AUCTORES
Globalize your Research

Journal of Clinical Case Reports and Studies

Sabelo Vusi Dlamin *

Open Access

Research Article

Routine Malaria Control During the Covid-19 Pandemic in The Kingdom of Eswatini: A Benefit-Risk Analysis of Health Benefits Versus Excess Risk of Sars-Cov-2 Infection

Sabelo Vusi Dlamini [1]*, Mathobela Mbongiseni [2], Nxumalo Sihle [1], Hlope Londiwe [1]

[1]University of Eswatini, Faculty of Health Sciences, Department of Environmental Health Sciences;

[2]National Malaria Programme, Kingdom of Eswatini.

***Corresponding Author:** Sabelo Vusi Dlamin, University of Swaziland, Faculty of Health Sciences, P.O. Box 369, Mbabane, Eswatini.

Received date: April 04, 2025; Accepted date: May 13, 2025; Published date: May 20, 2025

Citation: Sabelo V. Dlamini, Mathobela Mbongiseni, Nxumalo Sihle, Hlope Londiwe, (2025), Routine Malaria Control During the Covid-19 Pandemic in The Kingdom of Eswatini: A Benefit-Risk Analysis of Health Benefits Versus Excess Risk of Sars-Cov-2 Infection**,** *J, Clinical Case Reports and Studies*, 6(4); **DOI**:**10.31579/2690-8808/254**

Abstract

Introduction: The ongoing COVID-19 pandemic is the most sustained disruptive and lethal disease outbreak since the 1918 influenza pandemic. As witnessed globally, the COVID-19 pandemic has the potential to overburden health systems and delay achievement of set targets for elimination or control. Discovery and implementations of effective treatments and/or vaccines for SARS-CoV-2 would reduce the duration and intensity of social distancing required to maintain control of the COVID-19 pandemic. The substantial progress made by the Kingdom of Eswatini in reducing the malaria burden could be jeopardised by the current COVID-19 pandemic. This study aims to describe potential effects of the COVID-19 pandemic on malaria incidence in the Kingdom of Eswatini.

Methods: This study employed a retrospective analytical study using monthly malaria morbidity data on the overall number of outpatients. Confirmed malaria cases were extracted from the National Malaria Programme database derived from routine passive reported malaria cases in health facilities and from reactive case detected malaria. Malaria diagnosis was based either on the results of rapid diagnostic tests or microscopy. The data have been processed with Microsoft Excel Version 16.52 and analysed with Stata IC Version 16 (Stata-Corp, College Station, TX, USA).

Findings: During March 2020, the number of confirmed malaria cases in Eswatini increased by 107% in March 2020 when the RSA, Mozambique and the Kingdom of Eswatini announced implementation of the first lockdown and travel restrictions. A majority of the cases confirmed in March were local cases, contrary to previous reports where imported cases were among the majority of cases reported in the country during each transmission season. The increase of cases in March 2020 suggests that intervention measures were implemented at reduced levels due to COVID-19 restrictions.

Conclusion

Neglecting malaria control interventions during the COVID-19 pandemic could prove catastrophic for malaria elimination in Eswatini. Malaria could develop into a scenario worse off than COVID-19 if neglected. Diagnosis for COVID-19 could be coupled with malaria diagnosis to avoid missing malaria cases during the COVID-19 pandemic.

Key Words: malaria; plasmodium falciparum; and covid-19; SARS-COV-2; malaria elimination

Introduction

The Kingdom of Eswatini is located in a part of sub-Saharan Africa (SSA) that is endemic with malaria and one that bears the brunt of the global mortality rates of 400 000 deaths and 200 million cases in 2018 [1]. The scaling up of Indoor residual spraying (IRS) and distribution of long-lasting insecticide treated nets (LLINs), introduction of rapid diagnostic tests (RDTs) and effective treatment with artemisinin-based combination therapies have resulted in significant reductions of morbidity and mortality due to malaria in the Kingdom of Eswatini. However, the introduction and spread of the COVID-19 pandemic has had a negative impact on many public health gains and threatens to bring public health interventions in low-income countries to a collapse. Many sub-Saharan African countries are faced with saturation of health systems that are likely to expose pre-existing fragilities

and exacerbate the myriad health problems afflicting human populations. Recognition of the threat posed to malaria control by COVID-19 has been widespread [2], and many countries have made attempts to contextualise these threats amid evolving global health priorities. Progress towards the 2020 milestones of the WHO global malaria strategy was reported to be substantially off track. In 2020, the global malaria case incidence rate was 59 cases per 1000 people at risk against a target of 35 — putting it off track by 40% [3]. The global mortality rate was 15.3 deaths per 100 000 people at risk against a target of 8.9 — putting it off track by 42%. Reaching the 2030 goals of the WHO malaria elimination strategy, including a 90% reduction in global malaria incidence and mortality rates by 2030, will require new approaches, new tools and the better implementation of existing ones [3]. The World Health Organization's malaria strategy emphasizes the need to carefully tailor existing approaches to prevention, diagnosis and treatment to local contexts, and to strengthen health systems overall, with a view to achieving universal health coverage.

As of 28 May 2020, severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) had infected more than 5·85 million individuals worldwide and caused more than 359 000 deaths [4]. On March 11, 2020, the World Health Organisation (WHO) officially declared the COVID-19 pandemic to be a public health emergency of international concern [5]. The first case of COVID-19 was reported on 14 March, 2020 in Eswatini. As of 16 November, 2020 at least 6 095 cases had been confirmed and 119 deaths reported. Globally, COVID-19 has the potential to overburden health systems and contribute to the prevention of access to essential healthcare. Compared with responses to COVID-19 in high-income countries, however, the measures taken in Eswatini have come amid the backdrop of more acute health-system resource limitations and persistently higher burdens of other infectious diseases such as HIV/AIDS and tuberculosis. Emergency lockdowns were initiated in countries across the globe, and the effect on health, wellbeing, business, and other aspects of daily life were felt throughout societies and by individuals. With no effective pharmacological interventions or vaccine available in the imminent future, reducing the rate of infection (i.e. flattening the curve) was a priority, and prevention of infection was the best approach to achieve this aim. Whilst the national shutdown measures to help curb the spread of the virus resulted in widespread inconvenience, it created an unprecedented public health opportunity as well. It has long been hypothesized that interruption in the movement of infected persons (and, therefore, malaria parasites) across borders would impact the malaria elimination trajectory by reducing importation pressure on receptive areas [6]. However, the COVID-19 pandemic represents a new threat to malaria service delivery. As the virus begins to spread in malaria-endemic countries, including many sub-Saharan African countries, their fragile health systems will likely be overwhelmed. Indeed, the recent Ebola outbreak in West Africa demonstrated that a sudden increase in demand for health services can lead to substantial increases in morbidity and mortality from other diseases, including malaria.

This study aims to describe potential effects of the COVID-19 pandemic on malaria incidence in the Kingdom of Eswatini, both from locally transmitted and imported source.

Methods

This study employed a retrospective exploratory study using monthly malaria morbidity data on the overall number of confirmed outpatients. Confirmed malaria cases were extracted from the National Malaria Programme database derived from routine follow-up of passively reported malaria cases in health facilities. Malaria diagnosis was based either on the results of rapid diagnostic tests or microscopy. Total numbers of confirmed malaria cases between the transmission seasons 2015/16 and 2020/21 were sourced from records of the National Malaria Programme (NMP). CIVID-19 data was sourced from achieved data from the Epidemiology and Disease Control Unit (EDCU). Both malaria and COVID-19 are notifiable diseases and health facilities that confirm diagnosis of these diseases are required to complete notification forms and report their diagnosis to the Ministry of Health and to the EDCU or the NMP. The data have been processed with Microsoft Excel Version 16.52 and analysed with Stata IC Version 16 (Stata-Corp, College Station, TX, USA).

Results

Confirmed malaria cases were on the increase in Eswatini until 2017 when the country and the region received higher than normal rains, hence the increase in number of cases reported across the region. The National Malaria Programme timely implemented indoor residual spray (IRS), appropriate diagnosis and disease management among patients confirmed to be infected through rapid diagnostic test (RDTs), microscopy and treatment of uncomplicated cases with artemether-lumefantrine. The country also introduced chemoprophylaxis to travellers visiting malaria endemic areas, especially Mozambique, in order to prevent importation of parasites. The country also implemented reactive case detection through the screening and treatment of persons within 500m radius of the households of an identified case. The surveillance unit of the NMP, upon receipt of notification of a malaria case, would follow it up to its locality and implement control measures in that area, including IRS in all the homesteads and the treatment of those screened and found to be positive. These implemented strategies proved to be successful in moving the country towards elimination of malaria within the foreseeable future. These initiatives resulted to reduced malaria incidence between the 2017/18 and the 2019/2020 transmission seasons i.e. before introduction of COVID-19 and the implementation of strategies to reduce its spread in the country (Fig. 1).

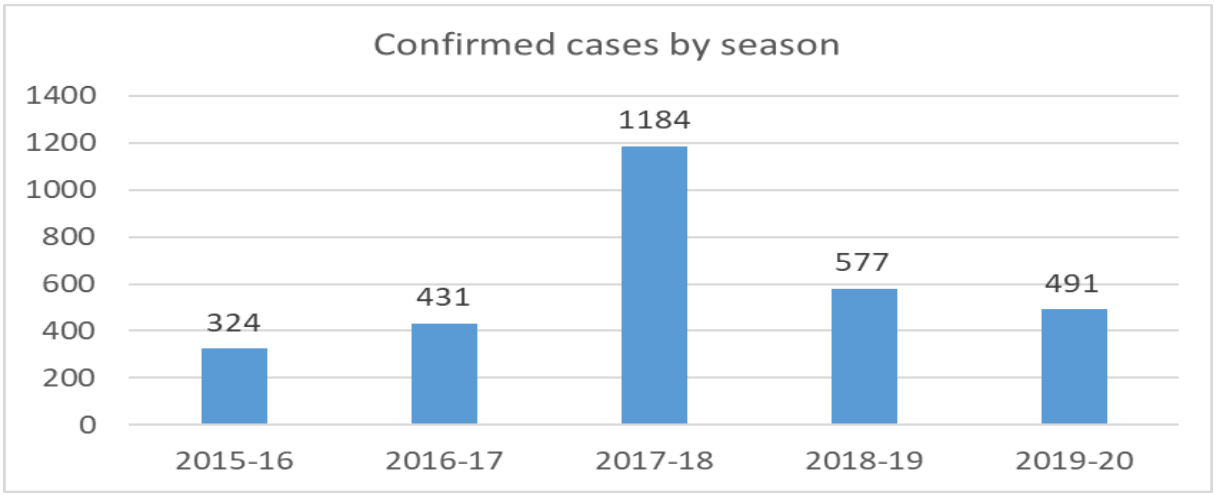


Figure 1: Total Confirmed Malaria Cases (Local and Imported) by Transmission Season 2015/16 to 2019/20

The number of confirmed malaria cases from July to June for the transmission seasons 2018/19 and 2019/20 were broken down by month. The results suggest that there were higher numbers of malaria confirmed cases in July, November and December 2018/19 transmission season compared to the same period in the 2019/20 season. However, this was before COVID-19 was reported in the Kingdom of Eswatini. Therefore, this difference could be due to other reasons and not COVID-19. The reduction of cases in 2019 was probably due to timely implementation of indoor residual spray in 2019. A significantly higher number of cases were recorded in March 2020 compared to March 2019 (Fig. 2). This period recorded a 106.8% increase in number of cases between the 2018/19 and the 2019/20 transmission seasons. March 2020 coincides with the start of the partial lockdown period as a response to contain the COVID-19 pandemic that had been reported in the Kingdom of Eswatini and among neighbouring countries. During the partial lockdown, all borders between South Africa and Mozambique were closed between 26 March, 2020 and 29 December, 2020 and local travel was significantly restricted in the Kingdom of Eswatini. This restriction included malaria personnel travelling to outreach areas and health facilities to implement control measures e.g. the movement of spray teams that routinely conduct indoor residual spraying at malaria endemic areas in the country was restricted.

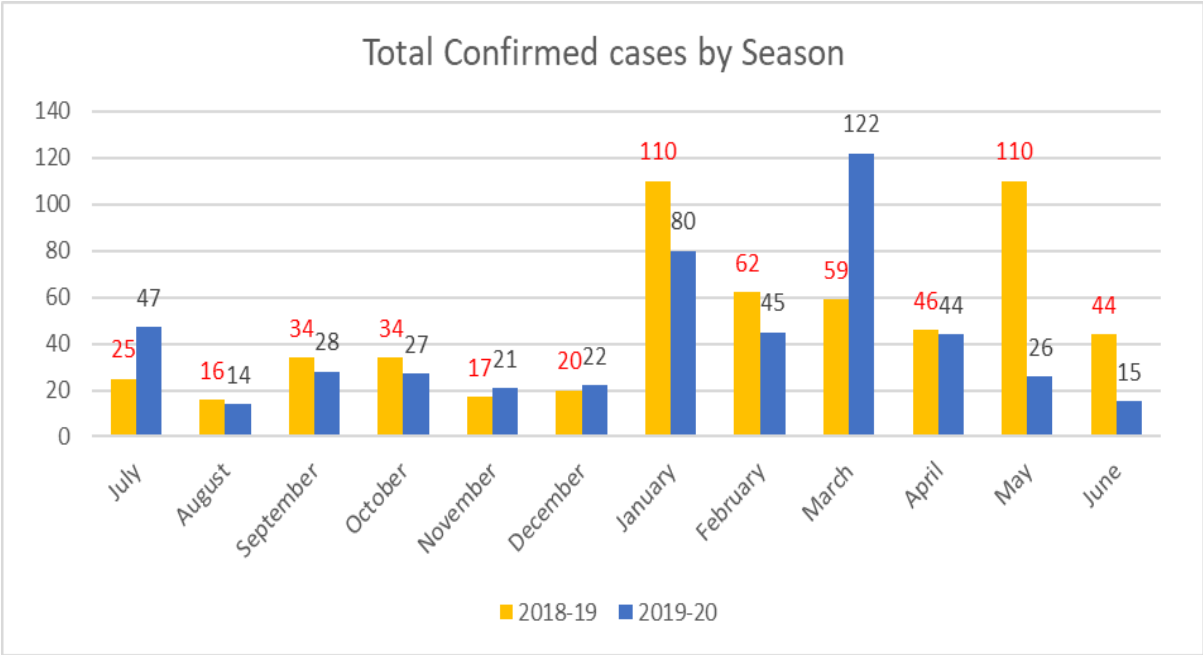


Figure 2: Total Confirmed Cases (Local & Imported) by Month (July 2018 – June 2020)

The number of confirmed malaria cases for the transmission seasons July 2018 – June 2019 and July 2019 to June 2020 were broken down by local versus imported cases. The results suggest that local transmission was dominant in the months of March and April. The programme had to halt proactive community screening in response to COVID-19 regulations implemented in March 2020. The number of confirmed local malaria cases was significantly higher in March 2020 compared with March 2019, 93 versus 34 cases, respectively (Fig. 3). The return of Swazi nationals working or visiting neighbouring countries such as Mozambique, with high malaria incidence, could partly account for the high number of malaria cases reported in March 2020. In March, 2020, the country imposed a partial lock-down which forced many locals to return to the country to stay at their homes. Those infected returned with parasites that initiated local transmissions. The disruption of control interventions due to COVID-19 restrictions partly contributed to reduced implementation of control measures, especially along border areas and within communities.

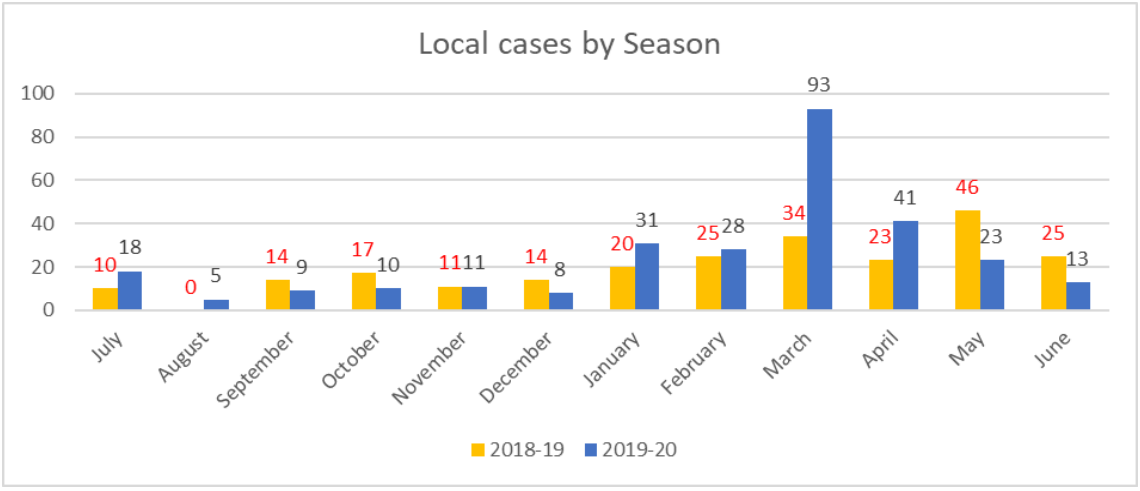


Figure 3: Number of Confirmed Local Malaria Cases in Eswatini by season, July 2018/19 to June 2019/20

Testing of community members for malaria is only done reactively following passive confirmation of local cases by health facilities, and only those with immediate risk are targeted. However, following the implementation of partial lockdown in response to COVID-19 spread, reactive testing of community members and implementation of measures around a confirmed case were halted, resulting in increased local transmission. This phenomenon partly explains the increase of local cases after the pronunciation of restricted movement during the COVID-19 response.

The majority of confirmed cases of malaria in the Kingdom of Eswatini are usually from imported sources. The country routinely reports a high number of imported cases in January, following the festive season and in May, after the Easter holidays. Increases are usually due to returning residents that are citizens of Mozambique but who are employed in the country. Locals who also visit malaria endemic areas during the holidays return with malaria parasites and are recorded as imported cases since the disease is contracted externally. Following pronunciation of partial lockdown in March 2020, the number of local cases increased between February and March (OR=2.44, p=0.0079). Imported cases then initiate local transmission in areas where inadequate control measures have not been put in place. However, our data suggests that, following the ban of international travel, imported cases were lower between January and June in 2020 compared to the same period in 2019 (Fig 4). A reduction of 54.5% of imported cases was observed in January. In April and May 2020, reduction rates of 90.5% and 96.8% respectively when compared to the same months in 2019 were observed.

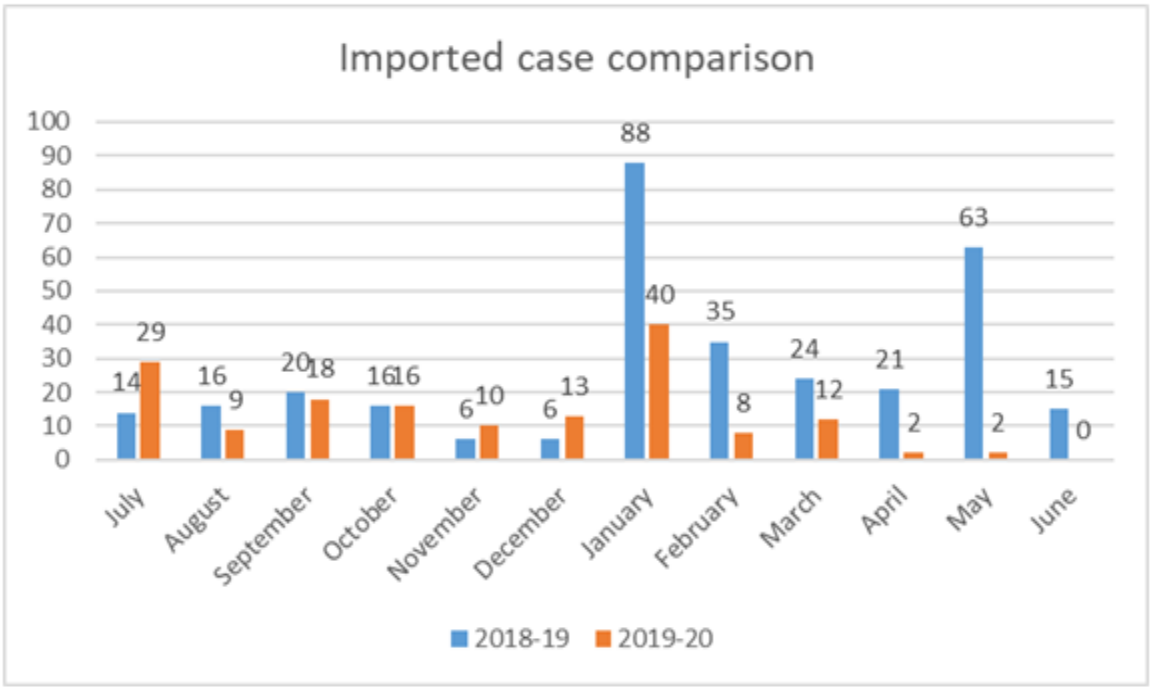
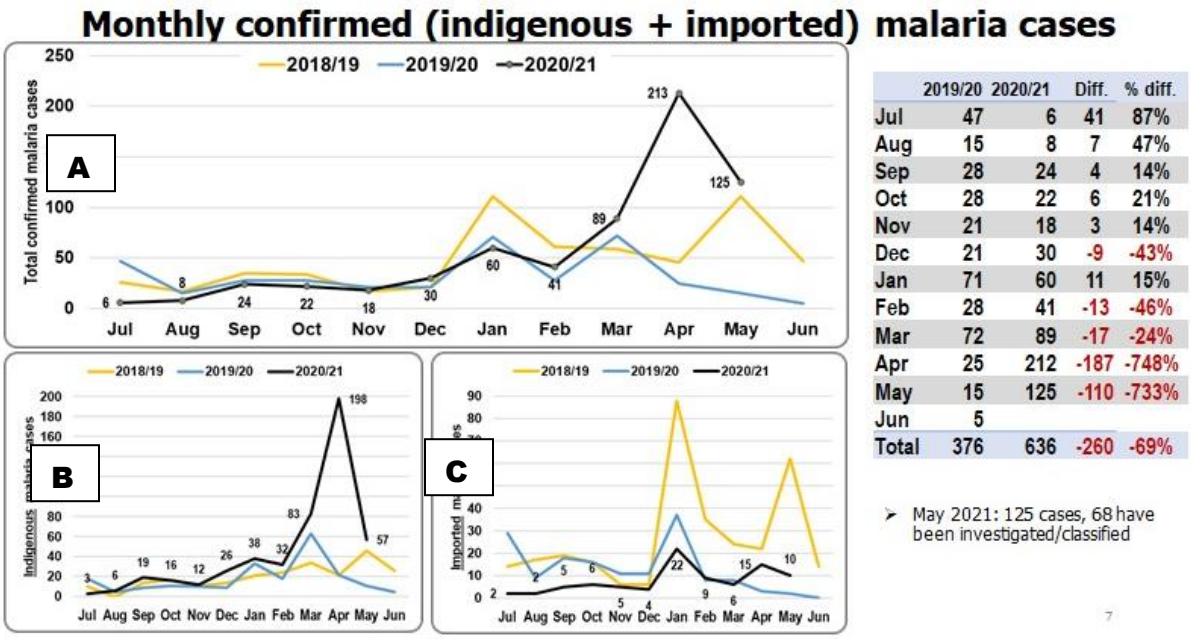


Figure 4: Confirmed imported malaria cases in Eswatini by season, July 2018 to June 2019 and July 2019 to June 2020

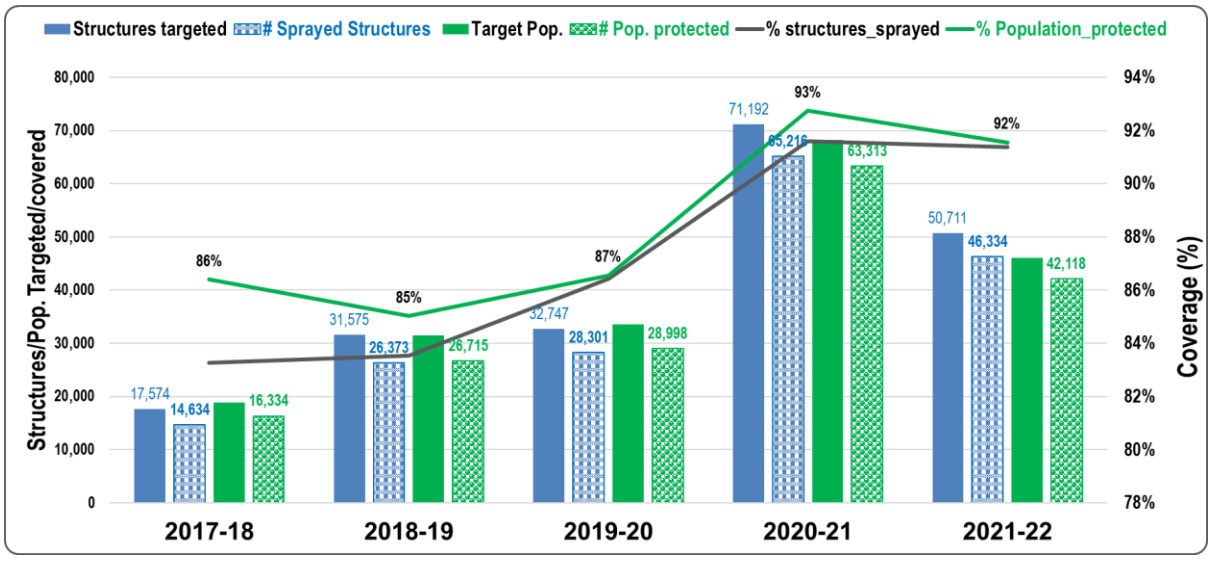
The total confirmed imported malaria cases increased between December and January (OR=0.22, p=0.0016), both in the 2018/19 and 2019/20 transmission season as has been the norm. However, in February and March 2020, the number of imported cases suggest that there was a decrease even though this does not appear to be a significant decrease (OR=2.19, OR=0.13), but imported cases continued to decrease from February to May 2020/21 season compared to the number of cases reported for the same months in 2018/19 and 2019/20 (Figure.5A). On a positive note on malaria importation, the COVID-19 regulations imposed travel restrictions in personnel travelling from other countries, some of which may be high malaria endemic regions in the continent or between endemic parts of the country and non-endemic parts. For these reasons, imported malaria was significantly lower in January in the 2019/20 and 2020/21 transmission seasons compared to the same transmission season in 2018/19 (Figure.5C). However, the number of indigenous cases was significantly higher in April and May 2020/21 compared to the same period in 2018/19 and 2019/20 when the country reported a sharp increase of indigenous cases between February and May (Figure.5B). The percentage difference increased considerably from 43% in December 2019 to 733% in May 2020 and this increase is congruent with the period of introduction of COVID-19 and implementation of measures to prevent spread of the pandemic.



	2019/20	2020/21	Diff.	% diff.
Jul	47	6	41	87%
Aug	15	8	7	47%
Sep	28	24	4	14%
Oct	28	22	6	21%
Nov	21	18	3	14%
Dec	21	30	-9	-43%
Jan	71	60	11	15%
Feb	28	41	-13	-46%
Mar	72	89	-17	-24%
Apr	25	212	-187	-748%
May	15	125	-110	-733%
Jun	5			
Total	376	636	-260	-69%

Figure 5: Monthly confirmed (indigenous + imported) malaria cases

Particularly following implementation of the partial lockdown in March 2020, confirmed local cases increased by 748% in April and 733% in May. This could be due to locals returning from endemic areas with infections following pronouncement of the partial lockdown. Returning residents may have carried parasites and initiated local transmission without any interventions to halt such. Disruption in ITN distribution, indoor residual spray and reactive case detection could likely explain these unusual increases.



Data on sprayed structures was examined for four transmission seasons (2017/18 to 2021/22) (Fig.6) and, while efforts resulted in increased structures sprayed in 2020, the proportion significantly decreased in 2021/22 (OR=1.16 95% CI 1.11 – 1.21), p<0.0001), suggesting that reduced IRS may have contributed to increased local transmission of malaria. Spraying of housing structures, if carried out properly and timeously could eliminate infected mosquitoes before they transmit parasites (especially those imported), and prevent onward transmission.

Discussion

The COVID-19 pandemic has strained healthcare delivery systems in a number of southern African countries. Despite this, it is imperative that malaria control and elimination activities continue, especially to reduce as far as possible the number and rate of hospitalisations caused by malaria and to ensure gains on elimination targets are not lost. The implementation of enhanced malaria control/elimination activities in the context of COVID-19 requires measures to protect healthcare workers and the communities they serve. The challenges of coping with curbing the spread of COVID-19 while routinely implementing malaria control strategies placed major challenges and burdens in the Eswatini's health system. The findings reported in our study are in agreement with modelling estimates which suggested that, given worst- case scenarios of disruptions of malaria interventions, including IRS and ITNs, there could be four-fold increase in malaria mortality in the sub-Saharan region within 2020 than malaria deaths reported globally in 2000 [3]. The country reported higher numbers of confirmed local and imported malaria cases in March 2020 compared to March 2019, which coincides with announcement of the beginning of the partial lockdown implemented to curb the spread of COVID-19 in the country. These findings are consistent with

reports of significant spikes elsewhere during implementation of the lockdown in response to COVID-19 [7]. During the outbreak of Ebola virus in a multi-country epidemic in 2014-15 in parts of West Africa, malaria deaths increased significantly and exceeded the number of deaths from Ebola virus [8, 9]. The increase was attributed to decrease in antimalarial drug administration, reduced healthcare capacity and cessation of rapid diagnostic testing [10,11,12]. The experiences from Ebola should be taken into consideration during the COVID-19 predicament. This experience suggests that, it may pose danger of significant magnitude to focus on prevention COVID-19 spread while ignoring malaria control which may result in severe disease and increase death rates worse off than the new epidemic. The Kingdom of Eswatini, through the Global Fund for HIV/AIDS, Tuberculosis and Malaria (GFATM), has invested millions of dollars in the fight against malaria, to the point that, in 2011, a policy for the elimination of malaria was adopted following several years when malaria incidence remained considerably low. Neglecting control measures for malaria, even only for a few months, could result in Eswatini losing the gains that had been achieved towards maintaining control of malaria and the strides made towards elimination. The WHO recommends that malaria control processes should remain intact during COVID-19 travel restrictions. This recommendation suggests that all the resources required to fight malaria, including human and material resources should be in place and not be tempered with during the fight against new emergent diseases such as COVID-19, Ebola, etc.

Malaria Control Resources

The global push to accelerate progress in malaria control was made possible by a substantial increase in international funding from partners such as GFATM, Bill and Melinda Gates Foundation, the President's Malaria Initiative and others. The recent slowdown in progress towards malaria elimination has been accompanied by a plateauing of international funding, leading to concerns that financing may be a constraint to accelerating progress to malaria elimination even before the introduction of SARS-CoV-2. At the same time, there were concerns about the impact of the global financing architecture to the effectiveness of malaria control and elimination at the country level. Despite the total investment funding for malaria control and elimination being successively increased from 2018 to 2020, constituting USD 2.7 billion in 2018 [1], USD 3.0 billion in 2019 [13], and USD 3.3 billion in 2020 [14], there was an expected financial gap of approximately USD 6.8 billion in 2020 compared to the goal [14]. Despite the focus on international funding, the reality is that domestic financing for malaria from government and private sources has been far greater. The financial contribution of developing countries is systematically under-counted because most efforts to track malaria financing only consider programmatic spending by malaria control programmes, and do not consider the larger spending by general health services, which also includes private expenditures by households. Therefore, despite the Global Fund's efforts and other funding agents, to alleviate country funding gaps, the reallocation of country resources towards the fight against COVID-19 undermines the effort. Reports suggest there was a significant gap in financing malaria control globally, which imposed a significant burden on the economies of many Sub-Saharan African countries [15]. During COVID-19, many of the country's limited resources were reallocated to the response of curbing the potential COVID-19 catastrophe. Motor vehicles used for many disease control processes including those for the malaria control and elimination were re-deployed towards curbing the COVID-19 threat. Meeting global targets will require robust funding while current funding levels (estimated at US$3.3 billion in 2020) will need to more than triple, reaching US$ 10.3 billion per year by 2030 in order to also offset financial challenges resultant from the COVID-19 depletion of many countries' financial positions. The Global Fund provides 56% of all international financing for malaria programmes and had invested more than US$14.7 billion in malaria control programmes as of June 2021. Since 2020, the Global Fund had also stepped up to support countries to mitigate the impact of COVID-19 on the malaria response. From January 2021, the Global Fund had increased malaria grants by 23% on average, expressed committed to deploying about US$4 billion to fight the disease over the next three years. Such contributions, however, have contributed to sustained fight against malaria but, still fall short of the required amounts especially with some of these funds reprioritised towards fighting COVID-19 in low- and middle-income countries including Eswatini. Nevertheless, COVID-19 has disproportionately affected developed countries, threatening their capacity to make donations towards funding malaria control in low and middle-income countries.

Malaria Surveillance

It has become apparent with improved surveillance and case investigation that imported malaria, deriving almost entirely from Mozambique (greater than 90%) [16], drives malaria transmission in Eswatini. It was shown that patients identified through passive surveillance and classified as imported cases by the Eswatini NMP have networks of contacts who can easily be reached and screened for malaria infection [17]. Patients with fever may get tested for COVID-19 and sent home due to a negative result when they may, in fact, have malaria infection and vice versa, thereby preventing implementation of case investigation. Also, laboratory-confirmed cases of both asymptomatic malaria and COVID-19 infected individuals have been reported. This increases the possibility that both asymptomatic patients can transmit the infection through their respective modes [18, 19].

Vector Control Operations

During the era of pre-elimination of malaria, the country resorted to deliver IRS annually before the beginning of each transmission season. Implementation of IRS in malaria endemic parts of the country and in foci where a malaria case (or cases) had been identified required workers to enter houses to spray the inner walls. The scaling up of indoor residual sprays was the main driver for reduced malaria incidence in Eswatini. However, during COVID-19, such action was viewed as invasive by householders and the safety of the householders from contracting COVID-19 from any visitor was viewed to be more important than malaria. Also, due to implementation of the COVID-19 regulations, which emphasized physical distancing and travel restrictions, disruptions in the supply chains for IRS materials and insecticides were experienced. During the COVID-19 pandemic, IRS operations were also hindered by reallocation of limited resources to COVID-19 response and disruptions in the supply chain of IRS insecticides. Modelling has estimated that, given worst-case scenarios of disruptions of malaria interventions, including ITN and IRS, there could be up to a fourfold increase in malaria mortality in the African region within the next year or more malaria deaths in 2020 than all malaria deaths reported globally in 2000 [3,20]. Mozambique, a country that has direct influence of imported malaria into the Kingdom of Eswatini, had scheduled both IRS and ITN in 2020, yet these campaigns were delayed because of COVID-19 restrictions. The NMCP in Mozambique had planned to distribute 20.9 million ITNs, to provide protection to almost 70% of its population at risk of malaria [21]. Failure to implement and achieve this target could suggest that Mozambicans that lived in Eswatini would return with malaria parasites when the lockdown period ended and travel restrictions were lifted. In Nigeria, a country with the highest malaria-at-risk population in sub-Saharan Africa (SSA) (>200 million) could only manage to distribute 11.2% of the 22.7 million ITNs planned for distribution during 2020 [22]. Overall, in SSA, more than 34 million people were denied access to the lifesaving ITNs during the COVID-19 disruptions. However, the Eswatini NMP could not intricately convey the difficulties it faced when implementing malaria vector control programmes during COVID-19. Hence, our study may have grossly underscored the true picture of the challenges faced by the programme.

Prompt diagnosis, reporting and surveillance

The gains in reduced transmission of malaria in Eswatini has been partly due to constant passing on of messages to the public to promptly identify malaria related symptoms and visit the nearest health facilities, where healthcare workers were also trained to suspect and test for malaria on any patient reporting with fever. The symptoms of COVID-19 are similar to those shown by patients with malaria, especially fever, headache and other flu-like symptoms, thereby complicating differential diagnosis. During COVID-19, many individuals that experienced fever immediately thought of COVID-19

and not malaria. Attending healthcare personnel also tested for COVID-19 among presenting patients and ignored the routine testing for malaria among fever patients, resulting in malaria infected patients being missed, leading to some malaria cases being untreated. COVID-19 messages, especially during the lockdown period, discouraged clients to attend health facilities in strict contradiction to malaria messages of seeking treatment at the onset of suspicious symptoms. In addition, COVID-19 deaths instilled fear of infection with the rampant coronavirus among malaria symptomatic individuals who would have adhered to the call for prompt visit to health facilities. This probably explains the decreased malaria testing in health facilities during the lockdown period. The market for malaria rapid diagnostic tests was also disrupted by increased demand for COVID-19 tests making it difficult for the country to get its supplies timeously and in adequate amounts.

Experience from several developed nations such as the United States, Italy and China have demonstrated beyond reasonable doubt that COVID-19 can overwhelm even well-established healthcare systems [23, 24]. Modelling approaches have suggested that SARS-CoV-2 will enter into long-term circulation alongside other beta-coronaviruses, possibly in annual, biennial or sporadic patterns [25]). If the development of appropriate treatments or effective vaccines continue to delay, (including the uptake of the vaccines), it suggests that countries with malaria elimination ambitions and targets will have only the current strategies (physical distancing, enforcing the wearing of face masks, promotion of hand-washing with soap and water or disinfecting with 70% alcohol-based sanitizers) to contain spread of coronavirus. However, several countries have experienced severe transmission peaks despite implementation of these strategies because they all largely depend on change of social habits. Therefore, it means countries like Eswatini will have to strengthen adherence to the current COVID-19 regulations if gains made in the past years of malaria control will have to be preserved. Also, the country will have to quickly make available resources (human, financial, vehicles, etc) specifically to fight the spread of COVID-19 to prevent redeployment of resources reserved for other public health interventions such as malaria control and elimination. We also take note of the economic implications of continued social distancing with potentially catastrophic effects on businesses, households and the healthcare system itself. Better policies will have to be developed to ensure the economy survives within the new norms dictated by the constant presence and spread of COVID-19 or its reoccurrence in the public.

Conclusion

The available tools have been considered adequate to drive the malaria elimination agenda to completion by 2025 in the Kingdom of Eswatini. However, the introduction of COVID-19 into the country early in 2020 threatens to disturb the country's health systems towards achievement of this long term goal. Swift policy actions could substantially reduce the burden of malaria and COVID-19 epidemics simultaneously overwhelming the vulnerable health systems of the country. The country should consider testing fever patients suspected to be infected with SARS-CoV-2 for both malaria and COVID-19. Failure to implement effective strategies to maintain COVID-19 suppression is likely to lead to a large resurgence of COVID-19 transmissions, potentially resulting in worse outcomes for both COVID-19 and malaria. The risk of malaria resurgence often remains high in the country, particularly in view of the fact that a majority of cases are imported from neighbouring countries with high endemicity. Such scenarios are likely to lead to reduction of the gains achieved earlier in controlling malaria and targeting elimination in 2025. The commitment from the country's government, funding agencies and non-governmental organisations for adequate funding of malaria control and elimination programmes is instrumental during and after the COVID-19 pandemic. The major problem is that no one knows how long the COVID-19 pandemic will last, hence we must devise strategies to continue other disease control programmes while dealing with the pandemic. The WHO Global Malaria Programme (GMP) has also worked with several modelling teams to analyse the potential impact on malaria burden of different service disruption scenarios. The outputs of these modelling exercises reinforced the message that country programmes and ministries of health must ensure the continuity of malaria prevention and treatment services during the response to COVID-19. If anything, the COVID-19 pandemic has provided good lessons for when other similar pandemics arrive while malaria elimination is still an issue, and should remain a priority. Also, in 2020, the World Health Organisation released guidelines for malaria control in areas affected by COVID-19 [26]. The guidelines advice countries on strategies to implement while continuing with all the routine malaria control measures while adhering to COVID-19 local personal and physical distancing guidelines established by the authorities. Adherence to these guidelines could prevent loss of gains towards malaria elimination while also ensuring minimal morbidity and mortality due to COVID-19.

Funding

This work did not receive any specific funding from agencies in the public health, commercial, or not-for-profit organisations.

Competing Interests

The authors declare that they have no known competing interests or personal relationships that could have appeared to influence the work reported in this paper.

Ethical Considerations

This study was carried out in the technical support framework of malaria surveillance, in the ambit of the COVID-19 emergency, ethical clearance was not necessary, and the malaria data analysed were grouped and did not involve Individual identification.

References

1. World Health Organisation (2019). *World Malaria Report* 2019. Geneva.
2. Sands P. (2020) COVID-19 threatens the poor and marginalised more than anyone.
3. World Health Organisation (2020a). The potential impact of health service disruptions on the burden of malaria: a modelling analysis for countries in sub-Saharan Africa 2020.
4. Worldometer. COVID-19 coronavirus pandemic. 2020.
5. Cucinotta D, Vanelli M. (2020) WHO declares COVID-19 a Pandemic *Acta Biomed*. 91(1): 157-160.
6. Ranaweera P, Wickremasinghe R, Mendis K. (2020) Preventing the re-establishment of malaria in Sri Lanka amidst the COVID-19 pandemic. *Malar J*. 19:386.
7. Nyasha Chingono, H. (2020) Zimbabwe faces Malaria Outbreak as it Locks Down to Counter Coronavirus, in the Guardian.
8. Plucinski AS, Guilavogui T, Sidikiba S, Diakité N, Diakité S, et al. (2015). Effect of the Ebola-virus-disease epidemic on malaria case management in Guinea, 2014: a cross-sectional survey of health facilities. *Lancet Infectious Disease* 15(9): 1017-1023.
9. Parpia AS, Ndeffo-Mbah ML, Wenzel NS, Galvani AP. (2016). Effects of response to 2014-2015 Ebola outbreak on deaths from malaria, HIV/AIDS and tuberculosis, West Africa. *Emerging Infectious Disease* 22(3): 433.
10. Kolie D., et al., (2018). The Ebola effect in Guinea 2014-15: Tangled trends of malaria care in children under-five. *PLoS One* 13 (2).
11. Kuehne A, et al., (2016). Impact and lessons learned from mass drug administration of malaria chemoprevention during the Ebola outbreak in Monrovia, Liberia, 2014. *PLoS One* 11(8).
12. Walker PGT, White MT, Griffin JT, Reynolds A, Ferguson NM, Ghani AC. (2015) Malaria morbidity and mortality in Ebola-based countries caused by decreased health-care capacity, and the potential effect of mitigation strategies: a modelling analysis. *Lancet Infectious Disease* 15(7): 825-832.
13. WHO. *World Malaria Report* 2020b; WHO: Geneva, Switzerland, 2020.

14. WHO. *World Malaria Report* 2021; WHO: Geneva, Switzerland, 2021.
15. Gao L, Shi Q, Liu Z, Li Z, Dong X. (2023) Impact of the COVID-19 Pandemic on Malaria Control in Africa: A Preliminary Analysis. *Trop. Med. Infect. Dis.* 8(1): 67
16. National Malaria Control Programme Review report (2011), Ministry of Health, Eswatini.
17. Koita K, Novotny J, Kunene S, Zulu Z, Ntshalintshali N, et. al., (2013). Targeting imported malaria through social networks: a potential strategy for malaria elimination in Swaziland. *Malar J* 12: 219.
18. Chourasia MK, Raghavendra K, Bhatt RM, Swain DK, Meshram HM, et. al., (2017). Additional burden of asymptomatic and sub-patent malaria infections during low transmission season in forested tribal villages in Chhattisgarh, India. *Malar. J*. 16 (1): 320.
19. Nishiura H, Nishiura H, Kobayashi T, Yang Y, Hayashi K, et. al., (2020). The rate of under-ascertainment of novel coronavirus (2019-nCoV) infection: estimation using Japanese passengers' data on evacuation flights. *J Clin Med* 9(2):419
20. Sherrard-Smith E, Hogan AB, Hamlet A, Watson OJ, Whittaker C, Winskill P, et. al., (2020). The Potential Impact of COVID-19 on Malaria in Africa. *Nat Med* 26(9): 1411-1416.
21. Severe Malaria Observatory (2022) *Malaria in Mozambique: Statistics and Facts*.
22. Guerra CA, Donfack OT 2, Vaz LM, Mba Nlang JA, Nze Nchama LO, et. al., (2020) Malaria vector control in sub-Saharan Africa in the time of COVID-19: no room for complacency. *BMJ Global Health* 5(9): e003880.
23. Li R, Rivers C, Tan Q, Murray MB, Toner E, Lipstitch M. (2020) The demand for inpatient and ICU beds for COVID-19 in the US: lessons learnt from Chinese cities. *medRxiv*.
24. "COVID-19 infections rise in New York with peak weeks away", *AP News*, 25 March, 2020. "Not a wave, a tsunami'. Italy hospitals at virus limit," *AP News*, 13 March, 2020.
25. Kissler SM, Tedijanto C, Goldstein E, Grad YH, Lipstitch M. (2020). Projecting the transmission dynamics of SARS-CoV-2 through the postpandemic period. *Science*.
26. WHO. (2020c) *Maintaining essential health services: operational guidance for the COVID-19 context: interim guidance, 1 June 2020* WHO: Geneva, Switzerland, 2020.

DOI:10.31579/2690-8808/254