The Relationship Between Economic Development and Malaria Control:

British “Tropical Medicine” and Imperialism in Latin America and the Caribbean

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Certain facets of human geography, including migration, lack of social organisation, and environmental degradation are known to contribute to infectious disease prevalence. Yet, Western public health instead looks towards medical intervention and disease-specific prevention to address the resulting epidemics after they have already spiralled out of control, as is the case with the centuries-long battle against malaria. The prioritisation of downstream interventions stems in part from the imperial legacy of "tropical medicine," a medical speciality that originated as an arm of the British Empire whose purpose was to control diseases that inhibited expansion and productivity in their overseas extraction colonies, for example in Latin America and the Caribbean, whose standards of living they cared little to invest in. While today, global health organisations tout the "human right to health," the economic metrics they use to quantify the potential impact of aid (GDP growth inhibited due to disease and national per capita income) severely undermine the humanitarian sentiment (Amrith 2006). Global health organisations also focus on maximising efficiency, and as such for decades have attempted to solve social problems with technical solutions (Amrith 2006). This view of technocratic public health as a tool to advance economic development serves to distract from the importance of investment in social services and living conditions as methods to control malaria and infectious disease in general; organisations can point to their success through improvements in disease-specific mortality metrics on national and global scales, while the poorest of the poor remain just as susceptible to malaria and other diseases compounded with "the bodily effects of crushing poverty" (Amrith, 2006). The roots of the technology-based global health approach to malaria control today can be found in the example of the British imperial legacy in Latin America and the Caribbean. The importance of controlling disease in every facet of imperial rule, from military operations to production, to infrastructure development, to controlling the environment demonstrates the inextricable link between combating malaria and economic development. The British Empire, aware of this link, made conscious, economic choices of which lives to sacrifice to malaria and where to invest in disease control methods. Medical and technological malaria control methods in turn created a slew of other issues for human health, the environment, and social stratification that disproportionately impacted the poor in Latin America and the Caribbean, a legacy that persists to this day despite recent advances in reducing the threat of the disease in the region.

Medical progress itself became a symbolic justification for colonial rule, as it allowed Europeans to survive malaria and the many other "perils of the tropics" (Ring, 2003). It should

be noted that the terminology of "tropical" in relation to diseases often creates a false, symbolic association with shared climatic, geographical, or genetic characteristics of colonised peoples, while in reality, the only shared factor underlying these diseases is poverty (Hirsch, 2022). Tropical medicine, therefore, is based upon "theoretical connections made between disease and place," which fortified the idea that the locations and the peoples that the British colonised were inherently dangerous and diseased (Ring, 2003). This goes hand in hand with the idea that the development of public health institutions is a critical part of understanding state formation, nation-building, and political legitimation (Espinosa, 2013). Speaking to a sense of entitlement through medical progress, a 1904 newspaper about the work of Maj. Ronald Ross of the Liverpool School of Tropical Hygiene and Medicine states that his discoveries permitted "white men with their superior ability to settle sections formerly uninhabitable" to develop resources and financially benefit the Empire (Philadelphia Press, 1904, p. 1). Through the science of immunology, colonial doctors sought to solve the puzzle of why the supposedly superior Anglo-Saxon race had tended to succumb so easily to disease (Ring, 2003). The medical and public health apparatuses of a nation or Empire are anything but a-political; the end goal can often be traced back to increasing territory or wealth.

Malaria, to the British Empire, at first posed a threat primarily to the military, who needed healthy bodies to carry out their tropical conquests, including in Latin America and the Caribbean (Ring 2003). The British Empire deemed the strategic and economic importance of expansion to outweigh the staggering low survival rate in this region (De Barros, 2003). During the conquest of Jamaica in 1655, before malaria control efforts or cures existed, 47% of English troops died primarily from malaria in a sixth-month period and the remaining half continued to die at a rate of 20% annually (McNeill, 1999). Not until the mid-to-late nineteenth century did the continued need for able bodies to carry out imperialist expeditions finally catalyse developments in tropical medicine as an emerging field (Ring, 2003). The most notable shift during that period was the discovery that cinchona bark, which contains quinine, that Native populations in Latin America had been using to cure fevers, could be used to treat malaria (Espinosa 2013). Many historians characterise quinine as a weapon of conquest due to the ease it granted the British Empire in expanding their territories and ramping up their agricultural productivity (Luciano). Cinchona exports supplied the British Empire with the means not only to solidify their hold on Latin America and the Caribbean but also everywhere around the world

that malaria had inhibited their imperial success; maintaining British dominance in the colonial tropics would not have been possible without this advancement in malaria treatment (Espinosa, 2013). However, quinine was a pharmaceutical solution, and as such quickly became a commodity of the colonial elite to rule more comfortably, rather than an effective preventative measure for large populations (Luciano).

Malaria threw a wrench into the imperial machine by weakening and killing the labour force and thus decreasing its potential productivity (Coelho, 1997). However, health and sanitation initiatives to combat the disease were few and far between in Latin American and Caribbean plantation societies. As Andrew Balfour explained in the 1924 volume on Health Problems of the Empire, "a medical officer is confronted with an almost insuperable difficulty when he sets out to request the expenditure of good money for the purpose of improving general health and thereby the earning capacity of the community, unless he can show that the measures he is putting forward will yield a profit for the individual and that at no distant future" (Packard, 2009, p. 55). In some British colonies in the Caribbean and Latin America, they shifted the costs incurred by labouring days lost to malaria to the labourers themselves, making absence financially punishable (Kumar, 2013). Essentially, public health hung in the balance of a brutal economic scheme, kept intact only to the extent that was sufficient to keep the production of goods in motion but was by no means satisfactory to the human beings involved (De Barros, 2003).

Malaria to some extent motivated the British Empire's use of racialised labour forces in Latin America and the Caribbean, as natural immunities in African and Asian populations became favourable. While almost certainly a reductive explanation for racialised labour, the British reasoned that Europeans, unsuited to tropical environments and diseases, and Native populations, unaccustomed to European diseases, made unfit labourers in comparison to Africans, who due to previous exposure to malaria were less likely to die from it (Coelho, 1997). Africans' greater life expectancy than other groups in the Americas meant that their lifelong "income stream" (which of course the British Empire pocketed) was twice that of a European labourer (Coelho, 1997). Enslaved Africans and indentured labourers from Asia were not magically immune to malaria. Rather, frequent, forced migration of large numbers of enslaved and indentured workers from Asia and Africa to Latin America and the Caribbean only exacerbated malaria transmission (Luciano). However, given a labour force with a lower

mortality rate than European labourers, British colonists could avoid a complete labour die-off without having to make large, troublesome investments in health and sanitation.

Despite malaria's financial burden on colonisers, sanitation, living conditions, and hospitals that could prevent and treat malaria remained underdeveloped in British-influenced parts of the Caribbean and Latin America until relatively recently. Since establishing settler colonies in this region was not the goal, the British had little stake in the well-being of their colonial subjects; the sole purpose of the British presence in this region was to extract resources efficiently (Hirsch, 2022). Investments in healthcare were rare, as it was far easier to replace labourers (whose lives were also devalued as a result of extreme racism) compared to the time and effort it would take to cure them or to prevent sickness in the first place (De Barros, 2003). The distinction between bound labour, i.e enslaved peoples, indentured, and free labour also played a major part in determining the resources spent on public health initiatives (De Barros, 2003). Places like British Guiana and Trinidad remained under-resourced and unsanitary until the 1920s, since indentured labour from India, and enslaved Africans before that, were to the British Empire endless supplies of bodies that rendered healthcare unnecessary (De Barros, 2003). After independence in the age of trusteeship, it was local intellectuals and bureaucrats, not British officials, that advanced and shaped inherited British public health policy to meet the needs of the local population and improve health outcomes, particularly in former Caribbean colonies (Espinosa, 2013).

Meanwhile, wealthy British settler colonies were able to eradicate malaria wholesale as early as the mid-19th century. These efforts required capital and advanced social organisation, assets that are generally unavailable to the developing world (Jamieson, 1997). For example, Canada eradicated malaria by 1840 through land use changes, wetlands and surface water management, and public health surveillance and isolation to reduce malaria prevalence (Jamieson, 1997). Years later, in 1905 in Manaus, Brazil, a rubber-producing town economically and administratively dependent on the British Empire, one British health official named Harold Thomas wrote that the European population was greatly to blame for failing to cover standing water and that without works to fill in ravines and bays and construct an "up-to-date system of sewers," malaria prevalence would continue to strain the already under-resourced hospital there (Burns 1965). These two examples demonstrate that the same Empire in a formal settler colony versus an informal economic extraction site yielded vastly different results in the same method of

malaria control through water management (Austin, 2013). In Andrew Balfour's 1926 address on the economic benefits of hygiene called "Why Hygiene Pays," he acknowledges that "in certain localities antimosquito measures are impracticable – the game is not worth the candle; in other words, the results would not be commensurate with the money which would have to be spent. This applies to places where engineering works –draining, filling, and so forth – are required. But there are many spots where a reasonable expenditure pays hand over fist" (Balfour, 1926, p. 7). The British Empire tended not to invest back into Latin American and Caribbean extraction colonies, as the objective was to favour lucrative projects over improved living conditions.

British plantations in Latin America and the Caribbean, a key part of the Empire's economic engine, used methods of meticulous land cultivation that not only made the process of extracting resources from the land easier but also created highly favourable conditions for malaria-carrying mosquitos (Papworth, 2015). Large-scale, quick methods for agricultural development such as clear-cutting forests, massive water withdrawals, and inputting harmful chemicals degraded elements of the ecosystem that would have otherwise kept mosquito population growth under control (Austin, 2013). For example, in British Guiana, "wet-rice cultivation and flooding of cane fields increased the surface area of stagnant fresh water," opening up breeding areas for mosquitos (Kumar, 2013, p. 754). In Trinidad, colonists replaced the original salt-grass shrubbery with rice, sugar-cane, and coconut palm, the latter two being tall plants that blocked out sea breezes that had previously controlled humidity levels, again unintentionally cultivating ideal habitats for mosquitoes to breed in the fields precisely where labourers spent the majority of their time (Kumar, 2013). Commercial forestry in cacao, coffee, and nutmeg plantations combined with high humidity and rainfall created a "disturbed man-made environment" extremely conducive to malaria transmission as well (Fonaroff, 1968). Mosquitos prefer plantation forests to natural forests because their broken-up canopy covers allow sunlight to shine through, warming both the air and standing water (Fonaraff, 1968). Mosquitos not only survived human intervention with their environment in these different cases of highly cultivated plantation societies but even benefited from it. Development and cultivation, which in Western society are nearly synonymous with "progress," instead degraded protective elements of ecosystems and increased the likelihood that labouring populations would come in contact with malaria (Luciano).

Not only did the changes the British make to tropical environments encourage mosquito population growth but their efforts to control mosquito population growth further harmed the environment. From the mid-19th century, control efforts included destroying the source of malaria and malaria-carrying mosquitos, such as draining swamps where mosquitos lived and treating the sites with oil (Philadelphia Press, 1904) or the highly toxic chemical Paris Green, which were effective but expensive and hugely harmful to human health and the surrounding ecosystem (Packard, 2009). Then, in the 1940s, dichloro diphenyl trichloroethane (or DDT) became the gold standard of malaria control (Packard, 2009). It was cheap, effective, and easy to spray over entire countries, becoming a key component of vector control that led to a degree of economic development in nations that used it (Packard, 2009). In a 1945 article in the British Medical Journal, the author writes of DDT, "the way is now clear for a rapid and systematic attack on the major medical problems of the Colonies" (Control of Malaria in the Tropics). Too good to be true, DDT was only widely used up until 1973 when it was banned due to its toxicity to humans and its tendency to bioaccumulate in food webs (Casida, 2012). Thus, the malaria issue persisted, now with a heightened awareness of the damage that controlling it with pesticides can cause.

British contributions to modern-day global health through the Empire's long legacy of tropical medicine focus mainly on technocratic and medical innovation rather than social infrastructure to combat disease. The dichotomy of the medical versus the social and environmental approach to public health serves to illuminate the importance of the social determinants of health rather than to claim that the two approaches are mutually exclusive. A poignant distillation of these two points of view when examining the legacy of British colonial health projects is this: "Environmental historians tend to ask what humans have done to modify their environment. Medical historians ask what they have done to protect themselves from threatening aspects of that environment" (Curtin, 1993, p. 356). The environmental perspective can be likened to an offensive approach, whereas the medical is a defensive approach. Medicalised public health often fails to address root problems and instead focuses on the downstream effects of disease, and is available only to relatively privileged populations who are able to purchase these solutions, such as mosquito netting and antimalarial drugs (Jamieson, 1997). As recently as 2017, the World Health Organization stated that "there are good epidemiological, social, cultural and political reasons for allowing the local context to determine

an elimination strategy, but effectively designing and implementing flexible strategies actually requires more resources and capacities, both at the national and at the global level, than do highly rigid approaches" (World Health Organization, 2020, p. 16). Hence, without an integrated effort from local communities, and instead applying "highly rigid," one-size-fits-all solutions, the poorest nations and populations with the highest disease burden of malaria and the least able to cope with it continue to suffer (Packard, 2009).

In framing the current disease burden of malaria in Latin America and the Caribbean, it is important to note the disparate burden between socioeconomic classes within the same region, and also to compare it in general to other regions of the world. Malaria in Latin America and the Caribbean makes up only a small percentage of the total disease burden, as 95% of cases and deaths currently occur in Africa (World Health Organization, n.d). Economics is mostly responsible for this, as 60% of malaria cases occur in the poorest 20% of the global population (Austin, 2013). Significant progress in malaria control in Latin America and the Caribbean has only come about recently, with malaria incidence decreasing by 62% between the years 2000 and 2015 (Ferreira, 2019). However, in the region malaria is still endemic in 21 countries and territories and currently, 120 million people remain at risk of infection there (Ferreira, 2019). Globally, the poorest of the poor remain just as or more susceptible to malaria than they did in the past, even though the health outcomes of the middle class have improved (Jamieson, 1997).

The impact of malaria on the British imperial legacy in Latin America and the Caribbean provides a context in which to understand the relationships between geopolitics, economic development, and disease prevention. Each facet of the British imperial machine, from military conquest to labour and production, to social infrastructure was inhibited by malaria and other diseases, and as such prompted the emergence of tropical medicine, which the field of global health we know today was largely built upon. The harmful and unintended consequences of malaria control efforts included environmental degradation from harmful chemicals, health disparities along racial and class lines, and further economic inequity as a result. British prioritisation of productivity and severe neglect of social services and sanitation created conditions that contributed to malaria's high prevalence in the region until the 21st century. While most of the Caribbean and parts of Latin America are now malaria-free, it still disproportionately affects poor communities where it is endemic. In looking towards the future and learning from the past, we can learn that targeting specific diseases through technocratic and

highly medicalised methods is sometimes a futile battle without integrated effort across multiple facets of society; everyone from physicians to economists to educators has a part to play to reorient a society towards community-based public health (Packard, 2009).

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