

Impact of the COVID-19 Pandemic on Malaria Prevention in Africa: Evidence from COVID-19 Health Services Disruption Survey

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ABSTRACT

Background: The Coronavirus Disease 2019 (COVID-19) pandemic has caused an unprecedented disruption in healthcare systems throughout the world. This paper evaluated COVID-19's impact on malaria-related health services in Africa. Hence, measuring the disruption on malaria preventive and curative programs is essential for effective counteracts and future planning.

Methods: The research used data from the 2020 Premise COVID-19 Health Services Disruption Survey. Data were collected from 14,615 respondents to measure malaria related prevention and curative service utilizations in 20 African countries. In the analysis, other than descriptive statics and Chi-square test. Wilcoxon signed-rank test was employed to compare change in the Insecticide-Treated Net (ITN) ownership rating before and during the COVID-19 pandemic. Further, McNemar's test was used to assess change in malaria testing.

Results: Household ITN ownership rating declined significantly after the onset of the pandemic in march 2020 compared to the previous ownership or purchase rating before the COVID-19 onset. The COVID-29 pandemic had not impacted malaria testing utilization significantly. However, a drop in healthcare utilization was ascribed to fear of acquiring COVID-19 at health facilities, limited access due to movement restrictions, and dedication of health facilities as COVID-19 treatment centres.

Conclusion: The COVID-19 pandemic had a significantly negative effect on the prevention of malaria in Africa, which is evident by a decline of interventions during the pandemic. Interventions and strategies aimed at reducing and controlling burden of malaria in Africa, mainly in the malaria endemic settings should give attention to lessen the disruption and integrate this with pandemic response. It is critical for these services to continue during and after the epidemic.

Keywords: COVID-19; Impact; Malaria prevention; Malaria; Africa

INTRODUCTION

The Coronavirus Disease 2019 (COVID-19) pandemic has caused unprecedented disruption to healthcare systems throughout the world [1,2]. In Africa, this pandemic has forced healthcare leaders to take drastic public health measures, such as restrictions to movement, absenteeism, behavioral changes, closure of institutions and interruption of supply chain, and etc [3,4]. While these measures helped countries to successfully slow down the spread of the infection and relieve the public health systems. Consequently, these measures are also expected to affect the progress that is made to mitigate the burden of endemic and epidemic infectious diseases in the content [5-7].

In Africa, malaria is one of the major public health problems, which

is the leading cause of morbidity and mortality in the content. According to the latest world malaria report, there were 229 million cases of malaria and an estimated 409 000 deaths worldwide in 2019. Out of all malaria cases and deaths in the world in 2019, where African regions account for more than 94% [8]. Given the negative consequences of malaria on population health, the World Health Organization (WHO) 2015, endorsed the Global Technical Strategy for Malaria prevention which extends from 2016 to 2030, with its targets of reducing malaria incidence and mortality rates by 90% in 2030 [9,10]. Insecticide-Treated Net (ITN) use regarded as one of the core interventions among the strategies against effective malaria vector prevention along with indoor residual spraying, and intermittent preventive treatment for pregnant women, and drugs and diagnostics [11,12].

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Malaria-related health services have been argued to be an important factor in reducing the burden of malaria epidemic in Africa. Dealing with COVID-19 is likely to create imbalances in healthcare provision, disruption of essential prevention and control programs due to relocation of resources[13-15]. Reduction in ITN ownership rating and limitations to access essential malaria testing and treatment care which are associated with the COVID-19 crisis could potentially affect malaria-related programs negatively [6,14,16]. This may result in failure of malaria elimination goal designed to achieve the sustainable development goal.

In line with other ongoing research studies conducted across the globe, we aimed to assess the impact caused by COVID-19 crisis on malaria-related health services in Africa by using evidence from Premise COVID-19 Health Services Disruption Survey, which is conducted in 20 malaria endemic countries in the continent. Given ITN, malaria testing and malaria treatment programs are the major interventions to reduce the burden of malaria [9,11,12]. Findings of this study will help to improve our understanding of the scope of possible disruption on malaria related public health interventions and healthcare services utilizations, and underscore the need of strengthening health systems.

METHODS

Study design, setting and population

The Health Services Disruption was measured using COVID-19 Health Services Disruption Survey 2020 through the Premise platform [17]. The data from July 2020 malaria-related health service disruption is archived in Institute for Health Metrics and Evaluation (IHME) which are freely available for research purposes [18]. This research only assess the malaria related health service disruption in 20 malaria-endemic countries in Africa. Respondents from the general population in this pre-post single group cross-sectional survey were administered through an online survey to measure level of change in malaria prevention measures and malaria service before and immediately after the onset of COVID-19.

Data source and Study variables

This study analysed data obtained from the 2020 Premise Malaria COVID-19 Health Services Disruption Survey implemented by IHME, Bill and Melinda Gates Foundation (BMGF), Premise Data Corporation [17,18]. The sample comprised of 14,615 respondents, which designed to provide estimates on key indicators of malaria prevention and malaria related health services in Africa. This study used the ownership of ITN as the main outcome variable. The ownership of ITN defined as the number or rating of ITN purchased or owned in the household before and during

COVID-19. In addition, respondent malaria testing utilization was assessed, if a respondent had malaria symptom and visit healthcare provider both before and after the onset of COVID-19. Further, respondent malaria treatment utilization was assessed, if a respondent had tested positive for malaria both at before and after the onset of COVID-19.

Data management and analysis

We used STATA version 14.1 software for data cleaning and analysis. Descriptive and summary statistics were conducted to describe malaria prevention and malaria care utilization among respondents before and after the onset of COVID-19. Further, chi-square test was employed.

Assessing the impact of COVID-19

To assess changes in ITN ownership, Non-parametric paired Wilcoxon signed rank test was used to compare the number of ITN ownership or purchase rating in the household before and after the onset of COVID-19. In addition, Non-parametric paired McNemar test was used to compare the utilization of malaria testing service among respondents before and after the onset of COVID-19. Furthermore, p-values of <0.05 were considered statistically significant.

RESULTS

The COVID-19 malaria service disruption was assessed in terms of ITN ownership, malaria testing, and malaria treatment utilization activities. Data from a total of 14,615 respondents were used in this analysis, among them 55.4% (8,146) had a family size less than 4 in their households and 10.9% (1,590) had a family size greater than 10. Overall 67.4% of them reported having at least one ITN in their household (Table 1).

Amongst 9,253 households reported to possess ITN, 75.4% (7,421) had used at least one ITN the night before the survey took place, whereas 24.6% (2,422) did not hang any bed net. Further, out of households who did not hang any bed net, 44.2% (1,070) had 1 to 2 family size, 38.1% (922) had a family size greater than 3 who did not sleep under bed.

Changes in ITN ownership

In this study a statistically, significant changes were found between before and during COVID-19 in ITN ownership or purchase of the households. In order to evaluate if there were any changes in ITN ownership or purchase as a result of COVID-19, a Wilcoxon Signed rank. Test revealed a statistically significant negative change in household ITN ownership following the COVID-19 crisis, $Z=7.830$, $p=0.000$.

Table 1: Background characteristics of respondents.

Variable	Have bed net Frequency, n (%)	Don't have bed net Frequency, n (%)	p-value χ^2	Total
Family size				
1-4	5,168 (63.4)	2,978 (36.6)	0	8,146
5-9	3,467 (71.1)	1,412 (28.9)		4,879
Above 10	1,208 (75.97)	382 (24.03)		1,590
Had malaria symptoms before COVID-19				
Yes	4,841 (73.2)	1,770 (26.8)	0	6,611
NO	5,002 (62.5)	3,002 (37.5)		8,004
Had malaria symptoms during COVID-19				
Yes	3,996 (73.9)	1,412 (26.1)	0	5,408
NO	5,814 (63.6)	3,325 (36.4)		9,139

Table 2: Malaria related symptoms and service utilization before and during COVID-19 pandemic in Africa, 2020.

Variable	Before COVID-19	During COVID-19
Had malaria symptoms (n=4,433)	Frequency n (%)	Frequency n (%)
Visit Healthcare provider for symptoms		
Yes	3,710 (83.69)	3,649 (82.31)
No	723 (16.31)	784 (17.69)
Reason for not visiting		
Decline to respond	25 (1.10)	23 (1.01)
Health facility closed	853 (37.49)	880 (38.56)
I did not seek medical help	524 (23.03)	515 (22.57)
Lack of money	360 (15.82)	306 (13.41)
No transportation	89 (3.91)	34 (1.49)
Partner or family does not approve	12 (0.53)	3 (0.13)
Turned away from a health facility	386 (16.97)	331 (14.50)
Fear of being infected with COVID-19	-	59 (2.59)
Treatment or tests unavailable	-	67 (2.94)
Unable to access due to lockdown	-	40 (1.75)
Tested for malaria during the visit (3,315)		
Yes	2,422 (73.06)	2,530 (76.32)
No	893 (26.94)	785 (23.68)
Test result		
Positive	1,263 (52.15)	1,303 (51.83)
Negative	839 (34.64)	939 (37.35)
Other (decline to respond, don't know)	320 (13.21)	272 (10.82)

Changes in malaria service utilization

In this survey, a total of 4,433 respondents experienced symptoms of malaria prior to and during COVID-19, while before pandemic 16.31% (723) felt uncomfortable to visit health provider and during COVID-19 17.7% (784) felt uncomfortable with health provider visit. Among respondents who visited healthcare providers, following the COVID-19 pandemic, 76.3% (2,530) respondents were tested for malaria, while 23.7% (785) respondents did not tasted for malaria (Table 2).

However, the increase in the number of respondents who took malaria testing before COVID-19 and during COVID-19 was not statistically significant (McNemar Test, $p=0.31$). Furthermore, a total of 2,514 respondents were tested for malaria prior to and during COVID, while before pandemic 52.2% of were tested positive and during COVID 51.8% were positive (Table 2).

DISCUSSION

This study aimed to assess the difference in malaria preventive and curative measures before and during COVID-19 pandemic, which is focused on 20 malaria-endemic African countries and included 14,615 respondents from the general population. In our analysis, due to COVID-19, a greater decrease was found in preventive measures of malaria.

The result of the study showed that the COVID-19 pandemic has decreased the overall household ITN ownership or purchasing rating (p -value <0.05). After the onset of the pandemic respondents demonstrated negative changes in household ITN ownership rating, with effect sizes in the small to moderate range. This decrease could be explained by the fact that resources (including human resources) were reallocated to battle COVID-19, leaving less capacity to address essential public health measures during the

outbreak [7,13,14,19]. Additionally, 67.4% of respondents own at least one ITN in their household, 75.4% of the respondents reported experiencing the use of ITN during sleep, while 24.6% lack utilization. Even though, major progress are made in the Africa in improving the ownership and use of ITNs in the content to attain universal coverage mark which is nailed at 80% and above [20], still major intervention are need considering the long-term and short-term impact COVID-19 pandemic.

In within-person comparisons of malaria testing and treatment service utilization, we find that during the COVID-19 pandemic respondents did not differ significantly in utilizing malaria testing service than earlier COVID-19. This finding is similar with a study conducted in Sierra Leone which reported that COVID-19 did not significantly impacted the diagnosis of malaria, and it accounts for the comprehensive approach in malaria prevention which include educational programs for the populations [15]. This finding is different from other studies which shows the impact of COVID-19 on healthcare [2].

Findings of this study also reveal, the major challenges for healthcare utilization among respondents in this study were 38.6% respondents experienced closure health facilities, 2.6% of them fear getting COVID-19 during visit, while 1.8% reported that they were unable to access the service due to the lockdown restrictions. Given this gap in services utilization, in the future it could have a negative consequences on health conditions due to delayed treatment. This similar finding could be justified that the impact of COVID-19 on healthcare [1,16,21]. The findings of this study, therefore, could be a pointer to further assess the negative effect of COVID-19 on the delivery of health services.

There are some limitations of the current study that need to be considered in interoperating the results. Firstly, the use of an

online survey may result in sampling bias, so results may not be generalizable to the general population of countries in this study as lack of representativeness of the major populations in Africa, which lack online access. The inclusion of respondents through the use of Premise platform may result selection bias. Furthermore, lack of basic demographic information due to Premise privacy measures limited the discussion of possible associated factors [17]. The findings of this survey should be interpreted in the light of above limitations. However, we believe that our findings and suggestions will contribute immensely for better understanding of COVID-19 impact on this major public health epidemic in Africa.

CONCLUSIONS

Evidence suggested that the pandemic caused by the COVID-19 disease is leaving devastating consequences in our world from a social, health, political, educational, and labour point of view. In Africa, despite great the progress in reducing the burden of malaria and improving access to malaria prevention and treatment services, the occurrence COVID-19 could affect the progress that is made.

Based on the findings from this study, it appears that the COVID-19 pandemic negatively affect the malaria prevention programs, which caused a decrease in ITN distribution after the onset off the pandemic. Further the pandemic also impacted malaria testing and treatment programs that are undertaking by healthcare providers. Our findings may further inform countries to strengthened their malaria control and elimination efforts and need to develop strategies that counteract the disruption caused in malaria prevention and treatment services.

In sum, Africa should scale up its coverage of preventive and curative malaria service through increasing investments to further reduce the incidence and burden of malaria particularly among 20 malaria endemic countries.

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DECLARATIONS

Ethics approval and consent to participate

Since the study was a secondary data analysis of publically available survey data from the IHME program, ethical approval and participant consent were not necessary for this particular study. There are no names of individuals or household addresses in the data files.

Availability of data and materials

Data we used for this study are publicly available in the IHME and GBD programs which is freely accessible for research purposes at Global Health Data Exchange.

Competing interests

The authors declare that they have no competing interests.

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Authors' Contributions

Proposal preparation, acquisition of data, analysis, and interpretation of data was done by Seboka BT. Hailegebreal S,

Kabthmyer RH, Ali H, Yehualashet DE, Demeke AD, and Amede ES guided the study design data extraction and analysis. Seboka BT drafted the manuscript and all authors have a substantial contribution in revising and finalizing the manuscript. All authors read and approved the final manuscript.

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