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Perspective Piece

What We Lost in the Fire: Endemic Tropical Heart Diseases in the Time of COVID-19

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Abstract. The COVID-19 pandemic has profoundly influenced the effort to achieve global health equity. This has been particularly the case for HIV/AIDS, tuberculosis, and malaria control initiatives in low- and middle-income countries, with significant outcome setbacks seen for the first time in decades. Lost in the calls for compensatory funding increases for such programs, however, is the plight of endemic tropical heart diseases, a group of disorders that includes rheumatic heart disease, Chagas disease, and endomyocardial fibrosis. Such endemic illnesses affect millions of people around the globe and remain a source of substantial mortality, morbidity, and health disparity. Unfortunately, these conditions were already neglected before the pandemic, and thus those living with them have disproportionately suffered during the time of COVID-19. In this perspective, we briefly define endemic tropical heart diseases, summarizing their prepandemic epidemiology, funding, and control statuses. We then describe the ways in which people living with these disorders, along with the healthcare providers and researchers working to improve their outcomes, have been harmed by the ongoing COVID-19 pandemic. We conclude by proposing the path forward, including approaches we may use to leverage lessons learned from the pandemic to strengthen care systems for these neglected diseases.

The United States will shortly host the Conference for the Seventh Replenishment of the Global Fund for AIDS, Tuberculosis, and Malaria, one of the greatest financing bodies in global health. The Global Fund has provided millions of people antiretroviral therapy, antimycobacterials, and mosquito bednets, contributing to an estimated 44 million lives saved since its inception in 2002.[1] The current Replenishment, however, takes place amid a more somber tone set by last year's results report from the Sixth Replenishment, which highlighted the devastating toll that the COVID-19 pandemic has taken on the fight against priority communicable diseases. Although overall funding volume for managing these epidemics increased compared with the previous call to action, 2020 marked the first year in the history of the Global Fund that key programmatic results in all three illnesses saw setbacks, rather than advances. HIV testing and prevention services decreased by 22% and 11%, respectively, whereas deaths from tuberculosis (TB) and malaria increased.[1] More than a million patients lost access to TB therapy, with a nearly 20% reduction in the number of people treated for drug-resistant TB and 37% for extensively drug-resistant TB. Such sobering findings have led to appeals for redoubled international efforts to finance control measures for these diseases.[2,3]

Resigned to the periphery of this discussion, however, remains another class of disorders with significant global health importance, namely endemic heart diseases of low- and middle-income countries (LMICs). These include conditions such as rheumatic heart disease (RHD), endomyocardial fibrosis (EMF), tropical cardiomyopathies, and Chagas disease. Such illnesses are responsible for a substantial unrelieved burden of disease: more than 40 million people worldwide live with RHD, which claims a third of a million lives each year.[4] EMF, an idiopathic cardiomyopathy, has been associated with 20% of inpatient heart failure cases in high-prevalence nations such as Uganda.[5] Chagas disease affects six to nine million people, leading the World Bank to declare it the most important parasitic disease of the Americas.[6,7] Endemic tropical heart disease patients suffer a crushing dual burden of neglect. Although such illnesses are often the sequelae of infections, their end-organ cardiovascular complications are not typically treated as the domain of infectious disease specialists. Meanwhile, they are not usual disorders of the demographic transition in LMICs such as atherosclerosis or hypertension, thus not finding their way into modern cardiology textbooks, training, or funding priorities predominantly set by high-income country authorities.

Even before the COVID-19 pandemic, the level of neglect for endemic tropical heart diseases exceeded that of illnesses typically considered among the "classic" neglected tropical diseases. In 2019, Macleod and colleagues proposed a "disability neglect index" comparing disability-adjusted life years (DALYs) attributable to a condition to its respective research and development funding. They found that RHD was dead last in funding among 16 tropical diseases, with 15 US cents allocated per DALY. This was exponentially lower than HIV/AIDS ($20.50 USD/DALY), TB ($12.88/DALY), and even soil-transmitted helminths ($3.89/DALY).[8] It is no wonder that mortality from RHD has only decreased by 8% since the 1990s.[9] In contrast, HIV-associated deaths fell by 33% in the decade between 2005 and 2015 alone.[10] Chagas disease frequently goes undiagnosed by physicians, thus remaining unreported as the underlying cause of death in many cardiovascular fatalities and grossly underrepresented in official mortality figures.[11] The cause of EMF, despite the

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syndrome being first described in 1948, remains a mystery to this day.[12]

As such, endemic tropical cardiac disease control efforts were profoundly harmed by a global pandemic that disrupted chronic disease care systems, devastated international supply chains, and redirected funding to short-term (but urgent) COVID-19 relief measures.[13–16] The nations with the highest prevalence of endemic tropical heart diseases were among those hit hardest by COVID-19. As of this writing, India was second only to the United States in total reported pandemic cases (more than 44 million), and Brazil was third at 34 million.[17] Many Asian, Latin American, and sub-Saharan African countries with some of the highest rates of RHD, EMF, and Chagas disease, such as Argentina, South Africa, Indonesia, and Mexico, rank among the top 30 nations in cumulative COVID-19 incidence. Unfortunately, many LMICs report some of the world's lowest COVID-19 vaccination rates. The continent of Africa, despite more recent international efforts to distribute vaccine aid, only counts 18% of its citizens as fully immunized against the coronavirus.[18] Regrettably, while vaccine inequity persists, new coronavirus variants and subvariants such as Delta and Omicron continue to be reported first in LMICs such as India, Botswana, and South Africa—the same regions with the highest endemic tropical heart disease burden. To add insult to injury, these nations were doubly penalized for their role in disclosing the discovery of new COVID-19 strains to the international community, as travel and the flow of medical aid to these countries were subsequently shuttered in response to their declarations.[19] This has been particularly damaging for transnational training programs in cardiology because many LMIC institutions have developed collaborations for trainees to acquire specialized skills in echocardiography, catheterization, and surgery via exchange programs and visiting clinician-educators.[20]

On the disease management front, preexisting cardiovascular disease (CVD) is a risk factor for poor outcomes from COVID-19.[14] Many people living with endemic tropical CVDs in LMICs often remain undiagnosed during the asymptomatic or early symptomatic phases of the illness due to a lack of local echocardiographic or serologic diagnostic technologies.[21] Thus, they may not recognize their high-risk status until they have contracted COVID-19. Furthermore, the duration of treatments for endemic CVDs can pose additive pandemic risks. Antitrypanosomal therapy for acute or congenital Chagas disease lasts 60 to 120 days.[22,23] RHD necessitates monthly benzathine penicillin injections (for some patients, lifelong) to prevent disease progression.[24] The latter thus requires frequent, direct healthcare provider interaction, increasing the risk of iatrogenic COVID-19.[24] These care delivery challenges come amid worldwide cardiovascular care systems ravaged by COVID-19. Catheterization laboratories saw procedural delays for emergent cases, while lifesaving valvular operations have been postponed.[15,16,20] LMICs experienced an 80% drop in echocardiography volume during the first year of the pandemic, by far the greatest reduction by national income category.[13] There is now evidence that the pandemic exacerbated established challenges to delivering CVD care in LMICs, with increased mortality due to even common conditions such as heart failure and myocardial infarction, widening the gap in CVD care and outcomes between high-income countries (HICs) and LMICs.[25]

To mitigate these pandemic-induced harms and refocus attention on the fight against endemic heart diseases of LMICs, the global health community should take several key actions. First, further research is needed to determine the impact that the COVID-19 pandemic has had on endemic tropical heart disease care systems and the resultant effect on the outcomes of those living with such illnesses. This inventory is critical to developing benchmarks for assessing postpandemic recovery in disease control. In particular, attention should be paid to vulnerable groups within these populations such as pregnant patients, who already suffer from unique healthcare inequities while bearing escalated risks of adverse events from COVID-19.[14,26,27] Next, global COVID-19 vaccine equity must be realized. High-income nations should take the initiative to support LMICs with vaccine acquisition and delivery. This is important not just for the benefit of the recipient nations (and their CVD care systems) but for donor nations as well to stem the rise and influence of devastating future coronavirus variants. Simultaneously, medical misinformation from HIC countries regarding COVID-19 vaccination must be countered. Lastly, to ensure that short-term health system improvements from the redirection of resources for COVID-19 do not dissipate after the pandemic, we must find ways to pair coronavirus relief funding with initiatives to support chronic disease infrastructure. In many ways, this goal mirrors recent efforts to leverage HIV funding to improve chronic disease care in LMICs.[28–30] For example, COVID-19 tracking and contact-tracing systems can be used to improve treatment adherence such as penicillin prophylaxis for RHD. Teleconsultations expanded in many countries during the pandemic, and remote monitoring via ubiquitous and affordable cellphones in the global South can be adapted to the care of endemic heart disease patients in remote areas.[25] Critical care experience from COVID-19 surges can be used to strengthen cardiac intensive care units for post–heart surgery patients. Finally, vaccine development efforts for Group A *Streptococcus* and Chagas disease could explore the novel vehicle provided by the mRNA vaccine platform, much in the way that has been already pursued for HIV and malaria.[31–33]

Dr. Princess Nothemba Simelela, the WHO Assistant Director-General for Family, Women, Children and Adolescents, served as the keynote speaker of the May 2022 World Heart Federation Rheumatic Heart Disease Session. Commenting on the impact of COVID-19 on RHD care, she noted, "We hope this pandemic is now going to put health at the center." She added, however, that "hope is not a strategy. … The things we could have done as citizens and members of these institutions [for RHD control efforts] that we haven't done in the past two decades will remain undone." It is our job now to ensure that this will not be the case for the endemic cardiovascular diseases of the world's poorest citizens.

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