

“Going ‘the Last Mile’ to Eliminate Malaria” in Myanmar?

▼ **SPOTLIGHT ARTICLE** in *How Epidemics End*, ed. by Erica Charters

▼ **ABSTRACT** This article explores the question of how malaria “ends” in Myanmar, since malaria has been categorized both as an epidemic and as being endemic on seemingly countless occasions. The example of malaria reveals some of the limitations of understanding a disease within a single category of experience, such as an “epidemic.” In the case of malaria, epidemic is a shifting term that is best understood as being the point at which health authorities decide to intervene in the disease, rather than as a clear and absolute measure of the scale or intensity of the threat. The identification of malaria as epidemic may thus be better understood as a political choice rather than as a precisely defined medical category. This article thus discusses what it means to end malaria in Myanmar, what kind of ending has been envisaged, and by whom. As this article demonstrates, policy makers have at various points aimed for the “elimination,” “eradication,” and “control” of malaria. Unlike the local population, who seem to have a rather nonchalant attitude toward malaria since malaria has long been familiar to them, international partners and the government have been shaping the narrative toward elimination with the aim of obtaining the World Health Organization’s malaria-free certificate. Despite a number of political, social, and environmental obstacles, they believe that elimination can be achieved by 2030. However, unexpected political events such as the military coup in 2021, as well as the emergence of another pandemic, demonstrates that the “end” of malaria is a fragile concept.

▼ **KEYWORDS** Epidemics, Malaria, Elimination, Myanmar, Asia

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In their recent article, Erica Charters and Kristin Heitman asked “how do societies know when an epidemic has ended and normal life can resume? What criteria and markers indicate an epidemic's end?”¹ This raises the question of who in society exerts agency in controlling narratives regarding epidemics and their end. Malaria often simultaneously occupies dual categories of both epidemic and endemic; as James Webb explains, “in some time and places malaria has appeared as a seasonal affliction and in others as a year-round burden.”² According to the World Health Organization (WHO), “Malaria epidemics can occur when climate and other conditions suddenly favour transmission in areas where people have little or no immunity to malaria.”³ Epidemics may gradually decrease naturally over time or drop to endemic levels because of some social and/or environmental changes, such as shifting migration patterns or droughts. This article explores the question of how malaria “ends” in Myanmar, since malaria has been categorized as both an epidemic and as being endemic on seemingly countless occasions. The example of malaria reveals some of the limitations of understanding a disease within a single category of experience, such as an “epidemic.”

Existing scholarship on the history of malaria in Myanmar, as well as in other parts of Southeast Asia, does not seem to have categorized malaria as essentially either “epidemic” or “endemic.” Judith Richell's work focuses on the failed colonial malaria control projects that neglected the local environment of Burma.⁴ Sunil Amrith examines malaria control, especially the usage of DDT in the framework of the WHO-led development of international health, which relied on a techno-centric approach to public health. But neither scholar differentiates epidemic malaria from endemic malaria.⁵ Similarly, a classic study by Lenore Manderson examines colonial malaria control in the Federated Malay States, focusing on the government's responses to the malaria problem among plantation labourers without differentiating between epidemic or endemic malaria.⁶ Indeed, the historiography of malaria in Asia generally categorizes malaria as an epidemic only when malaria cases show a dramatic surge beyond normal endemic levels, during a specific period or in a specific area or region, such as the border regions in Myanmar.⁷

Identification has agency. Despite the variability of the disease between the two categories, for example, malaria receives special attention when it is categorized as an epidemic. As this article demonstrates, policy-makers have at various points aimed for the “elimination,” “eradication,” and “control” of malaria. In the case of malaria, epidemic is a shifting term that is best understood as the point at which health authorities decide to intervene in the disease, rather than as a clear and absolute measure of

1 Charters & Heitman (2021, p. 211).

2 Webb (2009, p. 2).

3 World Health Organization (2021a).

4 Richell (2006).

5 Amrith (2006).

6 Manderson (1996, pp. 127–165).

7 For example, Silva focused on the 1934–1935 “epidemic” of malaria in his book: Silva (2014).

the scale or intensity of the threat. The identification of malaria as epidemic may thus be better understood as a political choice rather than as a precisely defined medical category.

As a result of its dual nature and the role of practice (and thus politics) in identifying it as the subject of eradication efforts, malaria provides a uniquely useful challenge to the category of an epidemic, and thus to what it means for an epidemic to end. On the one hand, the indigenous population has lived with endemic malaria for many centuries. On the other, global leaders of health, such as the WHO; big funding organizations, such as the Global Fund, United States Agency for International Development (USAID), and the Bill & Melinda Gates Foundation; and other partners have played a significant role in shaping the narrative of the future of the malaria problem, particularly in malaria-ridden areas, including parts of Africa and Southeast Asia. Between them, there are some discrepancies in how they understand and view the end of the malaria problem. This article thus discusses what it means to end malaria in Myanmar, what ending has been envisaged, and by whom.

Shedding light on the social recognition of the end of epidemics is a difficult task because the available primary sources do not lend themselves to answering this question. As may be easily imagined, most malaria articles are written by indigenous medical doctors and scientists, and published in medical science journals, which rarely focus on illuminating the idea of ending malaria. As a result, we have a better idea of how the general population in Myanmar views the disease than its prospective end. It is almost a cliché, but since people have lived with the disease for a long time, it has been said that villagers usually have a nonchalant attitude toward malaria and do not fear it in the way that they do outbreaks of other types of diseases, such as COVID-19. Further, the decrease in malaria in many parts of the country may encourage the feeling that malaria is no longer a major problem, reaching the point where Charles Rosenberg's "sense of drift towards closure" is developed and shared.⁸ In contrast, the government and global partners who have led malaria control programmes in Myanmar share a sense of great progress and pride in their achievement of coming very close to terminating malaria. Nevertheless, malaria remains a key disease that has been difficult to eliminate completely. New developments such as artemisinin resistance have emerged as obstacles to achieving the complete eradication of malaria; and yet, as shown in the present article, social, political, and environmental factors can prove the most substantial obstacles to ending malaria.

In the last 20 years, malaria cases in Southeast Asia have dropped considerably despite concerns regarding the spread of drug-resistant malaria. It is reported that between 2000 and 2019, in the entire Greater Mekong Subregion (GMS; consisting of Cambodia, China's Yunnan Province, Lao People's Democratic Republic, Myanmar, Thailand, and Vietnam), malaria cases declined by as much as 90%, and that the number of *P. falciparum* malaria cases has fallen by 97%.⁹ Even countries such as Cambodia, Laos, and Myanmar, which have struggled to control malaria in past decades,

⁸ Rosenberg (1989, p. 2); see also Charters & Heitman (2021, p. 212).

⁹ World Health Organization (2020b, p. xvi).

have begun to show a considerable decline in the mortality and morbidity of malaria cases. In Laos, for example, there has been no report of a malaria death for 2 years.¹⁰ The GMS countries even became confident enough to envisage the ending of malaria. At the end of 2020, a report called “Going ‘the Last Mile’ to Eliminate Malaria in Cambodia” was published by the WHO.¹¹ This report introduces a strategic plan directed at eliminating all human species of malaria in Cambodia by 2025, based on their significant record of success thus far. Similarly, in Myanmar, a strategic plan aimed at eliminating all domestic malaria by 2030 has been adopted.

The elimination of a particular disease such as malaria and the achievement of malaria-free status was not always the goalpost for demonstrating the “end of epidemics.” What the “end of epidemics” meant changed from time to time depending on the feasibility of what could be achieved at that particular time. For malaria, the “end of the epidemic” was a very unstable concept. The WHO played a pivotal role in determining what it meant by the “end of malaria” and shifted its strategies many times since the end of the Second World War. Member countries of the WHO often adopted its recommendations. In Myanmar, for example, the goalpost for proving the end of malaria shifted many times under terms such as “eradication,” “elimination,” and “control” of malaria. Initially, in 1953, the effort started as a countrywide malaria control programme, which was assisted by the WHO and UNICEF. With growing confidence based on the widespread use of effective DDT and administration of antimalarial drugs such as chloroquine for treatment, the WHO changed its target and launched the Global Malaria Eradication Programme in 1955 after the Eighth World Health Assembly.¹² Myanmar, as one of the adopting countries, followed the WHO-led global campaign in 1957 by shifting from its malaria control programme to the malaria-eradication programme. Globally, this malaria-eradication campaign achieved a temporary success by wiping out malaria from many tropical Asian and developing countries, or at least considerably reducing the number of cases. However, by 1967, new problems and the limitations of the malaria eradication campaign became apparent. Increasing numbers of vector resistance to DDT had been reported in various parts of the world, followed by a resurgence of malaria cases. This led the WHO to abandon the malaria eradication programme in 1969. As for Myanmar, it abandoned the aim of eradicating malaria 2 years before the WHO's decision. At that time, a review of the malaria eradication campaign had been conducted in Myanmar, in which the WHO's assessment team participated. They concluded that the malaria eradication programme could not be implemented effectively in some parts of the country due to accessibility limitations. Therefore, it was decided that the malaria eradication programme would be partially abandoned in hard-to-reach areas, and the strategy shifted back to malaria control through the distribution of anti-malarial drugs to patients.¹³ Globally, too, the “end of malaria” stopped meaning “free from malaria”

¹⁰ World Health Organization (2021a).

¹¹ World Health Organization (2020a).

¹² Mendis et al. (2009, p. 803); Aung Than Batu (2003, p. 255).

¹³ Aung Than Batu (2003, p. 255).

in 1969, and started to mean “controlling” malaria. It took almost half a century before the goal of “elimination of malaria” or a “malaria-free world” was re-envisioned once again. According to the WHO’s *World Malaria Report 2020*, this was “fuelled by the sense of failure following the first eradication campaign of the 1950s and 1960s, [when] the world had shied away from placing the eradication of malaria within its goals.”¹⁴

There were many improvements made from the 1990s that changed this disinclination. One of them was that malaria, which had been excluded from global disease priorities for decades, began to start receiving attention as the cause of infant mortality, especially in Africa, and as a source of socioeconomic problems. This led to a series of political events that encouraged the establishment of new malaria control programmes, which treated malaria as a part of primary healthcare. Even though funding was limited at that time, the technological and medical progress in malaria prevention, such as the use of new insecticide-treated mosquito nets or the new treatment employing artemisinin-based combination therapies, also helped to improve malaria control.¹⁵ The malaria elimination programme began to receive significant funding from the Global Fund that was established in 2002 in order to fight the three major diseases of AIDS, tuberculosis, and malaria. Similarly, the Bill & Melinda Gates Foundation, which was founded in 2000, played an important role in supporting many countries’ expansion of anti-malarial operations. The emergence of artemisinin-resistance also placed pressure on partners to make “an unprecedented series of meetings, plans and strategy developments accompanied by a substantial increase in donor support for regional containment,” which have been implemented in the last 15 years.¹⁶

Dramatically increased financial support changed the development of anti-malarial medical and technological products and methods. The support from the aforementioned big funders as well as other partners, such as the JICA’s malaria programme, in improving malaria control infrastructure and expanding interventions made it possible to place the idea of the eradication of malaria back on the table. In 2012, the Mekong Malaria Elimination (MME) programme was launched by the WHO and is partnered with the GMS countries’ programme to fight artemisinin resistance, primarily through accelerated progress towards malaria (*P. falciparum*) elimination by 2025. Further, in the following year, the Mekong Regional Artemisinin-Resistance Initiative (RAI) was established by the Global Fund in order to assist with the MME programme.¹⁷ Finally in 2014, the goal to eliminate *P. falciparum* malaria in the Greater Mekong Subregion by 2030 was recommended by the WHO Malaria Policy Advisory Group based on their confidence that the elimination was feasible “technically, operationally and financially.” Following the WHO’s recommendation,

¹⁴ World Health Organization (2020b, p. 57).

¹⁵ Insecticide-treated mosquito nets were effective mostly in Africa and ineffective in Myanmar: Smithuis et al. (2013).

¹⁶ Woodrow & White (2017, p. 43).

¹⁷ World Health Organization (2020b, p. 8).

leaders of Asia Pacific Region who attended the Ninth East Asia Summit unanimously made a commitment to eliminate malaria from the region by 2030.

The GMS countries' vision of an “end of malaria” seems to have included being awarded a malaria-free certificate from the WHO. Obtaining this certificate is considered to be an impressive achievement, as there are strict conditions. According to the WHO, this status is only granted to a country that has proven

that the chain of indigenous transmission has been interrupted nationwide for at least the previous 3 consecutive years. In addition, a national surveillance system capable of rapidly detecting and responding to any malaria cases must be operational, together with an appropriate programme to prevent the re-establishment of transmission.¹⁸

Therefore, it is a symbol of great success for countries in Southeast Asia.

Myanmar used to have a substantial number of malaria cases and was one of the worst-affected countries in the GMS. It is reported that an average of 632,000 malaria cases and 3,000 deaths were reported every year between 1995 and 2004. These figures, however, are considered to be largely underestimated.¹⁹ In 2014, the number of malaria cases (reported) was 182,616, which represents a more than 70% reduction from the period between 1995 and 2004. Malaria deaths also declined steadily. There were 2,785 estimated malaria deaths in 2005, but only 77 in 2020.²⁰ Even though these numbers are considered to be an underestimate, it seems safe to say that malaria control has been making remarkable progress in Myanmar over the last 20 years. This progress created some optimistic views in Myanmar, and in 2016, the National Malaria Elimination Plan 2016–2030 was adopted. Yet malaria remains a public health threat. According to the WHO's data for 2015, of Myanmar's 54 million people, about 32 million people (60%) remain at risk of malaria.²¹ And, in 2020, 35% of malaria cases in GMS countries were from Myanmar.²²

Despite considerable progress, there are various aspects of the malaria problem in Myanmar that suggest that the 2030 goal of malaria elimination still faces various difficult obstacles. Recently, malaria cases have been occurring in a limited number of areas. Of the 330 townships, 20 are responsible for 81% of the malaria cases in the country. Even though this only amounts to a small number of areas, the obstacles it poses appear to present an uphill battle ahead for a number of reasons.

First, high malaria-transmission areas are almost entirely located in the remote border areas of the highlands and/or jungle-forest zones, many of which are geographically difficult to access and control. Further, developing efficient and timely surveillance and monitoring of malaria cases, most of which occur among a mobile population working in such hard-to-reach areas, is challenging. There are many migrant workers who frequently cross the borders between Myanmar and Thailand,

18 World Health Organization (2019).

19 Smithuis (2006, p. 9).

20 World Health Organization (2021b, p. 223).

21 World Health Organization (2018, p. 134).

22 World Health Organization (2020b, p. xvi).

China, India, and Bangladesh and enter malarious areas to take up jobs in mining, logging, and dam and road construction. These Myanmar migrants, especially forest-goers, have been identified as a group who were exposed to serious malaria threats in their work sites in the border areas between Myanmar and Thailand.²³

Second, there is great difficulty in vector control. Finding and investigating the locations of transmission sites and breeding grounds for *Anopheles* mosquitoes (*An. minimus* and *An. dirus*) in Myanmar has not been easy. This difficulty is not simply due to the challenges of accessing the breeding grounds and monitoring them, but it also requires intimate knowledge of the bionomics of each *Anopheles* species and an understanding of the local environment and ecological changes that affect their breeding habits.²⁴

Monitoring malaria cases and effective malaria vectors in villages has been challenging. However, the JICA's malaria programme, which has been collaborating with the National Malaria Control Program (NMCP) of the Vector Borne Disease Control (VBDC) of Myanmar's Ministry of Health and Sports for almost 20 years, to take one example, has been successful in introducing and assisting the development of the GSI system for monitoring malaria, and training the local indigenous staff to use it in their villages.

The reasons for the difficulties in eliminating malaria, which have been frequently explained in reports and workshops, were mostly scientific and practical ones.²⁵ However, there have been few studies of how the general population view and understand such programmes, or why local populations appear to treat malaria nonchalantly. There is no clear resistance against partner-led malaria treatment or collaboration with the malaria control operations. Nevertheless, the people seem to feel a lack of urgency to resort to such mainstream treatment. Nay Lin Htut et al., for example, investigated the response of adult villagers to malaria in malaria-endemic areas of the Shan State. This study demonstrated that there was a severe delay (84.2%) in seeking malaria treatment, and that more than half of the infected chose to go to traditional healers or quacks, or to attempt self-care as a first choice for the symptoms. As reasons for the delay, they suggest that the treatment was not affordable for the villagers, as well as pointing to the inaccessibility of the healthcare system compared to the accessibility and familiarity of traditional local healers.²⁶ For others, it may be that malaria has become such an ubiquitous disease for such a long time that it no longer causes concern for them; while the villagers who could afford treatment would know that there is no need to panic anymore. However, there may be other, more cultural and religious reasons for this as well. In Theravada Buddhist societies such as Myanmar, their worldview is based on the Buddhist law of *kamma* (karma), "the correlation between deed and its subsequent consequences." The Buddhist text of *Abhidamma* explains that "all beings are conditioned, constantly and persistently,

23 Ghinai et al. (2017); Tipmontree, Kaewkungwal, Tempongko, & Schelp (2009).

24 Parker, Carrara, Pukrittayakamee, McGready, & Nosten (2015).

25 Baird (2017, p. 782); Personal correspondence (2020, Feb.), with Dr. Masatoshi Nakamura, malaria advisor for the Japanese International Cooperation Agency, Myanmar.

26 Naym Wongsawass, Mongkoichati, & Laosee (2017, p. 660); Xu, Xu, Liu, & Zeng (2012).

throughout their lifetime, by karma, consciousness, temperature, and nutriment.”²⁷ It holds that what happens to you or what you are is the result or consequence of what you have done or what you have been in a previous life before rebirth. Therefore, whether you get the disease or not depends on your *kamma*.²⁸ This worldview may have contributed to people's acceptance of the disease as something that one has little control over, and may discourage them from actively seeking medical help.

However, the most significant obstacles for the malaria elimination plan in Myanmar arise from two recent situations. One of them is the emergence and spread of COVID-19, which has disturbed the development and implementation of malaria control operations in the country. Despite initial success in containing its spread, the number of COVID cases began to show a hike from September 2020. In November 2020, “stay home” orders were issued in major cities and COVID-stricken areas (Yangon, Mandalay, Rakhine, Bago, and so on). It was reported that travel restrictions caused a suspension of mobile team activities in migrant worksites (closure of road-construction and timber-plantation/extraction sites). This interruption also occurred in conflict areas such as Rakhine and Paletwe, which have been historically malarious regions. Further, according to personal correspondence, some local, voluntary malaria workers in the villages stopped working because they were afraid of catching COVID.²⁹

The other factor that most definitely affected the malaria-elimination plan in Myanmar has been the sudden changes in the political situation. The malaria control programme has already been challenged significantly by civil conflict. Many of the malarious frontier areas are the homes of ethnic groups such as the Kayah, Kayin, Shan, Kachin, and Rakhine, many of whom have been engaged in armed conflicts with the Myanmar Army (Tatmadaw) for many decades despite some improvement in the civil war conditions in 2011. Many malarious areas were designated as “no-go zones,” which prevented malaria workers of INGO and NGO partners from accessing and monitoring malaria situations. Further, civil war has created thousands of internally displaced people (IDPs), who became malaria victims when forced to live in malarious forests without proper healthcare.

On top of such long-term political difficulties, the military coup on February 1, 2021 and the resulting renewal of civil war conflicts have profoundly interrupted the elimination plan, and become one of the worst events for public health in Myanmar in recent years. General Min Aung Hlaing, the Senior Commander of the Tatmadaw, ordered the arrest of cabinet ministers from the democratically elected government, including State Councilor Aung San Suu Kyi and President Win Myint, claiming that there had been electoral fraud in the 2020 general election. The general public of Myanmar began their Civil Disobedience Movement (CDM) to resist the military coup and reinstate the democratically elected government. As has been reported in the media, the Tatmadaw began arresting, detaining, and killing many who partici-

27 Pyi Phyo Kyaw (2017, p. 577).

28 Ratanakul (2004, p. 162).

29 Personal correspondence (2021, Jan.), with Dr. Masatoshi Nakamura (JICA/NMCP).

pated in the CDM. According to the Assistance Association for Political Prisoners, as of May 29, 2021, 837 have been killed and 4,370 detained or sentenced.³⁰ There are two important consequences of this sudden political turmoil. One is the resulting huge delay in COVID responses. As discussed earlier, Myanmar's COVID cases remained low until September 2020, when they started showing a rapid increase. The military coup took place just as the new COVID cases declined after the lockdown, and, more importantly, a day before the planned start of the COVID-vaccination programme. Due to the coup, COVID test-centres have been closed and vaccination programmes halted. Further, there was a significant shortage of medical oxygen, which the junta neglected to rectify, leading to the deaths of thousands of people. Further, the number of tests decreased, and it became difficult to ascertain COVID case numbers beyond general observations that it has spread like wildfire.

Second, a large number of medical and health staff, including those working for the Ministry of Health and Sports, joined the CDM, refusing to return to their offices and hospitals. This has devastated the medical and health infrastructure. Needless to say, many staff of the National Malaria Programmes and volunteer malaria control health workers joined the CDM, resulting in the near suspension of the malaria programme across the entire country. The malaria surveillance network no longer functions and many of the international partners working with the VBDC/NMCP in Myanmar have begun worrying about the resurgence of malaria, especially in the border region. For example, local staff in the Shan State report that there have been new outbreaks of malaria.³¹ The military has been pressuring the medical and health personnel who participated in the CDM to return to work; however, many have refused to obey this order. The coup has caused the loss of many medical and health officers and staff who were familiar with the detailed workings of malaria control in local areas and their networks. Even when the military eventually convinces some of the former staff to return to work, it will take a long time to rebuild that network, and to restore people's confidence and willingness to work with the government on malaria control again. It is quite possible that the government (the Ministry of Health and Sports, VBDC/NMCP) will soon have to revise their goals to account for the damage caused by this coup, since the plan to eliminate malaria by 2030 is looking increasingly impracticable.

This is not the first time that a military coup has hindered the progress of malaria control in Myanmar. In 1988, a nation-wide people's protest against the government spread through the country, followed by a military crackdown. It is estimated that about 10,000 people were killed by the Tatmadaw and more than 10,000 fled to border regions controlled by the ethnic rebel groups. Even though the malaria surveillance and reporting system at that time was not as well organized as its more recent successor, it is clear that this political turmoil caused a resurgence of malaria in Myanmar. According to the epidemiological data of the VBDC's *Annual Report*

³⁰ AAPP (Burma) (2021).

³¹ Personal correspondence (2021, Jun.), with Dr. Masatoshi Nakamura (JICA/NMCP). Information reporting has been limited since the coup, as the previous regular formal reporting system has been disrupted.

of 1993, the annual parasite incidence (API) remained stable from 1984 to 1987, but positive cases and the API started increasing in 1988, reaching its peak in 1989. Additionally, malaria deaths went up rapidly from 1989 to 1991.³²

Due to the considerable damage done to the public health system and malaria-control programme, it is unlikely that the data showing a direct relationship between the 2021 coup and malaria cases will be available this time. This is the worst situation to emerge thus far, since monitoring, surveillance, and treatment of malaria no longer exist to prevent the resurgence of the disease.

Conclusion

In discussions of malaria, scientific and biotechnological aspects have been the centre of focus. Nevertheless, unexpected environmental, social, and political developments—such as itinerant populations of forest-goers or IDPs produced by civil conflicts—often demonstrate that these factors play a significant role in determining the development of malaria control, as well as shaping the concept of “end” regarding malaria. For Myanmar, changes in the overall political context have meant that the vision of the “end” is currently in danger of disappearing altogether. After the military coup, the ability to achieve an end to malaria appears to have become unreachable for some time to come. When anti-malaria operations do recommence, Myanmar will most likely have to change its “end” goalpost back to one of “control,” and away from “elimination.”

The question of how malaria ends in Myanmar cannot be defined or measured easily. It raises issues of who measures the end and how this is defined. “Ending” is actually a fragile concept, the target for which in Myanmar has been fluctuating between control and elimination, depending on shifting feasibility and different contexts. Further, it seems that the understanding of an “end” to malaria is different for different stakeholders. Global health partners and the government have viewed malaria as a serious public health threat that has been difficult to terminate, especially in the face of the emergence and spread of artemisinin resistance, even though the threat was diminished when it seemed that malaria had been brought under control. Yet for much of the general population, malaria seems to be viewed as a non-threatening, almost terminated disease. Because of this discrepancy and the fragility of the concept of termination, obtaining an official declaration such as the WHO's malaria-free status may help to consolidate that idea of the disease being at an end. Many Southeast Asian countries, including Cambodia and Laos, may achieve that malaria-free status by 2030 as they have envisaged, but such a clear end to malaria in Myanmar may prove more elusive.

³² Department of Health (1995; 1997; 1998).

Figure 1. Myanmar: Reported malaria cases by species and deaths, 2010–2019.

From *World Malaria Report 2020—20 Years of Global Progress & Challenges* (Annex 3–I, pp. 209, 241), by World Health Organization, 2020 (<https://www.who.int/teams/global-malaria-programme/reports/world-malaria-report-2020/>)

	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Indigenous cases	420,808	465,294	481,204	333,871	205,658	182,616	110,146	85,019	75,518	56,411
Total <i>P. falciparum</i>	388,464	433,464	314,676	222,770	138,311	110,449	62,917	50,730	38,483	23,092
Total <i>P. vivax</i>	29,944	28,966	135,385	98,860	61,830	65,536	43,748	32,070	36,502	32,940
Total mixed cases	2,054	3,020	31,040	12,216	5,511	6,624	3,476	2,214	1,530	599
Total other species	346	162	103	25	6	7	5	5	3	4
Deaths (point)	3,882	2,479	3,680	1,169	729	482	440	357	297	96

Figure 2. Annual malaria mortality 1984–1993.

From *Vector Borne Diseases Control Annual Reports for 1993* (1995, p. 3), *1995* (1997, p. 6), and *1996* (1998, p. 5), by Department of Health, Yangon, Myanmar: Department of Health

YEAR	MALARIA DEATHS	MORTALITY RATE/100.000 POP.
1984	3,236	9.5
1985	2,856	8.2
1986	3,102	8.3
1987	3,576	9.4
1988	4,072	10.4
1989	4,885	12.3
1990	5,127	12.6
1991	5,231	12.6
1992	4,739	11.2
1993	4,219	9.3
1994	4,380	9.9
1995	3,744	8.4
1996	3,424	7.5

Figure 3. Yearly malaria morbidity in Myanmar, 1985–1995.

From *Vector Borne Diseases Control Annual Report 1995* (p. 4), by Department of Health, 1997, Yangon, Myanmar: Department of Health

YEAR	NO. OF CASES (OUTPATIENTS & INPATIENTS) ('000)	MORBIDITY RATE PER 1000 POPULATION
1985	872	24.9
1986	878	23.4
1987	891	23.3
1988	957	24.5
1989	1,060	26.5
1990	989	24.3
1991	939	22.7
1992	789	18.7
1993	702	16.3
1994	697	15.8
1995	657	14.7

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