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LESSONS FROM THE FIELD

Overlaying COVID-19 mitigation plans on malaria control infrastructures

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To counter the coronavirus disease 2019 (COVID-19) pandemic, each country must design sustainable control plans given the inherent disparities in wealth and healthcare systems. Most malaria-endemic countries run well-entrenched malaria control programs via their established frameworks for diagnosis, case management, treatment and overall surveillance. We propose that the malaria control infrastructures can be partially co-opted for launching sustainable COVID-19 mitigation plans.

Keywords: control, COVID-19, malaria

As severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) infections increase above the current >25 million with >0.85 million deaths as on 2 September 2020, the coronavirus disease 2019 (COVID-19) pandemic continues to overwhelm public healthcare systems across the world. The pandemic is especially challenging for the underdeveloped and malaria-endemic countries of Africa, Asia and South America. Most countries remain at high risk of COVID-19, while half of the world is at risk of malaria. Malaria infects >200 million and causes >0.4 million deaths yearly, but unlike the more even distribution of COVID-19 across countries, 93% of malaria cases occur in Africa and India contributes >85% of cases from among the Southeast Asian countries.[1] Despite the decline in malaria between 2010 and 2018 from 71 to 57 cases per 1000 population, it remains one of the greatest causes of morbidity and mortality worldwide.

Due to the COVID-19 public health emergency, various countries have reprioritized their national healthcare focus. In malaria-endemic countries, the coronavirus pandemic has led to disruption and neglect of malaria control activities. The World Health Organization's malaria incidence modelling study of sub-Saharan Africa has predicted a >20% increase in malaria cases and a doubling of malaria deaths, predominantly due to substantial disruption of annual insecticide-treated net (ITN) distribution schemes and the lack of access to antimalarials.[2] Indeed, it is possible that the public health catastrophe due to a resurgence of malaria may begin to challenge the magnitude of the current COVID-19 crisis.

Due to the lack of therapeutic options, COVID-19 containment strategies are centred on minimizing exposure to SARS-CoV-2 via social distancing, quarantine, enhanced hygiene and the use of sanitizers and masks.[3] The world is eagerly waiting for an effective vaccine against SARS-CoV-2. Public health approaches adopted in polio vaccination programs may guide fair and rational deployment of COVID-19 vaccines as and when they become available.[4]

Some facets of COVID-19 response by governments have been very constructive and provide new impetus to malaria control.[5] However, concurrent indiscriminate state-level and national lockdowns have been enforced in many countries, much to the detriment of national economies and resulting in deep socio-economic collateral damages.[6] Such measures have also derailed routine healthcare services that cover both infectious and non-communicable diseases. Most international governments have grappled with decisions on lockdowns and plans are being devised to return a semblance of socio-economic normalcy along with the well-being of the citizenry.[7] It is especially feared that the spread of COVID-19 has severely disrupted the annual infectious disease containment services in many countries.[8,9] Specific simulation-based predictions suggest that due to COVID-19-driven lockdowns, almost all vector-borne diseases (i.e. chikungunya, dengue, Japanese encephalitis, malaria, yellow fever and Zika) may surge and cause excess mortalities.[10] Indeed, in some countries the failure of lockdown as a primary measure to control the pandemic has now resulted in a rush towards its abandonment that will inevitably fuel a surge in COVID-19 infections. Thus there is a growing realization that the spread of SARS-CoV-2 infection has to be dealt with strategically, and this will necessitate coherent public health action that aims at sustainable COVID-19 control programs. However, this new thrust

will require rigorous planning and will only succeed if embedded in the existing public health infrastructures. This is especially true for the underdeveloped world, which is typified by both poor healthcare provision and resource-stretched medical institutions.

By virtue of being an acute febrile illness, malaria shares some of its highly recognizable symptoms with COVID-19, including fever, difficulty in breathing, fatigue and headaches.[11] Malaria symptoms appear within 10–15 days after an infective mosquito bite, and multi-organ failure is common in severe malaria cases and can lead to death. Migration, aggregation and travel fuel transmission of both malaria and COVID-19. We therefore propose that as malaria-endemic countries consider shifting from the urgency of COVID-19 containment to more planned and sustained COVID-19 control options, it may be prudent for them to leverage the decades of investment in malaria control programs. The malaria control networks in endemic countries are generally proficient in dealing with patients from the most peripheral level to hospital-based treatment of severe cases. Thus COVID-19 control plans can piggyback on ongoing malaria control programs, as these are mature, highly evolved, deeply rooted and largely accepted by communities in affected states.

We propose a horizontal integration of public health strategies for malaria and COVID-19 that will harness from the former, especially in the African and Asian countries that are currently affected by both diseases, the following key features: 1) Existing personnel and infrastructure: different cadres of health workers who are well trained in integrated surveillance, including for malaria, at most peripheral levels can be reoriented to add COVID-19 to the basket of acute febrile illnesses. The well-established modes of healthcare delivery, including facility-based, outreach or campaign mode, need to be reoriented to infuse health services targeted towards COVID-19 detection and management. Although additional manpower would be needed to shoulder the responsibilities, the availability of point-of-care antigen and antibody testing for SARS-CoV-2 can now be integrated into surveillance systems on the ground. Active and passive surveillance networks, coupled with real-time data management system established for malaria can be harnessed for COVID-19 as well by augmenting facilities and reorienting healthcare field workers. Community health workers, the backbone of malaria control programmes, have a unique penetration in social settings. These can be leveraged for COVID-19 as well. These health workers need to be trained in the preventive, diagnostic and management aspects of COVID-19 in a similar fashion as for malaria. The reliance of communities on these workers can be an advantage in promoting health behaviours towards control and mitigation of COVID-19. Once in the communities, multiple health messages can be imparted via these healthcare workers. New recruits, if needed, can be trained under these more seasoned grassroots workers. 2) Special provisions: this is vital for vulnerable groups like those with comorbidities and the elderly. In malaria, pregnant women and children are given special emphasis, such as ensuring a supply of long-lasting insecticidal nets to these groups. Similarly for COVID-19, vulnerable segments of the population, especially the elderly and frontline workers, need to be specially monitored and supported. Socially marginalized individuals, including women, people with disabilities and the displaced, suffer from social inequities. Special shelters, free testing and treatment, and financial assistance and social security measures are being undertaken by governments for COVID-19. 3) Communication channels and tools: volunteers, local social and religious leaders, self-help groups, women's participation groups and voluntary organizations that played a significant role in community engagement in malaria must be activated for intensive messaging on COVID-19 containment and mitigation steps. Proven approaches used for active engagement in communities can be capitalized on for COVID-19 with specific provisions. 4) Frameworks for monitoring and evaluation: these are essential to assess the progress and success of COVID-19 containment strategies. The indicators and assessment parameters specific for COVID-19 can be layered on the basic framework of malaria monitoring. 5) Current supply chains: these will need to be augmented to accommodate the additional burden of detection kits, personal protective gear, hand sanitizers and medicines for COVID-19. 6) Stakeholders: involvement of national, international and private partners will be needed for scientific, technical, financial and political support in the successful control of COVID-19.

In addition to the above, laboratory diagnosis capacities at all levels of healthcare need to be improved. The use of rapid detection kits (antigen or antibody based) and confirmatory diagnosis by reverse transcription polymerase chain reaction are common to both diseases. Redesigning and partitioning existing facilities to prevent cross-contamination can save on resources needed for developing new facilities. Management of febrile cases/potential COVID-19 cases/co-infections will need standard protocols for health complications. The existing referral systems from grassroots-level to tertiary hospitals can be activated for COVID-19 with minimal additional effort. Segregation of outpatient departments, wards and intensive care unit facilities will be needed to minimize nosocomial transmission of SARS-CoV-2 and to enhance the confidence of the people seeking timely healthcare for febrile illnesses. Indeed, a highly balanced approach will be required to deal with patients who may have symptoms that cover a wider gamut of vector-borne infectious diseases, including chikungunya, dengue and Zika. Thus, before public healthcare systems remodel themselves to include COVID-19 patients, they may need to be augmented with additional technology and manpower. The healthcare workforce will need to be retrained to don personal protective gear and to take extraordinary precautions in the handling of biomaterials from fever patients. Stringent guidelines to safeguard the clinic premises from contamination and to avoid facility-based dissemination of SARS-CoV-2 infection to non-COVID-19 patients will need to be implemented. No doubt the forthcoming national response plans to mitigate COVID-19 will exert additional stress on the existing infrastructure, especially in the malaria-afflicted and usually resource-constrained countries of Africa and Asia. Nonetheless, it may be prudent to rationally adopt COVID-19 mitigation plans on the pre-existing health infrastructures that are embedded in the countries' public health systems. The malaria control infrastructures may allow overlaying of COVID-19 containment plans, albeit with additional provisions.

The historical lessons from the rise and fall of malaria have penetrated the consciousness of public health agencies in malaria-endemic countries. It is recognized that even a momentary release of pressure from malaria interventions can lead to outbreaks and epidemics that eventually cause greater human and economic hardship. Thus the spirit of sustained

and organized malaria control measures may provide a fillip for COVID-19 containment in countries where both COVID-19 and malaria are prevalent. The accrued malaria infrastructure may be co-opted for COVID-19 control right from the grassroots level up. The underlying similarities between the old foe of malaria and the new enemy of COVID-19 will enable joint patrolling and policing using existing infrastructures. However, neglect of either adversary will contribute to even greater human, social and economic loss.

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