Prioritize and strengthen monitoring and evaluation to*	Conduct mapping for Taeniasis in sampled districts	annually 2023 - 2027	Funding, Fuel, transport, Human resources, consultancy, accommodation & meals

track progress and decision making towards the 2030 goals	Conduct Trachoma mapping in Okavango	Annually 2023 - 2027	Funding, Fuel, transport, Human resources, consultancy, accommodation & meals
	Conduct sentinel surveillance for STH and SCH	Annually 2023 - 2027	Funding, Fuel, transport, Human resources, consultancy, accommodation & meals
	Strengthen NTDs information management and surveillance system	Annually 2023 - 2024	Funding, consultancy, manuals and SOPs
	Conduct midterm review for NTDs	Annually 2023 - 2027	Funding, Consultancy, Manual and SOPs
	Burden assessment for case management NTDs including the newly added ones	Annually 2023 - 2027	Funding, consultancy, manuals and SOPs
	Conduct impact assessment for NTDs following completion of MDA rounds	2023-2027	Funding, Fuel, transport, Human resources, consultancy, accommodation
Strategic priority 5: *Ensure timely, safe, and effective supply chain management of quality assured NTD Medicines and other products up to the last mile*	Procure and distribute NTD supplies and equipment across the country	Annually 2023-2027	Funding and human resources
	Monitor stocks for NTDs medicines and commodities	Annually (2023-2027)	SOPs, HR
	Develop SOP for supply chain management	2023	Funding and human resources
Strategic priority 6: *Prioritize operational research areas to facilitate NTDs implementation*	Identify research priority areas for NTDs	annually 2023 - 2027	Funding, Manuals, and SOPs
	Develop and implement research operational plans for NTDs.	2024	Human, financial and material resources
	Establish laboratory network for NTDs	Annually 2023 - 2027	Funding, Equipment

	Conduct trainings for NTDs research areas to all stakeholders	annually 2023 - 2027	Funding
	Promote research on innovative and cost-effective ways of controlling NTDs for sustainability	2024-2027	Human, financial and material resources
	Conduct research on Female Genital Schistosomiasis and document the disease burden	2023-2027	Human, Financial, resources
	Publish and disseminate research	annually 2023 - 2027	Funding
	Establish laboratory network for NTDs	annually 2023 - 2027	Funding, Equipment
Strategic Priority 7: Strengthen and scale up integrated case-management for CM-NTDs (Including Leprosy, LF, skin NTDs, snakebites, Rabies)	Procure medicines for case management diseases	Annually 2023-2027	Procure anti-snake and anti- rabies vaccines
	Train health workers on case management for the CM - NTDs	2024	Procure anti-snake and anti- rabies vaccines

Table 15.2, Strategic Pillar 2- Intensify cross-cutting approaches			
Strategic Priorities	**Key Activities**	**Time Frame**	**Resources Needed**
Strategic Priority 1: *Strengthen and mainstream platforms with similar delivery strategies and interventions (MDAs, Morbidity management, social mobilization for Behaviour Change and Communication, WASH, IVM, EPI, MCH services, etc) for integrated approaches across NTDs*	Build capacity on provision of integrated services	2023-2024	Expert, funding, guidelines and manuals, venue, stationary
	Conduct Integrated delivery of service (EPI, SRH, nutrition, TB, Eye Health, Malaria)	annually 2023-2027	Advocacy and consensus building, HR, funding, tools, transportation, medicines, kits
	Conduct IVM for vector borne NTDs	Annually 2023-2027	Supplies (ITN, molluscicides for snail control, Indoor Residual Spraying (IRS) chemicals for malaria control), funding, experts, transport
	Conduct integrated NTD MDA where applicable	Annually 2023-2027	Guidelines and manuals, HR, funding, medicines, SAE reporting format, tools, transportation, IEC
	Coordinate quarterly meetings with WASH partners	2023-2027	Human, financial & material Resources
	Advocate for increased access to safe water, basic sanitation and hygiene (WASH)	Annually 2023-2027	Logistics, funds, personnel, stationary
	Conduct supportive supervision to Monitor ongoing integrated service delivery	Annually 2023-2027	Human, material &Financial, resources,
Strategic Priority 2*: Mainstream delivery platforms within national health system*	Strengthen capacity of national supply management system	Annually 2023-2027	Consultant, funding
	Improve infrastructure	Ad hoc	Funding, IT materials, HR
	Build capacity on quantification and request of supplies	Annually 2023-2027	Consultant, IT services, programme reports

	Build capacity for timely delivery of supplies to IU level, monitor stock, improve reverse logistics	Quarterly	Supplies, transportation, funding, HR
Strategic Priority 3: *Integrated NTD planning, implementation, and monitoring*	Utilize a joint application package for targeted PC NTDs	Annually 2023-2027	HR, tools, fund, IT services,
	Develop and implement guidelines on integrated NTDs management	2023 -2024	Financial, human and material resources
	Identifying other vector borne disease program activities and (e.g. malaria preventive programs) and integrate cross cutting interventions strategies (e.g vector control), WASH programs, rabies vaccination programs)	Annually 2023-2027	Human, material &Financial, resources,
	Incorporate NTD prevention, control and management in pre-service training of lower, mid and tertiary level health-care providers	2023 -2024	Financial, human and material resources
	Conduct annual programme review and stakeholders meeting	Annually 2023-2027	Funding, venue, transportation, HR,
	Quantification, application and procurement of supplies for CM NTDS	Annually 2023-2027	HR, Funding
	Develop and implement guideline on integrated NTDs management	Quarterly	Funding
	Participate in international meetings	Ad-hoc	Funding, accommodation and meals, transport (air tickets)
Strategic Priority 4: *Strengthen multisectoral coordination and response (WASH, ONE HEALTH, Min of Education and all the stakeholders)*	Conduct Integrated meetings with animal health for continuous monitoring of interventions towards elimination e.g. Taeniasis	Annually (2023-2027)	Funding, transport, human resources
	Strengthen coordination mechanism	Annually (2023-2027)	Funding, human resources

	Conduct regular integrated planning and review meetings with identified stakeholders and partners	Annually (2023-2027)	Funding, human resources
	Strengthen multi-sectoral collaboration at all levels.	Annually 2023-2027	Human, financial & material Resources

Table 15.3: Strategic Pillar 3- Operating Models and culture to facilitate country ownership			
Strategic Priorities	**Key Activities**	**Time Frame**	**Resources Needed**
Strategic Priority 1: *Strengthen country ownership and leadership of the NTD programme at all levels (improved allocation of domestic funding)*	Conduct national planning for NTDs control activities	Annually 2023-2027	Experts, planning tool, funding (conference facility, accommodation and meal, stationary, transportation)
	Advocate for domestic funding	Annually 2023-2027	Advocacy tools, experts, funding, venue, stationary, IEC materials, transportation
	Advocate for establishment of Regional NTD Committees	2023-2024	Human & Financial resources
	Develop guidelines, roles and responsibilities of the different level of NTD governance from National to district level	2023	Human & Financial resources
	Mainstream NTDs in the NHS and National Health Sector Strategic Development Plan	2023 2023-2027	HR/expert, participation in the development
	Building capacity for resource mobilization	2024	Expert/HR, funding, training materials
	Improve community involvement	2023-2027	IEC material, community leaders, Funding, Experts
	Mainstream all NTD indicators in national HMIS	2023	Tools (disease specific indicators, HMIS, funding, IT)
	Engage policy makers for support on NTD programme including identification of NTD ambassador	Annually 2023-2027	IEC, HR, funding

Strategic Priority 2: *Empower local government and authorities in social mobilization, risk and crisis communication, behavioural change and building local support for NTD interventions.*	Raise awareness of Authorities on NTDs	Annually 2023-2027	IEC materials, funding, Experts
	Engage communities and local authorities to reinforce local ownership and commitment to the NTD programme activities.	Annually 2023-2027	IEC material, Funding, Experts
	Produce risk communication material and deploy these in print and media to the communities for improvement of NTD risk awareness	Annually 2023-2027	IEC material, Funding, Experts
Strategic Priority 3: *Strengthen collaboration with other sectors (CSOs and CBOs)*	Conduct coordination meetings with various stakeholders including CSO and CBOs to foster interest their participation in NTD	Quarterly 2023-2027	SOP, Expert (NTD focal person), venue, stationary, IEC material
	Conduct programme planning and review meetings	Bi-Annually	HR, funding, programme report
	Share the results with Partners and interested stakeholders increased appreciation of the burden of NTDs and to unlock funding for the NTD programme	Annually 2023-2027	Financial, human and material resources

	Strengthen Pharmaceutical supply chain management system	2023-2024	Financial, human and material resources
	Ensure the inclusion of NTDs into the MoH Essential Health Care Package.	2024	HR, resource material
	Promote integrated service provision	Annually 2023-2027	National strategy, HR, Reporting tools

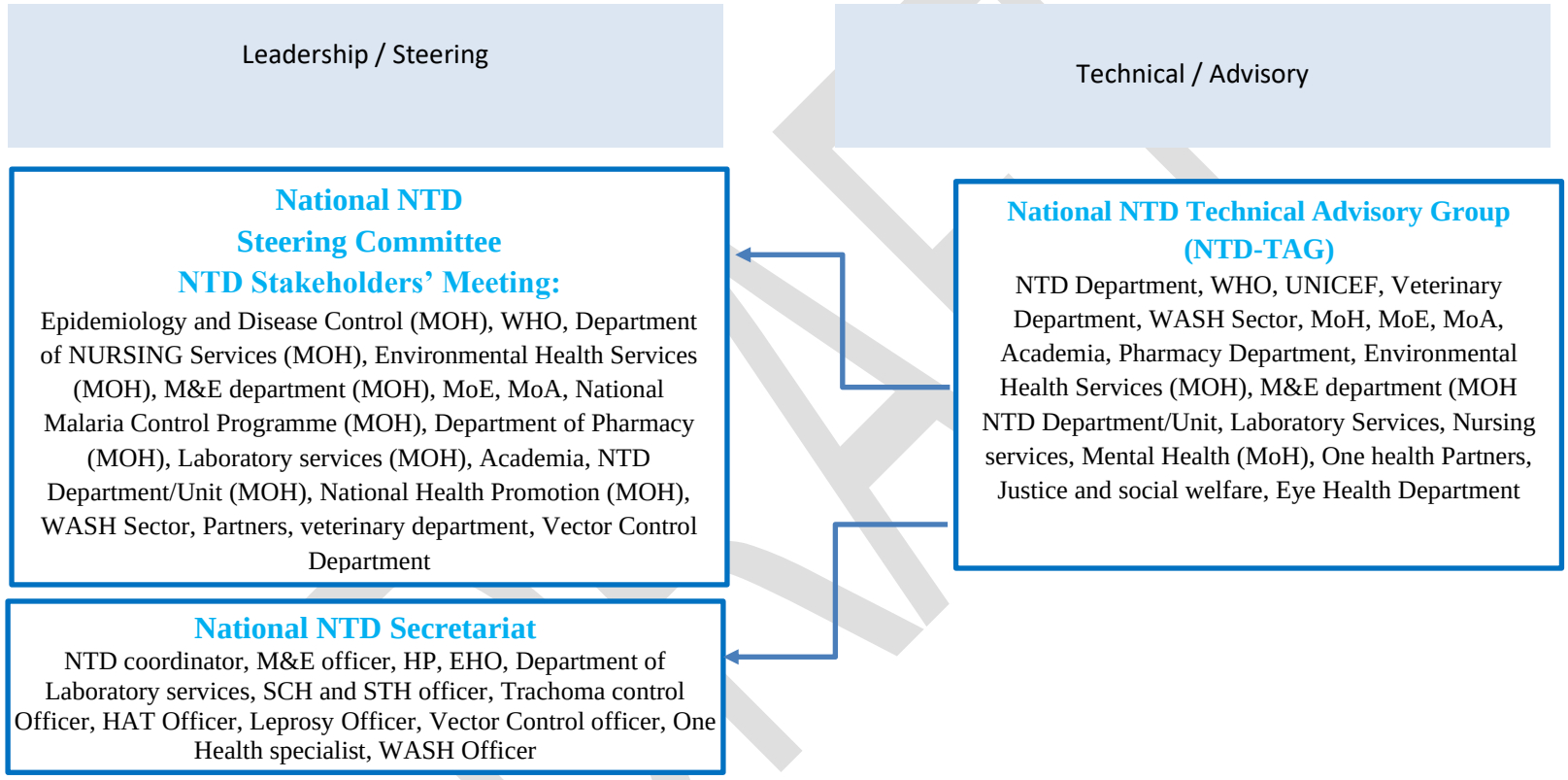
Table 15.4: Strategic Pillar 4-Strengthen Resource Mobilization, Coordination and Communication for the elimination of NTDs**.**

Strategic Priorities	**Key Activities**	**Time Frame**	**Resources Needed**
Strategic Priority 1: Promote community involvement and ownership of the program for optimal use of available resources.	Conduct community engagement meetings to discuss NTD program and community ownership of the program, identifying their roles in the NTD program.	Annually 2023-2027	Financial, human and material resources
Strategic Priority 2*: Build NTD programme capacity for resource mobilization*	Building capacity for on resource mobilization	2023	Expert, funding for organizing meeting, stationary
	Identify donors and partners for engagements on NTD control and elimination.	2023	HR,
Strategic Priority 3: *Promote community involvement and ownership of the program for optimal use of available resources*	Involve community in NTD interventions	Annually 2023-2027	IEC, HR, Funding

	Celebrate World NTD Day	annually	IEC material, HR, funding, transport
	Engage for multi-sectoral collaboration	quarterly	HR, programme reports
	Create budget line for NTDs programme in the national planning and budgeting	2024	Human resources
Strategic Priority 4: *Promote partnership and coordination for NTD programme implementation*	Identify NTD stakeholders (internal, external)	2023	HR
	Strengthen integrated Intervention	Annually 2023-2027	HR, funding for consultative meeting, stationary
	Strengthen multi-sectoral coordination	Annually 2023-2027	HR, venue, stationary
	Documentation and sharing best practices	Annually 2023-2027	HR, funding, transport, venue
Strategic Priority 5: *Advocate for domestic resource allocation*	Conduct advocacy workshop	Annually	IEC, stationary, funding Expert
	Engagement of policy makers	Annually	IEC, HR
	Stakeholder engagement meeting	Biannually 2023-2027	IEC, HR
	NTD Ambassador (former patient or public figures for advocacy on NTDs	2023 - 2017	Transportation, IEC, TV/HIV slots, ID NTD ambassador
	Conduct awareness raising	2023 -2027	IEC, HR, Stationary

Strategic Priority 6*: Improve communication and awareness at the community level for a successful elimination of the endemic NTDs.*	Engagement of community	2023 - 2027	IEC, transportation
	Promote social inclusion	2023-2027	IEC, National Policy, HR
Strategic Priority 7: Strengthen the integration and linkages of NTD program and financial plans into sector – wide and national budgetary and financing mechanisms	Mainstream NTDs into all Sectoral policies and plans	2024	Human and financial resources
	Establish national/regional coordinating mechanisms.	2024	Human, material and financial resources

Section 3.2: Toward Programme Sustainability: Intensifying Coordination and Partnerships



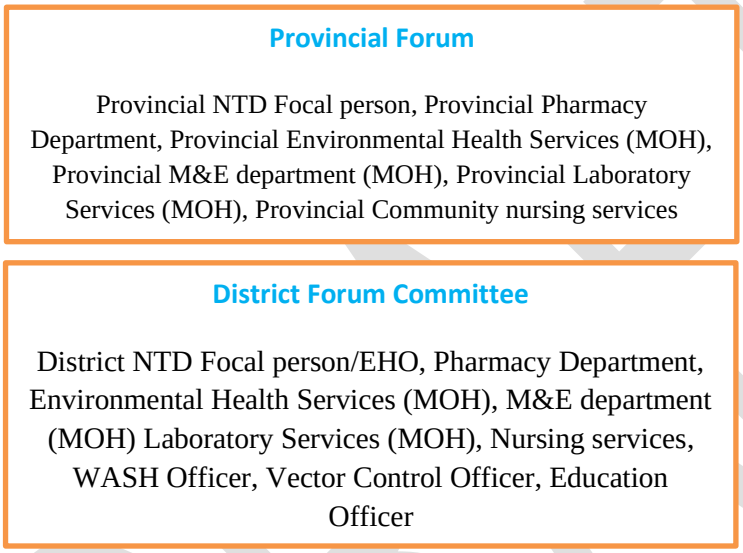


Figure 10: Programme Coordination Mechanism

Entity	Membership	Terms of Reference
National NTD Steering Committee		
Meeting frequency: Quarterly **Chair:** NTD programme Coordinator **Host:** MOH	Ministry of finance, Ministry of Agriculture Epidemiology and Disease Control (MOH), WHO, Department of NURSING Services (MOH), Environmental Health Services (MOH), M&E department (MOH), MoE, MoA, National Malaria Control Programme (MOH), Department of Pharmacy (MOH), Laboratory services (MOH), Academia, NTD Department/Unit (MOH), National Health Promotion (MOH), Partners, One Health Partners, Justice and social welfare	1. The committee serves as an advisory body to the MoH. **2.** Monitor and evaluate the implementation of the masterplan. **3.** Review implementation plan. 4. Advocate for resource mobilisation and political support **5.** Resource mobilizes for the NTD programme. **6.** Develop One Health Strategy for NTDs: Case definitions, common targets, Strategies and mechanisms for collaboration among Agriculture, Health, livestock, Wildlife, Food safety and other ministries. 7. Prevention discrimination associated with high level of stigmatization associated with NTDs (Leprosy, LF, neurocysticercosis) 8. Advocate for housing improvements to minimize vector borne diseases. 9. Coordinate and monitor MDA in schools, 10. Advocate for and provide technical advice on provision of improved water sources, hygienic conditions, access to sanitation facilities.

		11. Monitor impact track progress of NTD interventions using impact indicators. 12. To perform any other duties related to or incidental to NTDs elimination.
National NTD Secretariat		
Meeting frequency: Monthly **Chair:** NTD Coordinator **Host:** MOH	NTD coordinator/programme manager, M&E officer, HPO, EHO, Department of Laboratory services, Programme officers for SCH and STH officer, Trachoma control Officer, Leprosy Officer, Rabies officer, Mycetoma officer, Skin Diseases and Snakebite officers), Finance Officer, IT person	1. Serve as secretariat for the steering committee and the TAG 2. Review and identify gaps on individual progress of each disease 3. Scheduling meetings and taking minutes during the meetings for the TWG and the steering committee. 4.Compiling and distribution of reports 5.Review and identify gaps on individual progress of each disease 6. Serve as secretariat for the steering committee and the TAG 7. Administer the day-to-day NTD program activities and coordinate all partners/stakeholders' inputs. 8. Implement the NTD master plan 9. Share data on Occurrence of NTD, MDA impact, vector dynamics, and insecticide use 10. Maintain accurate dossier on each NTD disease 11. Administer the day-to-day NTD programme activities and coordinate all partners/stakeholders' inputs.

		12. Provide support to the Regional NTD secretariat and provide a platform for addressing any issues emanating there from during programme implementation
National NTD Technical Advisory Group (Experts)		
Meeting frequency: Bi- annually **Chair:** To be nominated **Host:** MOH	NTD Department/Unit, WHO, UNICEF, Veterinary Department, WASH Sector, MoH, MoE, MoA, Academia, Pharmacy Department, Environmental Health Services (MOH), M&E department (MOH) Laboratory Services (MOH), Nursing services (MOH), One Health Partners, Mental Health (MOH), Eye Health, Malaria control programme	1.Advisory board to the NTD Program 2.Advise the steering committee and the National NTD secretariat 3.Monitor the implementation of the NTD Masterplan 4. Mapping of potential donors and partners 5. Review individual progress of each disease 6. Advise on technical issues regarding NTD programme implementation 7.To perform any other duties related to or incidental to NTDs elimination
Regional/Provincial NTD Secretariat		
Meeting frequency: Monthly **Chair:** Provincial NTD Focal person **Host:** MOH	Provincial NTD Focal person, Provincial Pharmacy Department, Provincial Environmental Health Services (MOH), Provincial M&E department (MOH), Provincial Laboratory Services (MOH), Provincial Community nursing services, Provincial Education Officer, Provincial Nursing Officer, Provincial Administrator, Provincial Governor, Provincial Livestock Director	1. Receive policies and guidelines on NTDs and disseminate them to districts in the province. 2. Monitor and Coordinate NTD activities implemented at District level 3. Mobilize resources for the NTD programme at provincial level, Compile and report NTDs to the National Health Office and National NDT national office, Partners. 4. Review provincial progress in NTD control.

District NTD Forum		
Meeting frequency: Monthly Chair: District NTD Focal Point/EHO Host: MOH	**District Medical Officer, (Chair), District Public Health Officer (Focal person), District Nursing Officer, Senior Administrative Officer (Secretary), District Health Promotion Officer, District Leprosy/TB Control Officer, District Pharmacy Technician, Director of Agriculture District Education officer, Community Development Officer, District Livestock Officer, Governor's Office, District Administrator or equivalent position, Police, Social Welfare,**	1. Implement NTD activities in line with guidelines from the national Office. 2. Participate in NTD data collection and reporting. 3. Social mobilization: (i) Conduct joint awareness –raising and behavioural –change promotion (ii) Provide education on animal husbandry and management e. g tethering dogs, safe disposal of offal containing cystic stages. 4. Delivering NTD interventions 5. Participate in community engagement and advocate for community support in control and elimination of NTDs. 6. Review individual progress of each disease at the district level. 7. Report to the Provincial Secretariat on status of the NTD programme 8. Provide a platform to raise awareness on NTDs and address challenges with community level programme implementation.

Fig 11: Membership and Terms of Reference – Programme Coordination Mechanism

NTD Programme Partnership and Coordination Mechanism

Meeting the 2030 targets will require coordination, collaboration and cooperation among many sectors. The SDGs show that there is no single development target. Meeting the 2030 targets will require coordination among adjacent sectors and programmes, both within and beyond health, in the broader NTD network. Sectors such as vector control and WASH make critical contributions to progress on NTDs and working together more effectively can accelerate and sustain progress towards disease elimination and control. Coordination is also necessary with the wide array of relevant NTD partners, including donors, academic institutions, pharmaceutical companies, diseases experts, multilateral organizations and implementation partners to ensure effective service delivery. Coordination is especially necessary for the 12 NTDs targeted for elimination and eradication. Experience has shown that NTD interventions alone may be insufficient to eliminate a disease. For example, deworming to prevent schistosomiasis in the Mekong sub-region alone did not prevent reinfection but required parallel activities including WASH, health education, and the One Health approach to deal with animal reservoirs. Furthermore, the burden of chagas disease in Latin America was reduced by vector control particularly information, education, and communication, indoor residual spraying and house improvements, in combination with screening of blood donors to stop transmission via transfusion. Effective coordination can also minimize duplication of work. For example, harmonized vector control for both malaria and lymphatic filariasis can reduce overlapping initiatives in countries that are endemic for both diseases. Through collaboration, NTDs can benefit from the resources and activities of other sectors. For example, sharing microplanning data on the endemicity of WASH-related NTDs with WASH programmes can direct WASH activities to NTD hotspots. Collaboration may also improve the quality and cost -effectiveness of interventions by ensuring that they are delivered through the most suitable channel. For example, veterinary services would be better suited than an NTD programme to implement an intervention for animal health such as vaccinating pigs.

In Botswana, there is high level of government commitment for the implementation of NTD programme despite the limited number of partners in the country. The Disease Control and Prevention Directorate of the MoH-Botswana where NTD is one of the Programme Units is coordinating the NTD related activities in the country with good level of collaboration with the other government sector offices. Regular annual planning and review meeting of the NTD programme are organized by the MoH involving the few partners and sector offices. There are

NTD focal points that follow routine NTD programme intervention at provincial level. There is coordination meeting every six months (chaired the Communicable Diseases Control Division Director) with the involvement of various programme units of MoH and zonal health offices (NGOs and other partners are not involved) to review performance.

Table 16: Partnership Matrix							
State	**NTDs (List)**	**Veterinary (List)**	**WASH (List)**	**IVM (List)**	**One Health (List)**	**Education (List)**	**Malaria (List)**
North-West	MOH	Min. of Fishery and Livestock	MOH MOA	MOH MOA	MOH	MOE MOH	MOH Botswana National University
Central	MOH WHO	School of Veterinary	MOH MOA WHO	MOH WHO MOA School of Veterinary	WHO MOA School of Veterinary	UNICEF	WHO School of Veterinary
South-East	Min. of Local Government and rural Development	Enhanced Smallholder Livestock Investment Project	MOH MOA	MOH International Livestock Research Institute	MOA MOH International Livestock Research Institute	MOE	MOH
North-East	Min. Water development and sanitation	Climate Resilient Livestock	MOH MOA	MOH	MOA MOH	MOH	MOH
Kweneng	Min. of Fisheries and livestock	Livestock Infrastructure Support Project	MOH MOA	MOH	MOA MOH	MOE MOH	MOH
Southern	Sight Savers	Global Alliance for Livestock Veterinary Medicine – Bill and Melinda Gates Foundation	MOH MOA	MOH	MOA MOH	MOH MOE	MOH
Ghanzi	Operation eye Universal	Global Alliance for Rabies control	MOH MOA	MOH	MOA MOH	MOE MOH	MOH

Kgatleng	Liverpool school of Tropical Medicine and Hygiene	MOH	MOH MOA	MOH	MOA MOH	MOH MOE	MOH
Kgalagadi	Schistosomiasis control Initiative Foundation	MOH	MOH MOA	MOH	MOA MOH	MOE MOH	MOH

Section 3.3: Assumptions, Risks and Mitigations

Risk is the process of examining how likely risk will arise in the implementation of NTD programme. It also involves examining how the programme outcome and objectives might change due to the impact of the risk. The impact could be in terms of schedule, quality and cost.

Risk mitigation is the process of developing options and actions to enhance opportunities and reduce threats to the programme objectives. Risk mitigation progress monitoring includes tracking identifiable risks, identifying new risks, and evaluation risk process effectiveness throughout the programme period.

Table 17: Risk Criteria and Assessment

Potential risk	Before Risk Mitigation			Risk Mitigation			
	Likelihood of occurrence	Impact	Score		Likelihood of occurrence	Impact	Score
			Likelihood x impact				Likelihood x impact
	Certain =5	Severe=5			Certain =5	Severe=5	
	Likely =4	Major=4			Likely =4	Major=4	
	Possible =3	Moderate =3			Possible =3	Moderate =3	
	Unlikely =2	Minor=2			Unlikely =2	Minor=2	
	Rare =1	Insignificant=1			Rare =1	Insignificant=1	
Risk type							
COVID19 pandemic	4	4	16	COVID19 prevention	3	3	9
Lack of Funding	3	4	12	Advocacy for funding	3	3	9

Weak coordination	4	3	12	Coordination mechanism	1	3	3
Migration of trained and experienced health worker force	4	5	20	Improvement of conditions of service and recruitment of health workers	2	2	4
Community fatigue to multiple rounds of MDAs	3	4	12	Community Engagement to address misconceptions NTDs	1	2	2
IVM-Insecticide resistance (Indoor residual spraying insecticide for mosquitoes)	3	4	12	Research for new efficacious and affordable insecticides	1	1	1

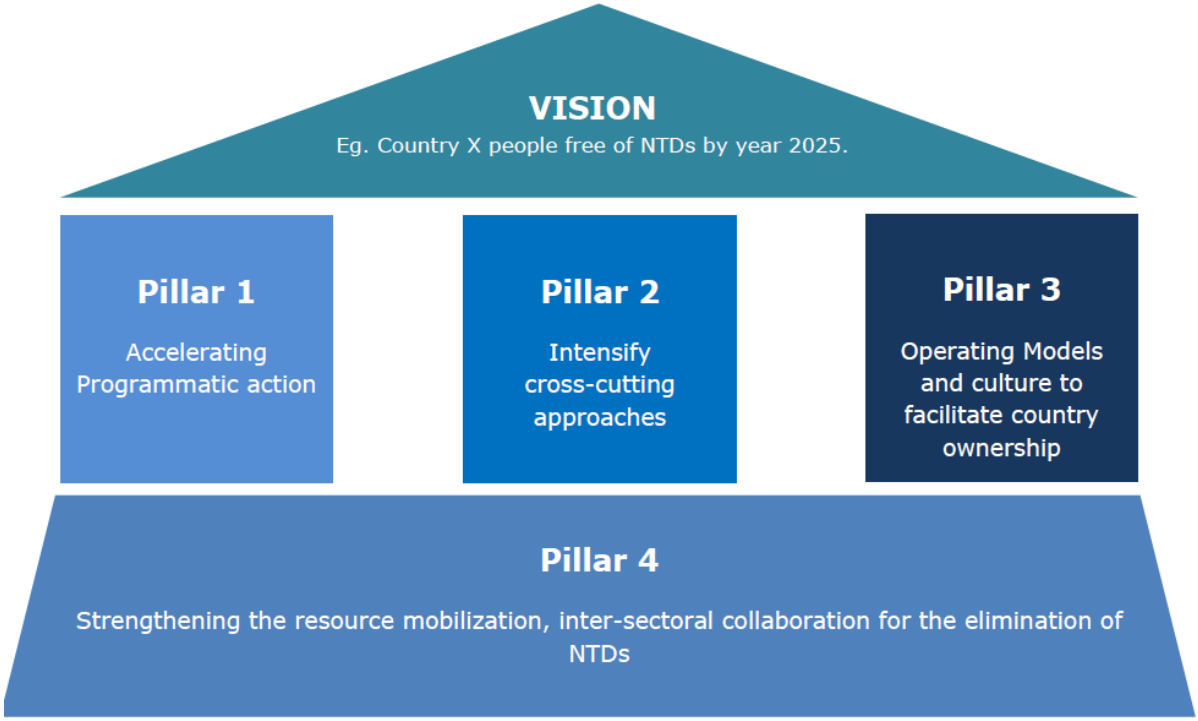
Operating in silos	4	4	16	Strengthen country ownership of the NTD programme, mainstream NTD into the National Health System, strengthen coordination of the NTD at all levels, including partners interested in the NTD programme and enhance inter-sectoral collaboration	1	1	1

Risk Rating (Likelihood x Impact)	
19-25	Severe
13-18	Major
7-12	Moderate
0-6	Minor

Mitigation

Managing risk means mitigating the threats or capitalizing on the opportunities that uncertainty presents to expected results. Failure to identify risks and failures to come up with risk mitigation strategies can and do kill projects. If no mitigation strategy can help, then you're the strategy and project approach are changed.

Table 18: Steps to mitigate risks	
Avoid	Change plans to circumvent the problem
Control	Reduce threat impact or likelihood (or both) through intermediate steps
Share	Outsource risk (or a portion of the risk) to a third party or parties that can manage the outcome.
Accept	Assume the chance of the negative impact
Monitor	Monitor and review process in which risk management is in place



Section 3.4. Performance and Accountability Framework

Table 19a-19d describe the strategic objectives, performance indicators, Targets and dates.

Table 19.1: Performance Indicators for Pillar 1: Accelerating Programmatic Action			
Strategic Priority	Performance Indicators	Target	**Date**
Strategic Priority 1: Establish a National NTD Programme	A set of Terms of References produced.	1	2023
	Organogram for NTD programme produced	1	2023
	NTD Programme established in the Ministry of Health with a dedicated Unit	1	2023
	Office provided for the NTD program.	5 Offices	2023-2024
	Furniture and equipment for the NTD Programme offices provided (desk and laptops, printer, photocopier, internet, filing cabinets and drawers, tables and chairs)	6 sets	2023
	Identify competent staff and deploy to the NTD Programme.	8 personnel	2023-2024
Strategic Priority 2.: scale up integrated preventive chemotherapy to achieve 100% geographic coverage and treatment access to SCH and STH	NTDs training manual developed to guide the implementation of integrated Mass Drug Administration for PC-NTDs	1	2023

	Social mobilization workshops conducted	1 per year	2023-2027
	Number of targeted endemic districts that Conducted MDA for SCH and Trachoma including woman of childbearing age (WOCBA)	19	Annually 2023 -2027
	Number of endemic targeted district that conducted MDA for STH	11	Annually 2023 -2027
	Health workers trained on delivery of integrated preventive chemotherapy for NTDs at one person per Health facility	629 health workers	Annually 2023-2027
	NTD Endemic districtswhere MDA coverage for specific PC-NTDs reached optimal coverage threshold.	100%	Annually 2023-2027
	Proportion of districts that achieved elimination target for at least one NTD	75%	2027
	Proportion of endemic districts that conducted MDA for scabies	100%	Ad hoc 2023-2027
Strategic priority 3: *Ensure early detection and prompt treatment of targeted case management/ IDM NTDs*	Health Care Workers Trained on active detection, Management of Case management NTDs in endemic districts	50%	2024
	Proportion of Health facilities with capacity for Testing Rabies, SBE, Scabies and leprosy	75%	2024-2027

	Public health laboratories with strengthened diagnostic capacity	90%	2025
	Integrated guidelines management of CM-NTDs	1	2024
	Proportion of Health facilities routinely reporting CM-NTDs, scabies and snake bites envenoming	100%	Annually 2024-2027
	Workshops conducted to build capacity to community health care workers, community leaders, teachers and other stakeholders on NTDs	3	2023-2024
	Case management NTD for which contact tracing is conducted.	Leprosy, scabies,	2023-2027
Strategic Priority 4: *Prioritize and strengthen monitoring and evaluation to track progress and decision making towards the 2030 goals*	PC and CM –NTDs for which Monitoring, and evaluation of intervention activities are implemented.	All PC and CM NTDs	2024-2027
	Suspected districts mapped for Taeniasis endemicity	All suspected districts	2024
	Health workers trained for trachoma mapping	100	2023

	Districts where trachoma endemicity mapping was conducted	All suspected districts	2023
	Endemic districts conducted sentinel surveillance for STH	100%	Annually 2023-2027
	Districts with Strengthened NTDs information management and surveillance system	100%	Annually 2023-2027
	Proportion of endemic districts that conducted mid-term review for SCH	100%	2025
	Proportion of NTDs for which impact assessment was conducted following completion of stipulated MDA rounds (years)	100%	2023-2027
	Proportion of NTDs for which dossiers are prepared for validation of elimination as public health problem.	50%	2027
Strategic priority 5: *Ensure timely, safe, and effective supply chain management of quality assured NTD Medicines and other products up to the last mile*	NTD adequately supplied with medicines for both MDA and Case management	100%	Annually 2024-2027
	Districts capacitated and Monitoring stocks for NTDs medicines and other commodities	100%	2023-2027
	SOPs for supply chain management Developed	1 set	2023

	NTD endemic districts with 100% MDA geographic coverage achieved	100%	Annually 2024-2027
Strategic priority 6: *Prioritize operational research areas to facilitate NTDs implementation*	NTD for which research Priority areas are identified	All endemic NTDs	2023-2024
	Research operational plans for NTDs developed and disseminated	1	2023-2024
	Laboratory network for NTDs established and sustained	All NTDs	2024-2027
	Proportion of NTD Research priority areas for which scientific research projects were designed and successfully implemented	50%	2027
	Number of workshops conducted to train stakeholders on NTDs research priority areas	1	2024
	New intervention strategies developed/evaluated through innovative research	For et least one NTD	2023-2025
	New NTD diagnostic tools produced /evaluated through innovative research	For at least 1 NTDs	2023-2027
	The burden of Female Genital Schistosomiasis documented	At least 1 scientific report produced /published	2023-2027

	Proportion of research conducted whose data is published in international peer reviewed journals	25%	2027
	Proportion of research results disseminated to stakeholders for policy planning and formulation of intervention strategies	75%	2027
	Number of laboratory networks established for NTDs	1 per disease	2027
Strategic Priority 7: Strengthen and scale up integrated case-management for CM-NTDs (Including Leprosy, LF, skin NTDs, snakebites, Rabies)	Medicines for case management diseases procured and stocked	For all CM NTDs	2023-2027
	Health workers trained on case management for the CM - NTDs	100	2023-2024
Performance Indicators for Pillar 2: Intensify –Cross Cutting Approaches			
Strategic Priority 1: *Strengthen and mainstream platforms with similar delivery strategies and interventions (MDAs, Morbidity management, social mobilization for Behaviour Change and Communication, WASH, IVM, EPI, MCH services, etc) for integrated approaches across NTDs*	Number of NTDs whose control is integrated with EPI, SRH, nutrition, TB, Eye Health, of Malaria delivery services	4	Annually 2024-2027
	Number of vector borne NTDs controlled through IVM strategy	3	Annually 2024-2027
	Quarterly meetings conducted with WASH partners	4	Annually 2023-2027

	Proportion of districts performing integrated MDA	75%	Annually 2024-2027.
	Advocacy meetings for increased access to safe water, basic sanitation and hygiene (WASH) conducted	1	Annually 2023-2027
	Proportion of NTD endemic districts where WASH activities have been increased to combat NTDs.	60%	Annually from 2024-2027
	Number of supportive supervision visits to Monitor ongoing integrated service delivery	2	Annually 2024-2027
Strategic Priority 2*: Mainstream delivery platforms within national health system*	Number of health care workers trained on national NTD medicines supply management system	10	2023
	Number of NTDs whose delivery of control strategies are mainstreamed within National Health system.	6	Annually 2024-2027
Strategic Priority 3: Integrated NTD planning, implementation, and monitoring	Number of Health care workers trained on the utilization of a joint application package for targeted PC NTDs.	5	2023
	Number of Joint application package utilized for targeted PC NTDs	1	Annually 2023-2027
	Guidelines on integrated NTDs management Developed	1	2024

	Guidelines on integrated NTDs management implemented	1	2024-2027
	Number of annual programme review workshops for NTDs	1 workshop per year	Annually 2023-2027
	Number of health workers trained on quantification, application and procurement of supplies for CM NTDS	2	2024
	Number of support supervision meetings conduced for NTD interventions.	3	Annually 2023-2027
	Number of International meetings Participated in.	Ad-hoc	Annually 2023-2027

Strategic Priority 4: *Strengthen multi-sectoral coordination and response (WASH, ONE HEALTH, Min of Education and all the stakeholders)*	Number of meetings to strengthen one health approach in integrated control and elimination of zoonotic diseases like including Taeniasis.	1 meeting quarterly	Annually 2023-2027
	Number of meetings conducted focusing on strengthening one health coordination mechanism	1biannually	2023-2027
	NTD integrated planning and review meetings conducted with identified NTD stakeholders and partners Including, WASH, One health, Veterinary services	1	Annually 2023-2027
	Number of multi-sectoral collaboration meetings conducted at all National, Provincial and District levels	At least two per year per level	2023-2027
Strategic Pillar 3- Operating Models and culture to facilitate country ownership			
Strategic Priority 1: *Strengthen country ownership and leadership of the NTD programme at all levels (improved allocation of domestic funding)*	Number of national planning meetings conducted for the control and elimination of NTDs.	1 annually	2023-2027
	Local budget allocated towards NTD control programme.	At leastUSD500 000.00	Annually 2023-2027
	Number of advocacy meetings for the establishment of Regional NTD Committees	2	2023
	Terms of references for the regional and district forums produced	At least a set of terms of references for each level	2023-2024

	Proportion of NTDs with Indicators Mainstreamed in national HMIS	100%	Annually 2023-2027
	Proportion of NTDs mainstreamed in the NHP and National Health Sector Strategic Development Plan	100%	2023-2027
	Number of community engagement meetings conducted for NTD control	1 per year	2023-2027
	NTD with indicators mainstreamed in national HMIS	Indicators for all endemic NTDs	2024-2027
	High level engagement meetings with Parliamentarians sensitizing them on NTD programme for their buy in conducted.		
	High level NTD ambassador identified to advocate the NTD program	1 at national	2023-2027
Strategic Priority 2: *Empower local government and authorities in social mobilization, risk and crisis communication, behavioural change and building local support for NTD interventions.*	Number of high levels NTD awareness advocacy meetings with the Minister of Health parliamentarians	1 meeting	Annually 2023-2027
	Number of local community leadership engagements meetings conducted to advocate for community support and	1 meeting	Annually 2023-2027

	participation in control and elimination of NTDs		
Strategic Priority 3: *Strengthen collaboration with other sectors (CSOs and CBOs)*	Number of memberships of various sectors (including CSO and CBOs) participating in NTD control programme.	At least a membership of 15 sectors established	2023
	Engagement meetings conducted with communities and local authorities to reinforce local ownership and commitment to the NTD programme activities	1 per region	2024
	Risk communication material produced	1 per NTD	Annually 20203-2027
	Risk communication material deployed in print to the communities for improvement of NTD risk awareness	30000 sets	Annually 20203-20207
	Number of NTD programme planning meeting conducted.	1 annually	2023-2027
	Number of joint sectors NTD review meetings conducted.	Biannually	2023-2027
	Number of NTD programmes integrated with other programme activities from other sector such as NTD and WASH activities, or NTD and Veterinary activities synchronized.	At least 3 programme activities integrated with other sectors annually where possible.	2023-2027

Strategic Pillar 4-Strengthen Resource Mobilization, Coordination and Communication for the elimination of NTDs.			
Strategic Priority 1: Build NTD programme capacity for resource mobilization	Number of training workshop conducted for NTD resource mobilization building capacity.	1 annually	2023-2027
	Number of donors and partners identified for engagements on NTD control and elimination.	At least 10 donors and partners identified	2023
Strategic Priority 2: Build NTD programme capacity for resource mobilization	Number of NTD personnel trained on resource mobilization	1 training workshop	2024, 2026
	Number of donors identified for engagements on NTD control and elimination.	At least 5 donors/partners	2023
Strategic Priority 3: Promote community involvement and ownership of the program for optimal use of available resources	Number of districts community engagement meetings reports for the NTD engagement meetings conducted.	1 meeting conducted annually at by each district NTD program Forum	Annually 2023-2027
	Proportion of NTD endemic districts with community involvement in NTD control programmes.	100%	Annually 2024-2027
	Number of World NTD days Celebrated	1 annually	Annually 2024-2027
	Budget line for NTDs programme created in the national planning and budgeting	1 budget line	Annually 2023-2027

	Number of engagement meetings with different sectors for multi-sectoral collaboration	2	2023, 2024
Strategic Priority 4: *Promote partnership and coordination for NTD programme implementation*	NTD stakeholders identified	20 stakeholders	2023
	Multi-sectoral coordination meetings conducted to strengthen multi-sectoral collaboration	2	Annually 2023-2027
	NTD research results shared with stakeholders and parliamentarians	1	Annually 2023-2027
	NTD experiences documented and shared with stakeholders	Ad hoc	Annually 2023-2027
Strategic Priority 5: Advocate for domestic resource allocation	Advocacy workshops conducted with stakeholders	1	Annually 2023-2027
	Engagement meetings conducted with Parliamentarians to build NTD awareness and advocacy for support	1	Annually 2023-2027
	Press briefings conducted by the NTD Ambassador (former patient or public figures for advocacy on NTDs)	2	Annually 2023-2027
Strategic Priority 6*:* Improve communication and awareness at the community level for a			
	Community NTD Awareness campaigns conducted	1	Annually 2023-2027

successful elimination of the endemic NTDs.	Engagement meetings with community conducted for community ownership and participation in NTD control activities	2	Annually 2023-2027
	Number of messages sent by the media men per month	At least 10 messages	Quarterly 2023-2027
Strategic Priority 7: Strengthen the integration and linkages of NTD program and financial plans into sector – wide and national budgetary and financing mechanisms	NTDs mainstreamed into Sectoral policies and plans	All endemic NTDs	2023-2027
	National coordinating mechanisms Established	1	2023-2024
	Regional coordinating mechanisms	8	2024

PART 4: BUDGETING FOR IMPACT: ESTIMATE AND JUSTIFICATIONS

The proposed activities in this Master Plan were estimated using the software named "Tool for Integrated Planning and Costing" (TIPAC) tool. The budget developed is comprehensive, concise; cost-effective and accurate. The total estimated cost of implementing this Master Plan over the five-year life span is ……, …., …. and…. with the annual costs shown in Table 20 below. It is hoped that partners and funders/stakeholders, having participated in the development of this Plan and its Budget will buy into it and support the government of Botswana to implement it diligently.

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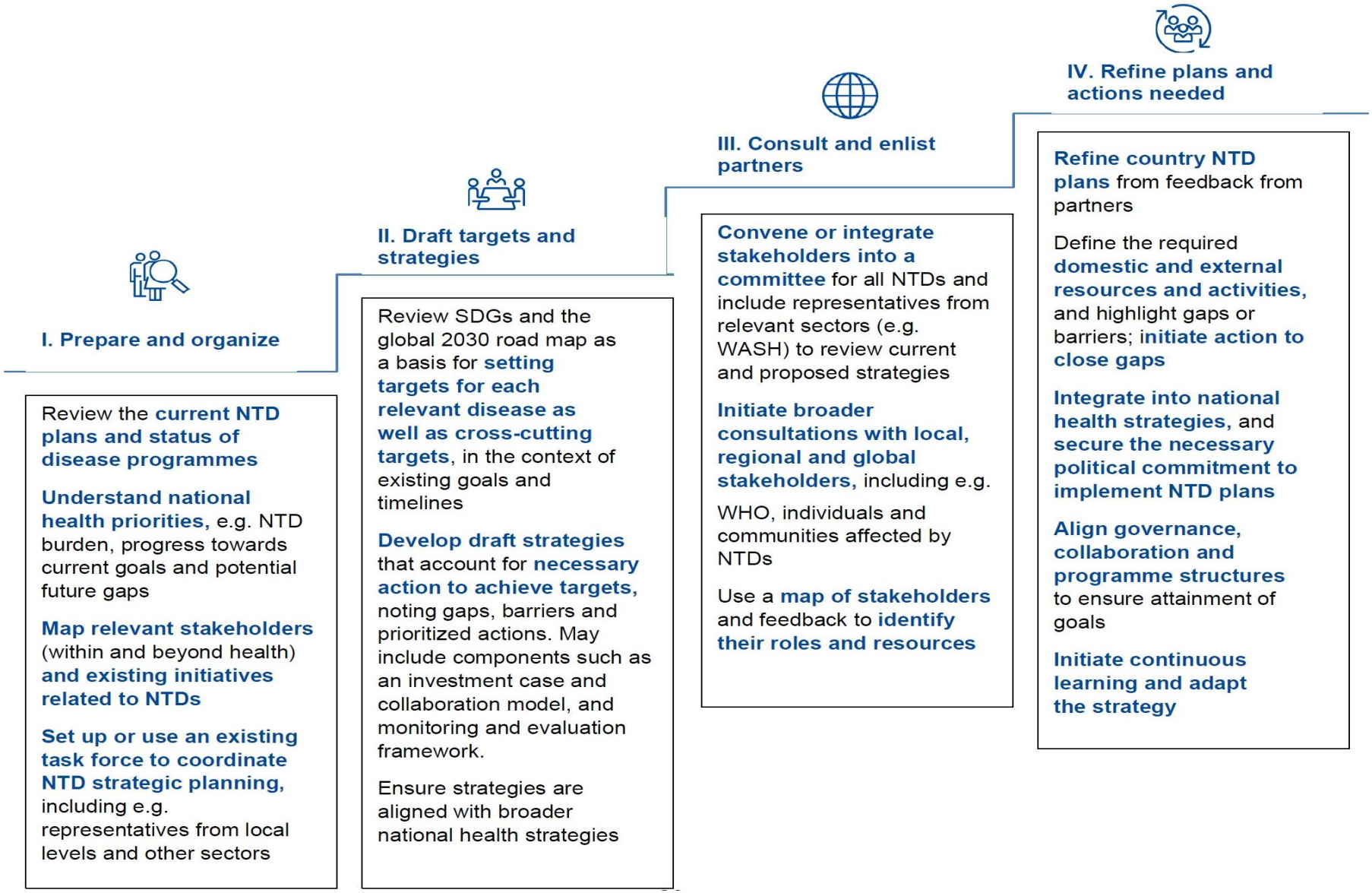
ANNEXES

Annex 1: Steps in designing/reviewing a national NTD Master Plan


I. Prepare and organize
Review the current NTD plans and status of disease programmes
Understand national health priorities, e.g. NTD burden, progress towards current goals and potential future gaps
Map relevant stakeholders (within and beyond health) and existing initiatives related to NTDs
Set up or use an existing task force to coordinate NTD strategic planning, including e.g. representatives from local levels and other sectors
II. Draft targets and strategies
Review SDGs and the global 2030 road map as a basis for setting targets for each relevant disease as well as cross-cutting targets, in the context of existing goals and timelines
Develop draft strategies that account for necessary action to achieve targets, noting gaps, barriers and prioritized actions. May include components such as an investment case and collaboration model, and monitoring and evaluation framework.
Ensure strategies are aligned with broader national health strategies
III. Consult and enlist partners
Convene or integrate stakeholders into a committee for all NTDs and include representatives from relevant sectors (e.g. WASH) to review current and proposed strategies
Initiate broader consultations with local, regional and global stakeholders, including e.g. WHO, individuals and communities affected by NTDs
Use a map of stakeholders and feedback to identify their roles and resources
IV. Refine plans and actions needed
Refine country NTD plans from feedback from partners
Define the required domestic and external resources and activities, and highlight gaps or barriers; initiate action to close gaps
Integrate into national health strategies, and secure the necessary political commitment to implement NTD plans
Align governance, collaboration and programme structures to ensure attainment of goals
Initiate continuous learning and adapt the strategy

Annex 2: Proposed Road map targets, milestones and indicators

Table. Proposed road map targets, milestones and indicators[1]

Overarching global targets

Indicator	2030
Percentage reduction in people requiring interventions against neglected tropical diseases	90%
Number of countries having eliminated at least one neglected tropical disease	100
Number of neglected tropical diseases eradicated	2
Percentage reduction in disability-adjusted life years related to neglected tropical diseases	75%

Cross-cutting targets

Indicator		2030
INTEGRATED APPROACHES	Integrated treatment coverage index for preventive chemotherapy	75%
	Number of countries that adopt and implement integrated skin neglected tropical disease strategies	40%
	Percentage reduction in number of deaths from vector-borne neglected tropical diseases (relative to 2016) – to achieve WHO's global vector control response goal	75%
MULTISECTORAL COORDINATION	Access to at least basic water supply, sanitation and hygiene in areas endemic for neglected tropical diseases – to achieve targets 6.1 and 6.2 of Sustainable Development Goal 6	100%
	Share of the population at risk protected against catastrophic out-of-pocket health expenditure due to neglected tropical diseases – to achieve target 3.8 of Sustainable Development Goal 3	90%
	Share of countries with neglected tropical diseases integrated in national health strategies/plans	90%
UNIVERSAL HEALTH COVERAGE	Share of countries including neglected tropical disease interventions in their package of essential services and budgeting for them	90%
	Share of countries with guidelines for management of neglected tropical disease-related disabilities within national health systems	90%
COUNTRY OWNERSHIP	Share of countries reporting on all relevant endemic neglected tropical diseases	90%
	Share of countries collecting and reporting data on neglected tropical diseases disaggregated by gender	90%

Impact of integrated approaches on disease-specific targets

Disease	Indicator	2020	2023	2025	2030
TARGETED FOR ERADICATION					
Dracunculiasis	Number of countries certified free of transmission	**187** (96%)	**189** (97%)	**191** (98%)	**194** (100%)
Yaws	Number of countries certified free of transmission	**1** (1%)	**97** (50%)	**136** (70%)	**194** (100%)
TARGETED FOR ELIMINATION (INTERRUPTION OF TRANSMISSION)					
Human African trypanosomiasis (gambiense)	Number of countries verified for interruption of transmission	**0**	**0**	**5** (21%)	**15** (62%)
Leprosy	Number of countries with zero new autochthonous leprosy cases	**50** (26%)	**75** (39%)	**95** (49%)	**120** (62%)
Onchocerciasis	Number of countries verified for interruption of transmission	**4** (12%)	**5** (13%)	**8** (21%)	**12** (31%)
TARGETED FOR ELIMINATION AS A PUBLIC HEALTH PROBLEM					
Chagas disease	Number of countries achieving interruption of transmission through the four transmission routes (vectoral, transfusion, transplantation and congenital), with 75% antiparasitic treatment coverage of the target population	**0**	**4** (10%)	**10** (24%)	**15** (37%)
Human African trypanosomiasis (rhodesiense)	Number of countries validated for elimination as a public health problem (defined as <1 case/10 000 people/year, in each health district of the country averaged over the previous five-year period)	**0**	**2** (15%)	**4** (31%)	**8** (61%)
Leishmaniasis (visceral)	Number of countries validated for elimination as a public health problem (defined as <1% case fatality rate due to primary visceral leishmaniasis)	**0**	**32** (43%)	**56** (75%)	**64** (85%)

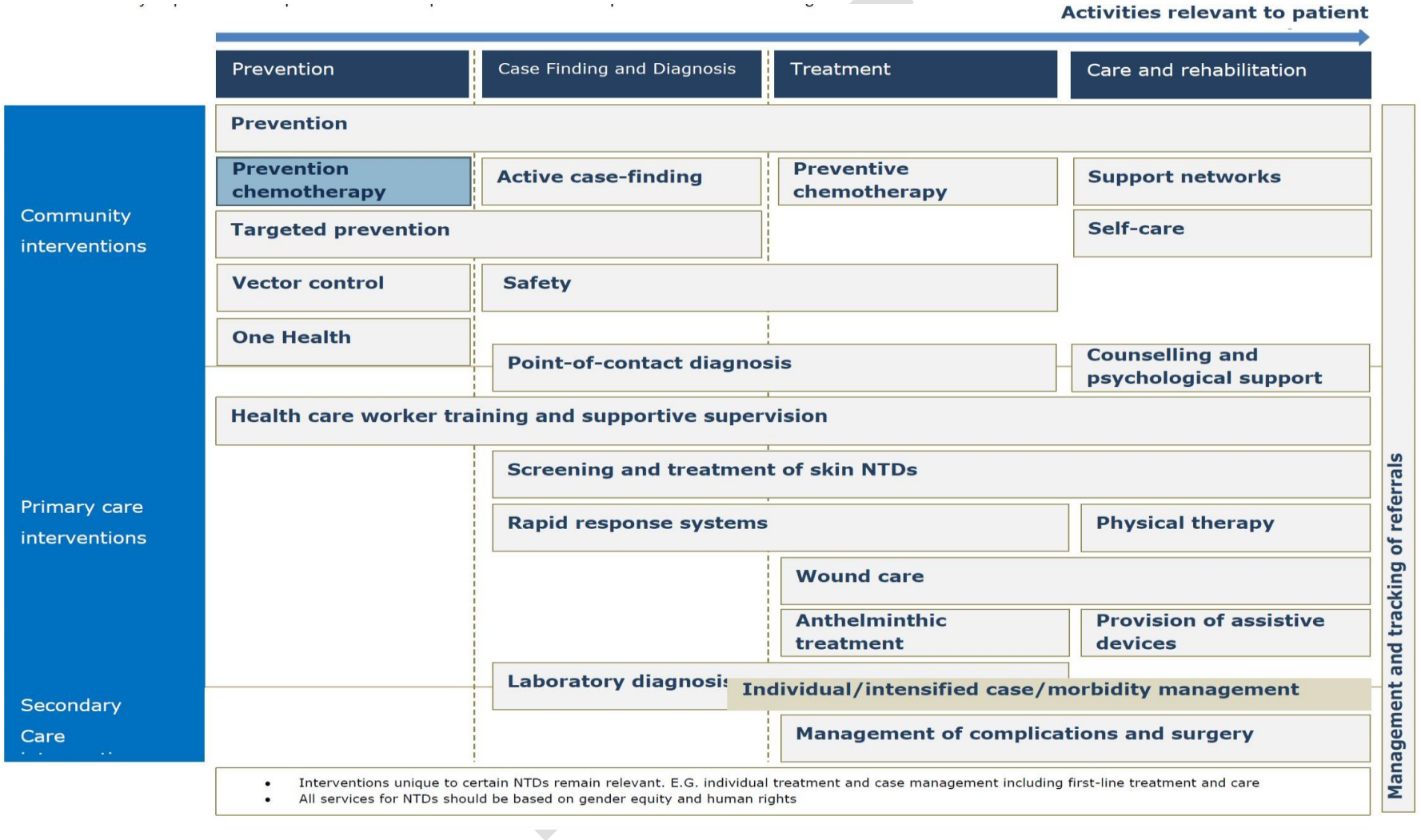
Note: In certain cases, reference to "countries" should be understood to signify countries, territories and areas.

Table. Proposed road map targets, milestones and indicators[1] (cont'd)

Disease	Indicator	2020	2023	2025	2030
TARGETED FOR ELIMINATION AS A PUBLIC HEALTH PROBLEM					
Lymphatic filariasis	Number of countries validated for elimination as a public health problem (defined as infection sustained below transmission assessment survey thresholds for at least four years after stopping mass drug administration; availability of essential package of care in all areas of known patients)	**19** (26%)	**23** (32%)	**34** (47%)	**58** (81%)
Rabies	Number of countries having achieved zero human deaths from rabies	**80** (47%)	**89** (53%)	**113** (67%)	**155** (92%)
Schistosomiasis	Number of countries validated for elimination as a public health problem (currently defined as <1% proportion of heavy intensity schistosomiasis infections)	**26** (33%)	**49** (63%)	**69** (88%)	**78** (100%)
Soil-transmitted helminthiases	Number of countries validated for elimination as a public health problem (defined as <2% proportion of soil-transmitted helminth infections of moderate and heavy intensity due to *Ascaris lumbricoides*, *Trichuris trichuria*, *Necator americanus* and *Ancylostoma duodenale*)	**7** (7%)	**60** (60%)	**70** (70%)	**96** (96%)
Trachoma	Number of countries validated for elimination as a public health problem (defined as (i) a prevalence of trachomatous trichiasis "unknown to the health system" of <0.2% in ≥15-year-olds in each formerly endemic district; (ii) a prevalence of trachomatous inflammation—follicular in children aged 1–9 years of <5% in each formerly endemic district; and (iii) written evidence that the health system is able to identify and manage incident cases of trachomatous trichiasis, using defined strategies, with evidence of appropriate financial resources to implement those strategies)	**9** (14%)	**28** (44%)	**43** (68%)	**64** (100%)
TARGETED FOR CONTROL					
Buruli ulcer	Proportion of cases in category III (late stage) at diagnosis	**30%**	**<22%**	**<18%**	**<10%**
Dengue	Case fatality rate due to dengue	0.80%	**0.50%**	**0.50%**	**0%**
Echinococcosis	Number of countries with intensified control for cystic echinococcosis in hyperendemic areas	**1**	**4**	**9**	**17**
Foodborne trematodiases	Number of countries with intensified control in hyperendemic areas	N/A	**3** (3%)	**6** (7%)	**11** (12%)
Leishmaniasis (cutaneous)	Number of countries in which: 85% of all cases are detected and reported and 95% of reported cases are treated	N/A	**44** (51%)	**66** (76%)	**87** (100%)
Mycetoma, chromoblastomycosis and other deep mycoses	Number of countries in which mycetoma, chromoblastomycosis, sporotrichosis and/or paracoccidioidomycosis are included in national control programmes and surveillance systems	**1**	**4**	**8**	**15**
Scabies and other ectoparasitoses	Number of countries having incorporated scabies management in the universal health coverage package of care	**0**	**25** (13%)	**50** (26%)	**194** (100%)
Snakebite envenoming	Number of countries with incidence of snakebite achieving reduction of mortality by 50%	N/A	**39** (30%)	**61** (46%)	**132** (100%)
Taeniasis/cysticercosis	Number of countries with intensified control in hyperendemic areas	**2** (3%)	**4** (6%)	**9** (14%)	**17** (27%)

Note: In certain cases, reference to "countries" should be understood to signify countries, territories and areas.

Annex 4: Mainstreaming NTDs into national health systems



Annex 4: Coordination with health ministries and other ministries and authorities

Health ministry

Activities of health ministry departments that are relevant for NTDs

Global vector control response (may be under the ministry of environment in some countries)

Use of repellents and traps, e.g. insecticide-treated bed nets, screens, insecticides or molluscicides, fogging

Environmental management to minimize mosquito habitats, including:

- **Housing improvements** (in collaboration with ministry of infrastructure), e.g. plans to build vector-free housing, including safe storage of water, sanitation, window screens, and ensuring air flow to prevent vector entry and to help to keep houses cool
- **Container management,** e.g. covering, emptying, cleaning and disposing of containers (e.g. old tyres)
- **Draining or treating stagnant water** (in collaboration with ministry of water and WASH)

Behavioural change, e.g. wearing long clothing

Use of other innovative approaches, e.g. release of modified, transgenic or sterile vectors, spatial repellents to stop vector entry into households

Mental health

Psychological support and counselling services for NTD patients

Routine assessment of mental health for patients with specific NTDs, particularly those with chronic conditions

Disability and inclusion

Treatment of disability and morbidity management, e.g. physical therapy
Provision of support services and devices, e.g. walking devices and prosthetics
Training for self-management of disability and self-care

Women's and child health

Awareness-building about diseases for which women and children are disproportionately at risk or for which there are particular manifestations in women (e.g. female genital schistosomiasis)

Use of pre- and post-natal contacts, e.g. in maternal health clinics, to deliver interventions, e.g. deworming tablets, and supplements (e.g. iron) for pregnant women and children to prevent anaemia

Pharmaco vigilance

Official regulatory authority for drug safety and adverse event reporting.

Expertise in adverse drug reactions, their investigation, and management

Expertise in communicating information on risk and in mitigating misinformation about adverse events

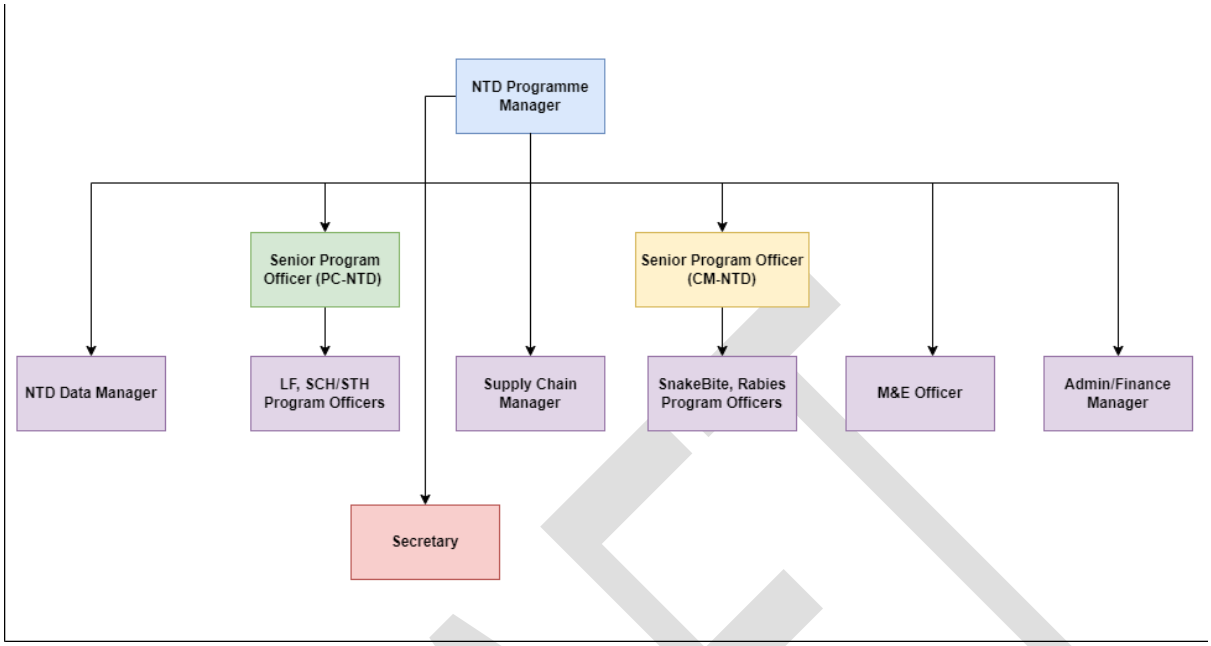
Eye health 	**Promotion of eye care,** e.g. face-washing, protecting eyes and eye examinations **Provision of treatment** for eye conditions related to NTDs, including surgery when required
Nutrition 	

Access to better nutrition to strengthen immune systems and reduce susceptibility to infection, e.g. for visceral leishmaniasis for which malnutrition is a risk factor

Provision of food and supplements (e.g. iron and vitamin A) to combat common side-effects of NTDs, such as anaemia and nutritional impairment

Other disease programmes 	**Immunization programmes:** joint delivery of preventive chemotherapy to pre-school-age children **Tuberculosis:** joint detection of paragonimiasis (foodborne trematodiases), leprosy and other mycobacterial diseases, e.g. Buruli ulcer **Malaria**: joint diagnosis with human African trypanosomiasis, vector control against *Anopheles* mosquitoes **HIV/AIDS:** education about risks, e.g. of coinfection with certain NTD

Annex 5: Organisational chart of the MoH and the NTD National Programme



Annex 7: Safety

Safety is critical for the success of programmes to control and eliminate neglected tropical diseases (NTDs). Attention to safety is also required to fulfill the core ethical obligation of public health programmes to 'do no harm' while delivering health benefits. Safety should be embedded in, and permeate, all aspects of NTD programmes, including training; supervision; drug supply and management; preventive chemotherapy; communication with communities; programme monitoring; and prompt SAE investigation and reporting.

Safety has long been a consideration for NTD programmes. Drugs that are donated for preventive chemotherapy should be manufactured according to the highest standards of safety and quality. However, maintaining safety requires ongoing vigilance, particularly in administering preventive chemotherapy.

Safety is not automatic. It must be considered, planned for, and integrated across all components of NTD programmes. Zanzibar NTD Master Plans should include safety-related objectives or targets. Including safety as an integral part of NTD Master Plans will ensure that safety receives adequate attention in NTD programming.

Organizational and systems preparedness

The WHO NTD RoadMap, 2021-2030 addresses safety primarily in the context of safe drug management and response to adverse reactions. For example, Figure 6 in the NTD Road Map refers to "safe administration of treatment and diligent monitoring and response to adverse events" as a key dimension for assessing programme actions.

Safe drug administration and competent responses to adverse events require advance planning as well as organizational preparedness, both within and beyond the Zanzibar NTD Program. ZFDA Pharmacovigilance Unit represents a key, but often overlooked resource for NTD Programmes in planning for, and responding to, drug-related adverse events. Pharmacovigilance centres have regulatory authority and responsibility for investigating and reporting adverse events, and they should provide essential resources and expertise to Zanzibar NTD programmes when serious adverse events (SAEs) occur. Collaboration with ZFDA pharmacovigilance centres should be highlighted in this NTD Master Plans. ZFDA Pharmacovigilance agency representatives should be included in Zanzibar NTD Technical Advisory Group.

A second high-priority area for preparedness is communications. Concern about adverse events is one of the main reasons for refusal to participate in preventive chemotherapy. When adverse events – or even rumours of them – occur, clear, effective communication is essential. Increasingly, this involves social media. This Master Plan should specify the development and periodic review of a strategic communications plan, which addresses key safety messages

during community mobilization; identifies spokespersons who can be trained and 'on ready' during mass drug administration; and coordinated responses to adverse events and other situations that cause community panic or threaten the program.

Safe drug management and storage

Safe management, good storage practice, and shipment of NTD drugs should be well addressed. It is important for this NTD Master Plans continue to highlight these factors. As preventive chemotherapy becomes increasingly integrated, and drugs are co-administered, safe drug management is essential for preventing mix-ups and improper dosing.

Safety training and safe drug administration

Safe drug administration depends on the quality of the interaction between the CDD and persons participating in preventive chemotherapy. CDDs should understand that safety is as important as high drug coverage and should be trained and skilled in ensuring correct dosing and preventing choking (such as insisting on observed treatment, crushing deworming tablets, and not forcing young children to take medicine against their will). CDDs should adhere to exclusion criteria (e.g., first trimester of pregnancy) and should know how to respond to choking events (e.g., Heimlich manoeuvre).

Managing adverse events

Inadequate or poorly executed responses to SAEs pose a threat to NTD programmes. NTD Master Plans should include objectives and activities specifically directed at recognition, response, investigation, reporting – and ultimately, prevention – of SAEs. They can include process objectives for preparedness and response to adverse events, as well as targets for collaboration with ZFDA pharmacovigilance Unit, strategic communications planning, and stakeholder awareness of procedures for responding to SAEs.

Integrating safety into NTD Master Plans

There are many opportunities for integrating safety into NTD Master Plans, which is facilitated by the systematic approach recommended in this document for developing NTD Master Plans. A first step may be to include safety – 'do no harm' – as a guiding principle in Table 13.

In Part I of the document, NTD Situation Analysis, the SWOT analysis (section 1.5) should consider SAEs and other safety issues as potential threats to be addressed, and the health systems analysis (section 1.2.2) should include ZFDA pharmacovigilance officers.

In Part II, Strategic Agenda, safety may be considered as a programme goal, and specific targets established (such as no choking deaths). Two strategic pillars (section 2.4) are particularly relevant for safety: cross-cutting approaches and country ownership. Safety is an issue that cuts across all aspects of NTD programmes, and all diseases. GPW13 highlights "safe, effective, and affordable essential medicines and their correct administration and use" in UHC. In addition, systems for identifying, responding to, reporting, and preventing SAEs and promoting

drug safety are essential for country ownership of NTD programmes. Safety strategies and targets are also appropriate for specific diseases, e.g., for onchocerciasis control in areas endemic for loiasis (Table 11).

In Part III, Implementing the Strategy, pharmacovigilance centres should be included in plans for coordination (Figure 11). Safety can feature prominently in Section 3.3, on assumptions, risks (e.g., choking; addressing rumours), and mitigation; and in Section 3.4, on performance accountability. Specific process and outcome indicators should be developed that address the safety issues of highest priority to national programmes.

Conclusion

Addressing safety in NTD Master Plans will have far-reaching consequences for improving programme quality. Additional details on NTD programme safety can be found in the WHO document, *Safety in Administering Medicines for Neglected Tropical Diseases*, which outlines approaches to establishing and nurturing collaboration with pharmacovigilance agencies, developing preparedness and excellence in communications, and creating systems to detect, respond to, and prevent SAEs.

Annex 8: List of the Botswana NTD Stakeholder workshop participants (November 2022)

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