Original Review Article

PROBABILITY OF ELIMINATION OF TARGETED VECTOR BORNE DISEASES BY 2030: INDIAN PERSPECTIVE

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ABSTRACT

Malaria, Lymphatic Filariasis (LF) and Visceral leishmaniasis (VL) are the three vector-borne diseases targeted for elimination in India in pursuit to achieve the SDG goal. There have been significant achievements in reducing 89% of malaria cases in India. Population living at risk for LF has been reduced as only 134 out of 328 districts are undergoing the preventive chemotherapy of mass drug administration (MDA) and in rest, MDA has been stopped. VL cases have also been reduced to

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1276 cases in 2021 as opposed to 8000 in 2015. The regular assessment and feasible course correction in strategic approaches viz., diagnostics and treatment with incentivization to grass root workers have led to globally recognised achievements. Considering the last mile challenge, emphasis has been to focus on intensified implementation of programme activities with enthusiastic and committed implementers prioritizing integrated or a mix of integrated and vertical approaches. It is important as the process of validation and certification of having achieved elimination are time-consuming. Validation for malaria elimination requires evidence for no indigenous case, subnational validation, ensuring prevention of reintroduction (PoR) policy, claim for national certification and then wait for response of WHO. Similarly for LF, validation requires evidence of successful completion of three transmission assessment surveys (TAS) at the interval of 2 years between each TAS. In addition, establishment of Morbidity Management and Disability Prevention (MMDP) clinics in all endemic units and implementation of vector control need to be reflected in the dossier for certification of elimination. In case of VL, the preconditions of epidemiological surveillance, adequate access to diagnosis and treatment need to be fulfilled followed by sustenance phase of cases below 1 per 10 000 population for at least three consecutive years. Validation process starts when such reports are submitted to WHO and the international validation team (IVT) reviews them. The probability of achieving elimination thus depends on evidence of zero indigenous malaria cases, clearance of TAS by all LF endemic districts and sustenance of VL cases below 1 per 10000 population in all endemic blocks for 3 years. All such processes, guidelines and risk factors in achieving elimination therefore need to be repeatedly disseminated which should be user-friendly and feasible so that target is achieved by the year 2027 and remaining period of 3 years is used for validation.

Keywords: malaria, filariasis, kala-azar, elimination, validation, vector borne disease

INTRODUCTION

In India, the major vector-borne diseases, namely malaria, lymphatic filariasis (LF), kala-azar, dengue, chikungunya and Japanese encephalitis (JE), are covered under the National Centre for Vector-Borne Diseases Control (NCVBDC), which runs an umbrella programme National Vector-Borne Diseases Control Programme (NVBDCP), under overarching of National Health Mission for prevention and control of these vector-borne diseases[1]. Of these, malaria, kala-azar and lymphatic filariasis (LF) have been targeted for elimination. The states are responsible for programme implementation, whereas the NCVBDC, Dte. GHS, MoHFW, and GoI provide policy guidance, and logistics to the states. During the last 4 decades, the country has witnessed an increasing load of vector-borne diseases, causing many morbidity and mortality. Diseases like dengue, chikungunya, Japanese encephalitis, and tick and mite-borne diseases are spreading to newer areas and continue as a crucial public health concern[2].

In pursuit of global strategy and commitment, India has initiated the elimination campaign of three vector-borne diseases, namely malaria, lymphatic filariasis and kala-azar. The goal of achieving elimination has been rescheduled aligning with sustainable development goals (SDG)[3] in respect of malaria and LF whereas for kala azar, it is targeted by the end of 2023.

Before the probability of elimination of these VBDs is discussed, it is important to understand the situation of these diseases and the challenges in achieving the elimination.

MALARIA

It is well known that about 95% population in the country (approximately over 1.2 billion) resides in malaria-risk areas, and 80% of reported malaria cases are from 20% of the population residing in tribal, hilly and hard-to-reach areas[4]. India achieved a reduction of about 86% in malaria morbidity between the years 2015 and 2021 reporting about 158326 cases against 1169261 in 2015[5]. The significant reduction in malaria cases has led to the shrinking of the malaria map in recent years and thus optimism for achieving its elimination by 2027 with zero indigenous cases and sustaining it for the next three years to realize the goal by 2030. The high-burden states have achieved the status of low burden category as shown in Fig. 1.

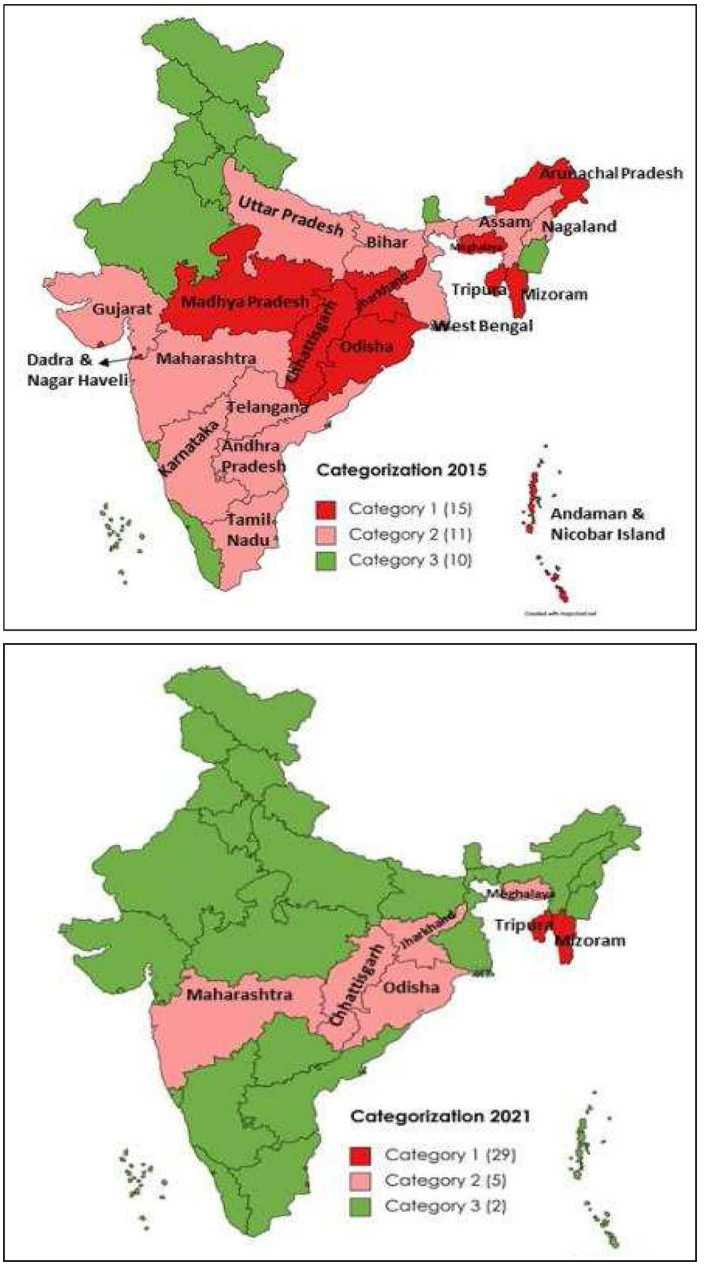

Fig. 1. Categorization of districts as per Annual Parasite Incidence (API) for the years 2015 and 2021.

The challenges, however, are also many in achieving elimination. These are also known since a long but the main issue is how to resolve them. The basic challenge starts from low priority to malaria programmes in low-burden areas both in terms of financial allocation and deployment of human resources. Surveillance involving the private sector and reporting from all to have the real burden in a timely manner is another issue which may need a regulatory framework. The reporting from difficult areas including tribal districts needs attention as the people have belief in various traditional healers[4].

Urban Malaria is one of the biggest concerns as it is mainly transmitted by *Anopheles stephensi* which now is not limited to identified towns, rather it has invaded all townships due to developmental activities and rapid urbanization which necessitates water storage practices- preferred breeding sites for this vector[6]. Limited coordination of municipal corporations with state and intersectoral coordination are also considered limiting factors in surveillance, treatment and preventive measures. Entomological surveillance across the country is suboptimal due to limited entomological capacity in the majority of states as well as at the central level which limits the appropriate advisory under integrated vector management (IVM) as to which tools and technology to be used in different situations like low, or high endemic areas and also in an outbreak situation. Last but not least, the actions for prevention of reintroduction of malaria cases after achieving zero indigenous malaria cases including cross-border malaria are issues to be resolved which need to be regulated by a policy framework[7].

LYMPHATIC FILARIASIS

This disease is targeted for elimination in line with the global target. Over 700 million population are reportedly living at risk of LF. India started a lymphatic filariasis elimination campaign in 2004 through Mass Drug Administration (MDA) in 250 endemic districts[8,9] which has been extended to 272 districts (328 after bifurcation or trifurcation of districts) during the journey of LF elimination. In India, the efforts to scale MDA and tackle LF have shown success because the number of districts requiring MDA has been reduced from 328 to 134 in 2022 (Fig. 2). This update has been documented in WHO weekly epidemiological record[10].

The current strategy for the elimination of Lymphatic Filariasis with annual MDA was to reduce the microfilaria rate below 1% so that transmission is

interrupted, and the new generation will not contract the disease. During scaling up the programme has switched from single-drug Diethylcarbamazine citrate (DEC) to a two-drug combination of DEC plus Albendazole and now with three drugs, i.e., Ivermectin with DEC plus Albendazole. The affected people with lymphoedema/elephantiasis are covered under the Morbidity management and disability prevention (MMDP) strategy of ELF by augmenting home-based lymphedema care through simple washing and drying[11]. The people affected by hydrocele are motivated for surgical intervention. The programme has enlisted lymphoedema and hydrocele cases which are updated every year. Integrated vector management (IVM) has also been advocated by WHO as a supporting pillar to sustain the gains achieved and made a part of the dossier though optional for submission of validation of elimination claim[12].

Though India has shown significant achievement towards LF elimination, the last mile challenges in generating evidence for the current status of LF endemicity in non-endemic districts, identifying and liquidating new foci in non-endemic districts with treatment and vector control under IVM and sustaining the achievements gained so far cannot be ignored.

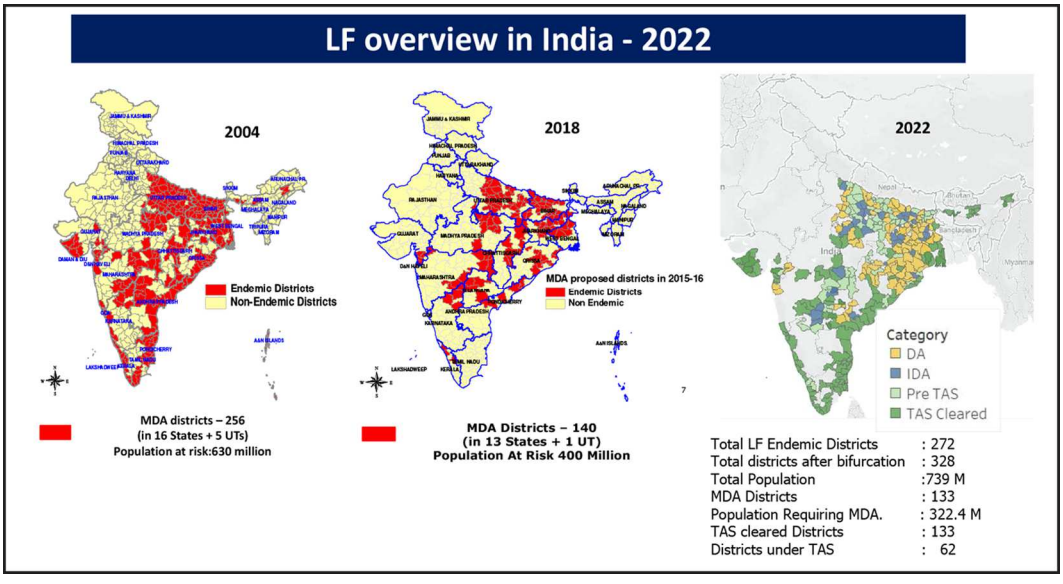

Fig. 2. Number of districts selected for MDA (*Source*: NVBDCP)

The challenges in LF elimination are suboptimal compliance to MDA drugs &acceptance of multiple drugs by the community[13]. Fear of side reactions due to DEC has initially been one of the factors in poor compliance. Inadequate IEC and mobilization of the communities at the ground level especially matching the needs of the programme have contributed to less awareness. Matching and timely requirement of drugs, as well as diagnostics, has resulted in staggering MDA and doing transmission assessment surveys. These mismatches need to be resolved with a greater number of implementation and evaluation units under block-level IU & Small EU strategy. The establishment of morbidity management and disability prevention (MMDP) clinics at each IU and conducting entomological surveillance for undertaking integrated vector management need focused attention as these are part of the dossier for claiming certification of elimination[14].

KALA-AZAR OR VISCERAL LEISHMANIASIS

This disease is mainly reported from 54 districts of four states, i.e. Bihar (33 districts), West Bengal (11 districts), Uttar Pradesh (6 districts) and Jharkhand (4 districts). A total of about 140 million population are reported to be at risk of VL in these endemic districts. The country has reported 1276 VL cases in 2021 against 32 803 in 2005 showing over 90 per cent reduction of VL cases since 2005[15]. Though significant achievement has been made in reducing the cases to less than 1 case per thousand population at the block level, the tackling of post-kala-azar dermal leishmaniasis (PKDL) may remain a challenge in addition to other challenges described in other VBDs. The occurrence of sporadic cases from other states will also need to be looked into for taking appropriate measures. Post-elimination vigilance will be crucial for quick response to case notifications.

DISCUSSION

Understanding the situation of diseases targeted for elimination and associated challenges, an analysis was attempted with a few examples of planning, resource allocation, access, availability (provided) and implementation (utilization) of resources[16]. The effective outcome due to reduction at different levels in the channel has been calculated with mathematical formulas shown below:

Situation 1: If planning is made for 100% resource and 50% of it is allocated out of which 80% is accessible and from accessible resources, only 80% is provided. The

expenditure is also 80% of funds provided then the actual outcome is only 25.6%. The diagrammatic flow is indicated in Fig 3.

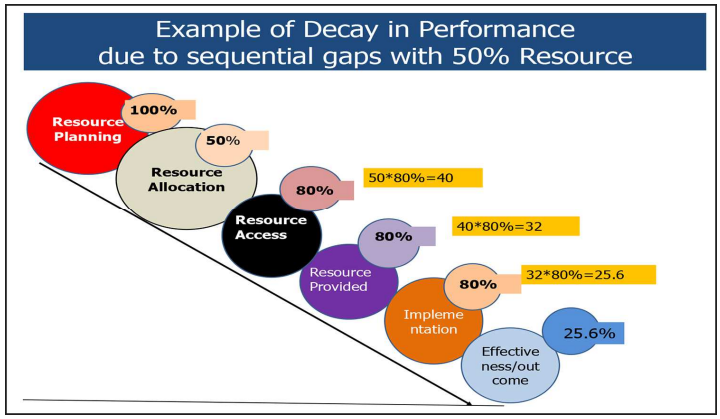

Fig. 3. Example of decay in performance due to sequential gaps with 50% resource.

Situation 2: If planning is made for 100% resource and 80% of it is allocated out of which 80% is accessible and from accessible resources only 90% is provided. The expenditure is also 80% of funds provided then the actual outcome is only 46%. The diagrammatic flow is indicated in Fig. 4.

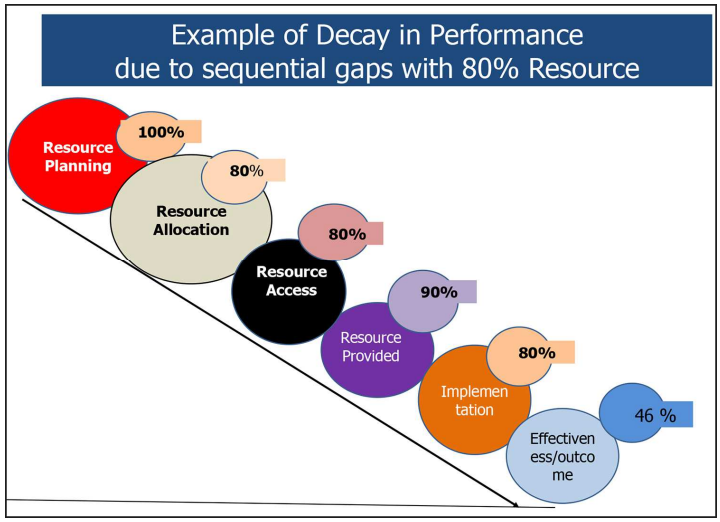

Fig. 4. Example of decay in performance due to sequential gaps with 80% resource.

Situation 3: If planning is made for 100% resource and 98% of it is allocated out of which 60% is accessible and from accessible resources only 90% is provided. The expenditure is also 70% of funds provided then the actual outcome is only 37%. The diagrammatic flow is indicated in Fig. 5.

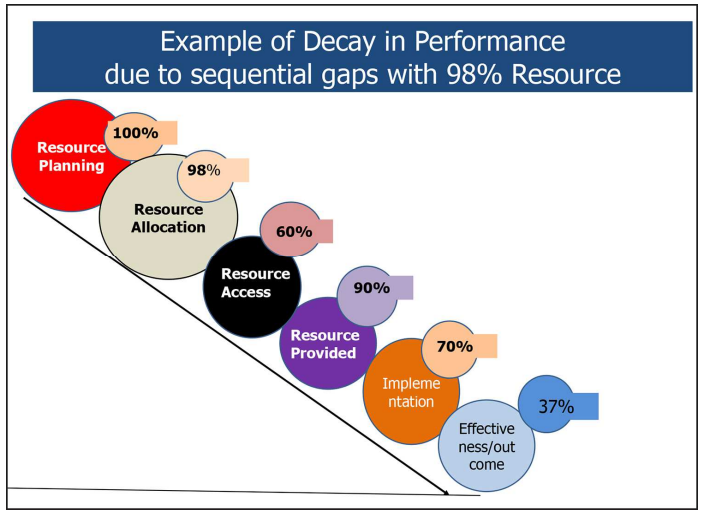

Fig. 5. Example of decay in performance due to sequential gaps with 98% resource.

CONCLUSION

The above discussions reveal that any reduction or ad-hoc arrangements results in the decay of performance due to sequential gaps. Various permutation and combinations can be made with the different scenarios but decay in performance need to be avoided by providing adequate resources and performance monitoring at every stage may be made mandatory with accountability and responsibility.

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