



# Roadmap to Zero Leprosy - A Situational Analysis of the Guyana Model

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## Abstract

Leprosy continues to negatively impact the quality of life and infringe upon the human rights of persons in more than 120 countries worldwide. The World Health Organization therefore aims to prevent, eliminate and eradicate this neglected tropical disease by 2030. The Leprosy elimination program in the Cooperative republic of Guyana was observed and analyzed. It was found to be a robust program originally instituted from the 1950's. This was governed by a national policy, and characterized by contact tracing with the administration of single dose Rifampicin to all contacts of consenting index cases in the absence of contraindications. Although on the road to zero cases of Leprosy, it will not reach a non-endemic status by 2030. Phase 1 until interruption of transmission is characterized by zero new autochthonous child cases for at least five consecutive years; for the past 9 years, pediatric cases are still being diagnosed in Guyana. This places Guyana in phase 1 of the Leprosy elimination framework. Through the implementation of a national strategic plan, revision of the law to better protect human rights, enhancing stakeholder engagement and destigmatization campaigns, and addressing gaps through the advancement of research, the program would be better positioned to achieve its goals. The country's journey can be used as a roadmap for other countries at risk of Leprosy resurgence.

**Keywords:** Leprosy; Elimination, ; Mycobacterium; Transmissions

## Introduction

Leprosy still occurs in more than 120 countries worldwide [1]. It is one of the 20 neglected tropical diseases that the World Health Organization has earmarked for prevention, elimination and eradication by 2030 [2]. Each year approximately 200,000 new cases are detected, with cases reported from all six regions of WHO, the majority of which are found in South East Asia [3]. Whilst a gradual increase has been noted in the United States over the last decade, the Caribbean is also on the alert as St. Lucia has seen a resurgence in cases where there was a 120% increase from 2020 to 2023 [4, 5]. It's associated deformities, and disability if left untreated, along with the inherent stigma warrants an immediate framework of action.

Although curable, interruption of transmission and eradication of Mycobacterium leprae still seems just outside the reach of many leprosy endemic countries. Elimination of leprosy as a public health problem, was a target endorsed in 1991 by the 44<sup>th</sup> forty-fourth World Health Assembly. This target, characterized as countries having a registered prevalence of less than 1 case per 10,000 population, was achieved universally by December 2000 [6]. By 2015 this was achieved in almost all countries at the national level [7]. This led to the perception that leprosy was no longer of concern, resulting in reduced investments in leprosy control programs and reduced research interests [6]. A delay in diagnosis also compounds the road to elimination. The reality is that many healthcare providers having never seen a case of leprosy outside of the textbook [7,8]. A waning interest coupled with inherent stigma amongst Healthcare providers raises additional concerns.

WHO therefore found it fit to clearly outline definitions, and indicators of the various phases on the road to elimination of leprosy; as well as to provide the necessary tools to aid surveillance and validation of milestones attained. Having a framework in place therefore meant that gaps in leprosy programs could be clearly identified, with standards being implemented to address the management of leprosy, its related disabilities, and the resultant stigma and discrimination, ensuring inclusion of all [6]. In its Global Leprosy Strategy 2021-2030, WHO envisioned the following targets by 2030: 120 countries with zero new autochthonous cases; 70% reduction in the annual number of new

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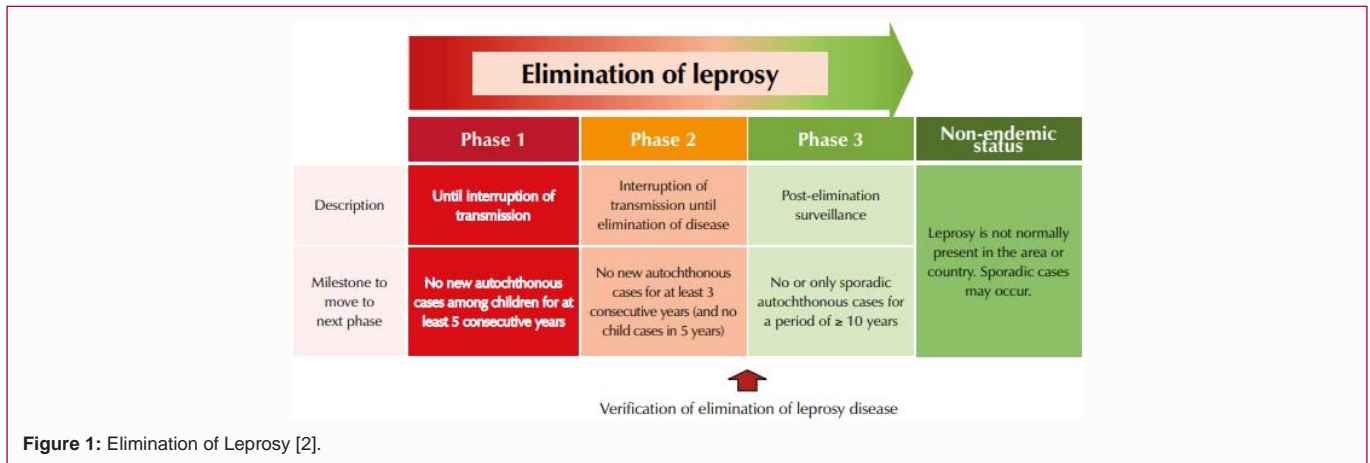


Figure 1: Elimination of Leprosy [2].

cases detected; 90% reduction in rate per million population of new cases with grade 2 disability and 90% reduction rate per million children of new child cases with leprosy [7]. Four key pillars needed for the interrupting transmission and eliminating disease include: (i) implementing integrated, country-owned zero leprosy roadmaps in all endemic countries; (ii) scaling up leprosy prevention alongside integrated active case detection; (iii) managing leprosy and its complications thus preventing new disability; and (iv) combating stigma, ensuring that human rights are respected” [7]. The phases of elimination include Phase 1 until interruption of transmission, Phase 2 interruption of transmission until elimination of disease, Phase 3 post-elimination surveillance all of which is followed by the status of being non-endemic See Figure 1.

Although WHO has a defined framework, taking a closer look at a country owned zero leprosy roadmap offers substantive advantage. “Public health problems are framed within historical, cultural, political and economic contexts [9]. Using as a model therefore helps to define realistic challenges and goes beyond that which is deemed ideal or routine. It enables other countries to benefit from strengths weaknesses, opportunities and threats from the ground level; being able to optimize their elimination programs by noting strengths without having to experience all pitfalls identified.

**Background**

The Co-operative Republic of is the only English speaking country on the South American mainland, and is enclosed by the North Atlantic Ocean, Suriname, Venezuela, and Brazil [10,11]. As a founding member of CARICOM, it is historically and culturally part of the Anglophone Caribbean [10]. At 83,000 square miles, with natural resources as its primary asset, it is the home to 813,834 people as of 2023. Ninety percent (90%) of’s population live on the low coastal plain representing 10% of the country’s area [12,13]. It was reorganized in the 1980s into 10 Administrative regions, see Figure 2. Georgetown, ’s capital is found in Region 4. It is religiously and culturally diverse, with the population being represented in 2012 by the following ethnic groups: East Indian 39.8%, African descent 29.3%, mixed 19.9%, Amerindian 10.5%, and other 0.5% (includes Portuguese, Chinese, White) [10]. A review of Guyana’s country profile revealed that the elderly (>65 years) represent 6.5% of the population whilst 65.1% is represented by those ages 15 to 65 years [13]. A life expectancy of 69.8 years remains lower than that for the region of the Americas. The literacy rate was 97.8% in 2021. Despite an increase in the Human Developmental Index, 11.8% of the

population remained below the national poverty line in 2019. Public expenditure on health accounted for 4.02% of the GDP in 2020.

The Leprosy Elimination Program’s (GLEP) headquarters is located on Brickdam Road, in the capital city of Georgetown. It operates under the auspices of the Ministry of Health. in 2022 had a Leprosy prevalence rate of 0.56 per 10,000 population maintaining the title of a country that has eliminated leprosy at a national level and as a public health problem (info from Annual report 2022) [4,14,20]. Notably, the Leprosy Elimination services offered has evolved over the years as demonstrated in Figure 3. It had transitioned from the Mahaica Leprosarium, on the East Coast of Demerara in the 1950’s to a primarily domiciliary program in the 1970’s [1,15]. It currently operates separately from the Neglected Infectious Disease Program. The history and progress of GLEP since the implementation of the Find and Treat Program to present, is accessible through resource persons, annual reports, and the evolution of the clinical register. A single formal source of the history however is yet to be established. The Leprosy regulations dating as far back as 1933 speak to isolation from the general public, utilizes words such as suffering and speak to

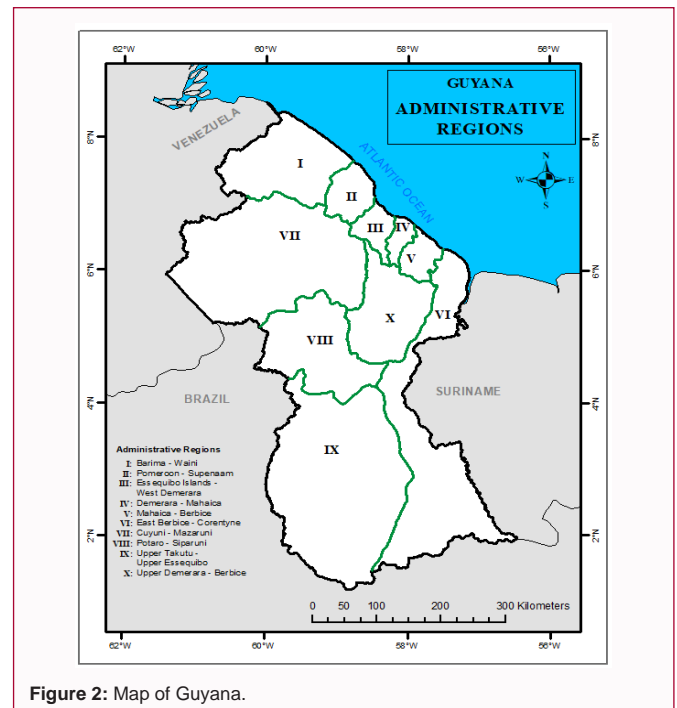
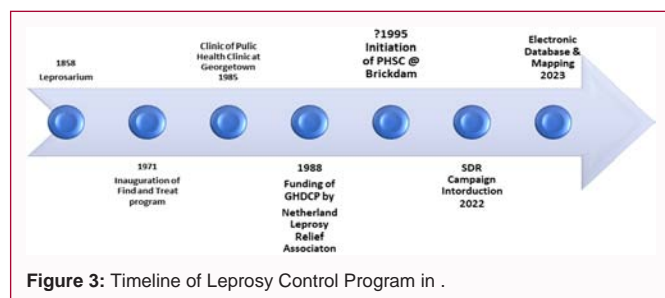


Figure 2: Map of Guyana.



restrictions of employment [16].

Currently it offers Leprosy control through consultation with the primary Healthcare services offered across the 10 regions of the South American Isle [2,17]. In collaboration with the Pan American Health Organization (PAHO), following the Global Leprosy Strategy 2021 to 2030, the scope of the program has been broadened through screening and contact tracing with the hope of interrupting transmission with the newly preventive chemotherapy for leprosy using Single Dose Rifampicin (SDR) in September 2022 [3,18]. This aims to decrease the transmission of *Mycobacterium leprae* in all contacts of detected and consenting cases of leprosy.

The aim of the practicum was to:

1. Observe an active leprosy elimination program
2. Review and analyze a national strategic plan
3. Review available policies that govern practice
4. Interact with staff and patients to better understand the local context
5. Review leprosy related indicators
6. Formulate a memo and manuscript that will enrich knowledge and that can be used for guidance

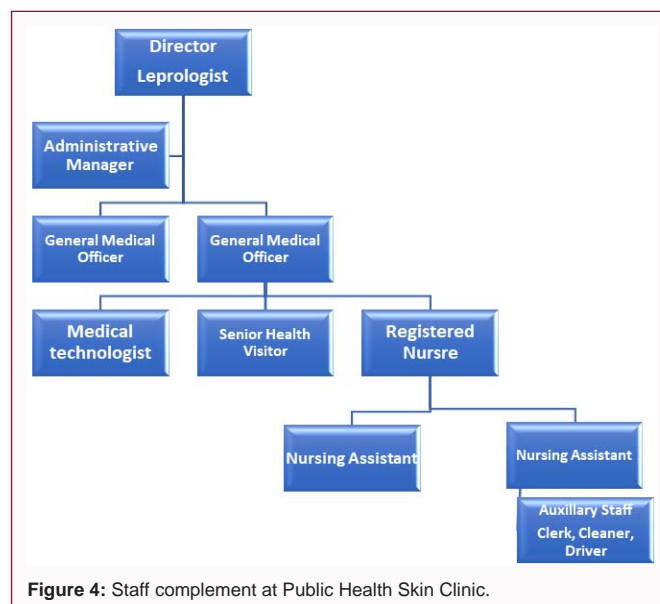
## Methods

As a pre-requisite for attaining a Master of Public Health, a practicum is required. The field of choice and location of the elective was selected by the MPH candidate. The Director of GELP was approached through the Chief Medical Officer of the Ministry of Health of . A learning agreement was prepared, discussed and established. A clearly outlined schedule was prepared by the Director of GELP that facilitated exploration of established policies, interaction with staff, attending community visits and observing clinic visits. Observational research was used to review GELP. Questions regarding the legal framework, policy, practice and cultural context were facilitated by Healthcare workers. Forms utilized by staff and surveillance reports were perused. Practices were also reviewed through the lens of the WHO established tool: Interruption of transmission and elimination of leprosy disease technical guidance [2].

## Findings

**Facility and Staffing:** Patients were seen at the Public Health Skin Clinic (PHSC). Adult and pediatric cases with general dermatological concerns were seen daily with suspected or confirmed leprosy cases being integrated within the weekly schedule. There was a general waiting area and offices that afforded privacy.

The staff complement was as demonstrated in Figure 4. In 2023 an Administrative Manager was added to the staff complement. A



social worker though desired is not currently on staff.

MDT packets were kept on hand at the clinic for ease of distribution and to ensure accountability. This role was carried out by the nursing staff. Drugs were supplied through the support of PAHO. Patients with PB received MDT for 6 months and MB for 12 months. Surveillance of these cases post completion of treatment was 5 years and 10 years respectively.

A standard intake sheet was utilized for the first visit of suspected cases of Leprosy. Patients were given an appointment card which outlined their next appointment. Community visits and specialist clinics within varying regions were also conducted. This facilitated conducting contact tracing, reducing the cost and travel distance that patients had to endure to come to the capital, and enabled visiting patients who would have defaulted or who would not have been able to physically come to the clinic. Medication packages were also prepared in advance.

A medical lab was present at the PHSC that facilitated slit skin smears being done and read; this was governed by a standard operating procedure which was perused.

A situation room where cases could be discussed and indicators reviewed, as well as a biopsy lab were noted and in the initial phases of establishment.

**Analysis of Program:** GLEP was analyzed based on the strategic pillars on the journey to zero leprosy [7].

## Pillar 1

**National Strategic Plan:** A country owned national strategic plan has not been established, however national Leprosy guidelines have been established and in 2013 were printed through the assistance of PAHO.

It is important to note that the Neglected tropical diseases program was separate in framework, structure, and financing from the GLEP.

The Strategies employed to achieve Leprosy Elimination included:

- A decentralized integrated leprosy services through the

General Healthcare system.

- Early detection and complete treatment of new leprosy cases.
- Carrying out household contact survey in detection of Multibacillary (MB), Paucibacillary (PB) and child cases.
- Early diagnosis and prompt MDT, through routine and special efforts .
- Organization of peer counselors in collaboration with Social Services to ensure that patients comply with medications.
- Strengthening of Disability Prevention and Medical Rehabilitation Services.
- Information, Education and Communication (IEC) activities in the community to improve self-reporting to Primary Health Centre and reduction of stigma.
- Intensive monitoring and supervision at Primary Health and Community Health Centers.

**Political Commitment :** There was evidence of political interest and commitment, which was further echoed by the financial support of the program by the government. The percentage of the national health budget allocated to Leprosy elimination however was unknown. At this time PAHO remains the only other stakeholder involved and financially committed to the program.

**Capacity Building:** Training was conducted by PAHO in 2016, 2019, and 2023. This included Healthcare workers within the community Healthcare centers. There was also a specialized training for medical technologists in 2019 and 2022.

**Surveillance and Data Management:** GLEP has an active surveillance system in place. Although most records are paper based, data collection is continuous and systematic. Currently log books/ registers are kept that track surveillance, contacts visited, treatment and prophylaxis that is administered. The program is transitioning to a digital case-based system as of 2024, however this will take time and added human resource. Digital mapping is not yet fully in place. It is hoped that this will be completed by 2025. Person based data is disaggregated by gender and age. Cases with disability to include the level of disability if present is being tracked prior to and at the end of treatment. Reports are submitted to the Ministry of Health on a quarterly and annual basis, with clearly defined objectives, strategies and outcomes.

**Monitoring of AMR and Adverse Drug Reactions:** A system that monitors AMR has not yet been established, neither is there a pharmacovigilance system in place.

## Pillar 2

**Contact Tracing:** This takes place once the index case gives consent by signing the standard consent form. The Healthcare team conducts contact tracing during community visits twice weekly with the frequency of visits increasing during special campaigns in endemic hotspots. A list of all contacts including their demographics is captured in the patient clinical chart, and note is made when each person is contacted. An examination is performed at the time of contact

**Preventative Chemotherapy:** SDR was introduced in September 2022 through a chemoprophylaxis campaign with the aim of administering a single dose of rifampicin to all contacts of consenting

index cases in the absence of contraindications.

**Active Case Finding (ACF):** Was regularly done by GLEP however efforts had to be tailored at times due to lack of funding and the unavailability of suitable transportation to travel to hard to reach locations. ACF included a door to door approach to examine the skin of contacts of new and old leprosy cases, as well as examining the nerves for signs of inflammation which is a risk factor for deformities. This approach is beneficial as it can find early cases of leprosy and facilitate starting MDT immediately. Cost is a limiting factor due to the need to pack medications and mobilize a team of 5 to 6 members of staff to go on an outreach to search for undiagnosed cases.

## Pillar 3

**Early Detection Diagnosis and treatment:** The annual report for 2023 with a 10 year review is reflected in table one below. Further analysis of indicators demonstrated will be further discussed.

**Access to Referral Facilities:** A referral system is in place that facilitates referrals of suspected cases to the skin clinic and that also facilitates referral of cases for specialist assessment, and intervention to include internal medicine, surgery, psychology, ophthalmology, neurology and physiotherapy.

**Management of reactions, Neuritis and Disability:** The number of patients with disability at diagnosis during and post MDT treatment is tracked. There is a policy that governs the classification and management of reactions. Assistive devices are not readily available and is therefore not tracked.

**Self-Care and Mental Well Being:** Self-care counselling is given by the nurse during a brief session held with each patient post consultation where medication administration is described, the side effects discussed, and home exercises especially with those with an established disability are explained. At this time the program remains without a social worker or formally trained staff in psychosocial support. An attempt was made to explore personal stigma at the level of the patient thorough the introduction of the Screening Activity Limitation and Safety Awareness Scale (SALSA) score in 2016. Referral services are currently not in place to address the mental health needs of patients.

## Pillar 4

**Adoption of Principles and Guidelines:** Advocacy and ensuring inclusion at the policy level was still in evolution as the laws were still being perused regarding clauses that facilitated the discrimination against the person living with Leprosy.

**Inclusion of Persons affected by Leprosy:** An Association of Persons Affected by Leprosy was started in 2023 where meetings were held every 2 months.

**Stigma:** Stigma reduction campaigns have started but are primarily focused at or around the time of International Leprosy Awareness day. This is achieved through the use of social media platforms, interviews with media houses and school educational campaigns.

**Social Support and Rehabilitation:** For persons who are no longer able to carry out gainful employment a public assistance form is filled that certifies the need of the client for welfare pension. Difficulties are sometimes faced despite a form filled in detail based on findings at home visit.

Table 1: Indicators of 2023 Annual Report.

Indicators	2023	2022	2021	2020	2019	2018	2017	2016	2015
Annual New Case Detection (NCD)	28	29	32	13	27	49	67	52	30
Number and % of MB (severe) leprosy cases among new cases	22	28	24	8	22 (82%)	41	56	38	20
	-0.79	-0.93	-0.75	-0.62		-0.84	-0.84	-0.73	-0.667
New Case Detection Rate (NCDR) (per 100,000 persons)	3.44	3.97	4.38	1.78	3.7	6.71	9.17	7.12	4.1
Number of cases registered for treatment as of 31 <sup>st</sup> December 2022	35	41	35	25	60	54	100	54	29
Prevalence (10,000 population)	0.43	0.56	0.48	0.34	0.75	0.74	1.37	0.74	0.41
Number of leprosy patients co-infected with COVID-19	0	2	1	1	0	0	0	0	0
Number of patients restarting leprosy treatment due to relapse/reinfection	6	4	0	6	3	8	7	2	1
Number of patients whose treatment was discontinued due to dubious/different diagnosis or negative smears	0	0	1	1	1	3	3	1	0
Number and % of cases with females among new cases	7	11	8	6	10 (37%)	21	37	15	10
	-0.25	-0.37	-0.25	-0.46		-0.6	-0.55	-0.48	-0.344
Number and % of cases with grade 2 disabilities among new cases	8	7	6	5	8 (30%)	12	10	19	12
	-0.29	-0.23	-0.19	-0.38		-0.24	-0.15	-0.365	-0.4
Number and % of PB (mild) leprosy cases among new cases	6	2	8	5	5 (19%)	8	11	19	10 (33.3%)
	-0.21	-0.07	-0.25	-0.38		-0.16	-0.16	-0.369	
Number and % of children <15 years with leprosy among new cases	6	2	2	1	2	7	4	6	5
	-0.214	-0.07	-0.06	-0.08	-0.07	-0.14	-0.06	-0.11	-0.167
Number and % of children <15 years with leprosy among new cases with Grade 2 disabilities-G2D- (visible deformities)	0	0	0	0	0	1	0	0	1
Proportion of contacts screened	0.41	29% <sup>^</sup>	50% <sup>^^</sup>	0.95	0.88	0.95	0.6	0.7	0.96
Proportion of foreign born among total new cases detected	0	0	0	0	0	0	0	0	0
Proportion of PB completing treatment	1	0.86	0.9	0.95	0.9	0.99	0.91	0.9	0.95
Proportion of MB completing treatment	0.48	0.5	0.6	0.65	0.7	0.65	0.7	0.65	0.54

**Impact of Covid-19:** At the start of the COVID-19 pandemic, clinics were not held. This was a due to the lock down implemented. Once resumed, the number of patients seen in clinic were less due to the distancing protocol. In 2020, 12 new cases were detected compared to 27 and 32 new cases in 2019 and 2021 respectively [19]. The institution of a roster system, implementation of an appointment system, home visits and the distribution of care packages were some of the ways the leprosy control program were adjusted during the pandemic. The number of patients co-infected with leprosy and COVID-19, their outcomes, and the impact of medication of clinical presentation, progress and management are beyond the scope of this manuscript.

## Discussion

Phase 1 until interruption of transmission is characterized by zero new autochthonous child cases for at least five consecutive years. Table 1 demonstrates that for the past 9 years, that pediatric cases are still being diagnosed. This places in phase 1 of the Leprosy elimination framework. It is therefore highly probable that by 2030 they will still remain within this phase. Diagnosing leprosy within the pediatric population suggests recent transmission but also suggests a diagnostic system that is efficient [2]. It would be useful to review

the trend in age at detection as a shift in the mode towards older age groups would better indicate that the country is moving towards elimination of transmission [2].

Annual new case detection ranged from 13 to 67 over the past 9 years; with 28 new cases being detected in 2023 a NCDR of 3.44 per 100,000 (34.4 per million). As reflected in Table 2 below, this is higher than the world NCDR in 2019 of 26.0 per million. This is a true reflector of the burden of disease and it would be interesting to review this indicator for the regions within thus giving a better view of endemicity. Efficiency of case detection determines if this indicator is true replica of incidence.

Delayed diagnoses can result in and is often evident by the presence of disability especially grade 2 disability. Although this indicator speaks to the efficiency of the program, it is also impacted by factors at the level of the patient and the community to include accessibility of specialized care, acceptance of the need to seek specialized care, stigma induced delays, and cultural and religious overtones. The rate of new cases with grade 2 disability was 9.8 per million population and ranged from 6.1 to 23.3 million population in 2015 to 2023. This rate is declining however which suggests that cases are being diagnosed earlier which may be as a result of earlier

**Table 2:** New Case Detection by WHO region.

Region	Countries reporting ≥1 case	New cases reported		New child cases		New cases with G2D	
		Number	Rate (per million population)	Number	Rate (per million children)	Number	Rater (per million population)
Africa	38	20209	18	2150	5.2	2933	2.6
Americas	24	29936	29.5	1612	7.1	2544	2.5
Eastern Mediterranean	15	4271	5.8	149	0.68	254	0.35
Europe	6	42	<0.1	0	0	4	0
South East Asia	10	143787	70.4	10661	20.4	4817	2.4
Western Pacific	25	4011	2.1	411	1.1	264	0.14
<b>Total world</b>	<b>118</b>	<b>202256</b>	<b>26</b>	<b>14983</b>	<b>7.9</b>	<b>10816</b>	<b>1.4</b>

**Table 3:** Strengths, weaknesses, opportunities and threats of the Leprosy elimination program.

STRENGTHS	WEAKNESSES
<ul style="list-style-type: none"> <li>National policy in place</li> <li>Dedicated staff</li> <li>SDR prophylaxis</li> <li>Active surveillance program</li> <li>MDT Availability</li> <li>Lab onsite</li> <li>Mobile clinic</li> <li>Referral System in Place</li> <li>Index and Contact Case Consent forms</li> </ul>	<ul style="list-style-type: none"> <li>Paper based records to include register</li> <li>No Social worker on staff</li> <li>No psychosocial support</li> <li>Transportation challenges</li> <li>Staff Pool</li> <li>Lack of Decentralized Care</li> <li>Archaic laws</li> <li>Inconsistent raising of awareness</li> <li>Lack of additional stakeholders</li> <li>Not much emphasis on WASH</li> <li>Lack of Digital Mapping</li> <li>Delay in detection</li> <li>Stigma and Discrimination</li> <li>Lack of AMR monitoring</li> </ul>
OPPORTUNITIES	THREATS
<ul style="list-style-type: none"> <li>Research gaps, but ample scope exists</li> <li>Reduction of stigma through patient association</li> <li>Capacity building across regions of the country and the Caribbean region</li> <li>Digitize data systems</li> <li>Discuss blanket prophylaxis</li> <li>Optimize Disability support</li> <li>Update curriculum for Healthcare providers in training ( nurses, physicians, physiotherapists)</li> <li>Screening of school children</li> <li>High endemic region screening</li> <li>Situational room</li> <li>Merge with NTD program</li> <li>Economic growth thus greater potential allocations</li> <li>Effective management of disabilities</li> </ul>	<ul style="list-style-type: none"> <li>Crises leading to health system interruption                             <ul style="list-style-type: none"> <li>Pandemics</li> <li>Natural Disasters</li> <li>Wars</li> </ul> </li> <li>Impact of Religion, Conspiracy theories, Culture</li> <li>Migration of healthcare workers</li> <li>Stigma amongst Healthcare workers</li> <li>Imported Cases</li> <li>Risk of Zoonotic Infections</li> </ul>

referral from peripheral centers due to more prompt recognition by Healthcare workers, and or earlier presentation by patients due to increased awareness. When compared to the world’s rate of 1.4 per million population it suggests that more work needs to be done.

The trend in the percentage of MB cases amongst new cases detected ranged from 62 to 93% over the past nine years with the highest proportion being noted in 2022. It should be recalled that MB cases have a longer incubation period than PB cases. The Global Leprosy strategy 2016 - 2020 suggests that this indicator is a reflection of case detection therefore pointing to delayed diagnosis and ultimately higher rates of transmission [3]. It was interesting to note that the rates of adherence amongst PB patients was higher when compared to that of MB patients. Although the difference of duration of administration may have an impact, it would be crucial to review potential causes. Knowledge however remains inefficient to set a threshold for this indicator [3]. MDT requirements can also be

calculated using this indicator.

The percentage of female cases among new cases was 25% to 60% over the past 9 years, with 37% of the new cases diagnosed in 2023 being female which was favourably in keeping with the world average of 38.8% (WER, 2016) [3]. The knowledge of gender gaps in leprosy remains limited. This outcome indicator may speak to differences in physiology, access to Healthcare, gender related barriers within the Healthcare system or social inequity. This therefore is a potential area of study as gender perspective should be integrated into healthcare [3].

The proportion of contacts screened declined from 2020 to 2022 from 90% to 29% respectively. Challenges with transportation were identified as the primary contributing factor. The GLEP program aptly captures all of the cases contact of the index case within the standard intake form which is exemplary but a reduction in this indicator

suggests an interruption that is crucial to leprosy elimination and therefore has to be remedied.

Less than 10 patients per year from 2015 to 2023 required the resumption of treatment due to relapse/reinfection. This number is usually low universally, but crucial to this indicator is the availability of an AMR system so that resistance is not missed [19]. This is yet to be implemented in . It has also proven difficult to differentiate between reinfection versus relapse.

The laws should be void of any discrimination against persons affected by leprosy, including their family members. A revision of the law is therefore required as it should reflect the principles and guidelines for the elimination of discrimination as adopted by the United Nations. Resolution 65/215 was adopted by the General assembly in 2010 [20]. It outlines the approaches that should be taken to ensure that persons with leprosy are able to reclaim their human rights. The legal framework should therefore reflect “a religious and moral approach, a scientific and administrative approach, a representational and cultural approach and a human right based approach [20].

The history of the leprosy elimination in is notably rich but needs to be better documented. Many vital persons who were apart of the history to include nursing and physician staff are still available. Taking note of the strides made is crucial. It not only helps a country to recognize from whence they came but it also can be used as a tool for others who will embark on a similar journey. The opportunity should therefore be seized to formally document the history of transitioning from Mahica Leprosarium to current day practice.

The need to establish mental health support can't be overemphasized. Loss of function, chronic pain, changes in body image, isolation, polypharmacy, rejection from family and society, loss of familial role, and the impact on family members and friends, unemployment, dependence on others all have a negative impact on an individual's mental health. Anxiety, depression, low self-esteem, a risk of suicide and other neuro-psychiatric disorders have all been observed. Psychosocial support is therefore invaluable with the consideration of meeting basic needs foundational. With the loss of employment and earning power comes the risk of inappropriate/in-adequate nutrition which ultimately negatively impacts overall health and wellbeing. Consideration should therefore also be given to providing food baskets post a situational analysis.

Currently the lack of research is a significant gap, but there are many research opportunities that have been identified. Potential areas include but are not limited to the following: the impact of leprosy on mental health, the impact of SDR implementation on case reduction, endemicity based on region and contributive factors, and the AMR profile in patients who relapse.

Based on that which has been observed and the indicators outlined above a SWOT analysis enables a quick overview of the milestones achieved, the gaps which exist, and that which offers an opportunity to strengthen the elimination framework. This is demonstrated in Table 3.

## Conclusion

The Leprosy elimination program in the Co-operative Republic of is well established and has shown significant progress since the 1950's. Through political will, support from PAHO, a national policy, and dedicated staff, it is expected that they will transition through

the phases of elimination until Leprosy is no longer endemic. This ultimate goal however will unlikely be achieved by the 2030 target established by WHO. The implementation of additional foundational steps to include electronic records, AMR surveillance, digital mapping of the regions, an expanded stakeholder pool, a legal reform team, continuous educational programs and mental health support will result in improvement of the quality and efficiency of the national program. The GLEP framework can be used as a model for countries who are at risk of experiencing a resurgence of Leprosy.

## Recommendations

1. Expedite regional mapping .
2. Procure formal transportation for the unit.
3. Strengthen WASH program and campaign.
4. Aim for continued awareness campaigns, even outside of Leprosy awareness week.
5. Create partnerships with additional stakeholders including Civil Society, this should aid in raising awareness and generating community support.
6. Amend legislation ensuring that human rights are appropriately considered and protected
7. Consider blanket prophylaxis in highly endemic regions.
8. Continue to build on the current patient support group.
9. Enhance accessibility and availability of social support to include the support of mental health.
10. Institute AMR monitoring program.
11. Transition to Electronic Medical Records.
12. Formally capture the rich history of the Leprosy elimination from its inception .

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