

RESEARCH ARTICLE

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Citation Style For This Article: Chasaya M, Phiri ML, Ngomah MA. An Update on Malaria trends in Zambia (2019 to 2020); A descriptive study. Health Press Zambia Bull. 2020; 4(01); pp 13-18

Abstract

"Malaria continues to be a major global health concern, killing hundreds of thousands annually, especially in sub-Saharan Africa such as Zambia. Using data from Zambia's Integrated Disease Surveillance and Response reports analyzed using Microsoft excel, this study aimed at studying and reporting on the malaria trends in a 10 month period (August, 2019 to June, 2020). It is also aimed at checking for possible associations between tested cases and confirmed cases. The study showed that malaria cases diagnosed as positive in Zambia are high, about 3700892 in a space of 10 months with a mean score of 370089.2 confirmed cases. The findings also identified an increase in testing rates especially from March, 2020 onwards. Similarly, an increase was also noticed in the number of confirmed Malaria cases within the same period. A strong positive and significant relationship through regression analysis confirmed the association between tested cases and confirmed cases. The study also suspects the possible effect of COVID-19 pandemic on Zambia's healthcare system including the efforts in curbing malaria. The study further recommends continued disease surveillance at national level and the need to prioritize malarial preventive and treatment interventions to avoid potential malarial outbreaks and morbidity.

Keywords: Malaria; Zambia; Cases; IDSR

Introduction

It is easy to assume that the severity and incidence of Malaria is under-control in Zambia as well as other African nations. Unfortunately, research has consistently demonstrated that Malaria is one of the greatest killer diseases in Sub-Saharan African countries [1, 2, 3]. This also means that Malaria and its effects have negatively impacted the public health sector not

only in Zambia but Africa wide as well. Considering the persistence of Malaria in Zambia, it is important for national health organizations and ministries to consistently do retrospective reviews of trends and patterns in order to enhance response strategies and models of intervention development which may in turn, improve the effectiveness and responsiveness of health systems [3].

Different intervention measures have been implemented by several Sub-Saharan African nations to fight malaria among other diseases. Among them is the International Disease Surveillance and Response system (IDSR). The goal of IDSR is to strengthen the overall national system for public health surveillance and response. Many countries embarked on the strategy of keeping national disease surveillance and response systems about a decade ago because researchers had recommended and observed that disease investigation and surveillance systems were effective measures for monitoring and controlling and responding to prevalence of diseases such as malaria [4].

Some malaria interventions have focused on methods such as the epidemiological triangle model and the web of causation and social determinants of health. These interventions have tried to fight Malaria by concentrating on the relationship between the agent (mosquito), the host (human being and environment) [2, 3].

Others have concentrated on measures such as treatment, insecticide spraying and distribution of mosquito nets to communities.

Most recent research evidence has predicted potential influence of COVID-19 on Malaria intervention. This prediction has been in line with the amount of stress COVID-19 has placed on African health care systems and its workers [5, 6]. The

researchers have used COVID-19 and malaria transmission models to estimate the impact of disruption of malaria prevention activities and other core health services under four different COVID-19 epidemic scenarios. Their findings conclude that if activities are halted, the malaria burden in 2020 could be more than double that of 2019. They establish that in Nigeria alone, reducing case management for 6 months and delaying prevention measures such as long lasting insecticidal nets (LLINs) campaigns could result in 81,000 (44,000-119,000) additional deaths. Therefore, researchers have suggested that some of the ways of mitigating impacts of COVID-19 is by scaling up preventive interventions such as long lasting Insecticide nets and increased access to antimalarial treatments to prevent substantial malaria epidemics [5, 6, 7].

Zambia is among the countries that have been committed to the fight of Malaria for some time now. In 2010, 2012 and 2015, Zambia reported odds ratio of malaria for various malaria interventions measures. Those who slept under an insecticide-treated net (ITN) had odds at 0.90, indoor residual spraying (IRS) at 0.66, urban residence at 0.23 and standard house at 0.40. The country also reported that IRS reduced malaria prevalence by 0.3% and ITNs by 0.2% [1]. The national malaria incidence reduced from 386 per 1000 persons in 2013 to 409 per 1000 persons in 2014, and 335 per 1000 persons in 2015, with North-western Province recording the highest overall incidences and Luapula Province recording the highest incidence rates in pregnant individuals [8]. The 2018 Malaria Indicator Survey (MIS) reported that 79% of households owned at least one ITN with 45% of these households having all members sleeping under an ITN and a 9% drop in the national malaria parasite prevalence among children under age five [9]. Luangwa and Nyimba

district reported an increase in the use of ITNs in households where 398 mosquitoes were captured from light-trap collections, including 49 anophelines and 349 culicines [10]. Additionally, adherence to Mass Drug Administration (MDA) of antimalarial treatment Dihydroartemisinin-piperazine (DHAp) in Zambia was recorded at 84.4% of households completing the full course of DHAp [11].

As the nation marches towards Malaria eradication, it is very essential to monitor diagnosis and complexity of the disease. Between January 2015 and July 2017, Choma-Southern Province reported parasite prevalence identification of 0.7% by RDT and 1.8% by quantitative Polymerase Chain Reaction (qPCR) with 8.5% of households having at least one resident with parasitaemia detected by qPCR or RDT [12]. Zambia has also recently recorded a reduction in the average complexity of infection and consequential increase in the proportion of infections that harbored a single parasite genome [13]. 69.5% of patients have been reported as febrile of which 37.0% have had a malaria test conducted with a number of patients receiving diagnosis without parasitological confirmation and many continuing onto antimalarial treatment [14]. The current study is aimed at studying the trends in incidence of malaria cases in the period between August 2019 and June, 2020. Secondly the study aims at investigating the relationship that exists between the tested cases and the confirmed cases in Zambia during the same period.

It is expected that this close study of the IDSR data may contribute to providing useful information for intervention direction and case management as far as fighting against malaria is concerned.

Methods

The current retrospective study extracted data from the Zambian Integrated Disease Surveillance and Response (IDSR) system for the period August 2019 to June, 2020. The study population included the Zambian population of those cases that were reported at the health facilities such as those suspected, those tested and those confirmed. The data was analyzed using Microsoft Excel. Malaria cases were presented using graphs and tables generated from Microsoft Excel as well as descriptive statistical data. The study also used linear regression to check the relationship between tested cases and confirmed cases using Microsoft excel.

Results

The goal of IDSR is to strengthen the overall national system for public health surveillance and response. Based on data from the IDSR a total of 6480715 suspected Malaria cases between August 2019 and June 2020 (Table 1) with August 2019 recording the lowest number of suspected cases at 92668 and June 2020 recording the highest at 1105759 (Figure 1). Table 1 further illustrates that cumulatively 6335010 tests were conducted within the review period with a mean of 633501 tests across the months.

The month of June 2020 recorded the highest number of tests conducted at 1088917 (Figure 2). Moreover, a total of 3700892 confirmed malaria cases occurred between August 2019 and June 2020 in Zambia (Table 1). The highest number of cases occurred during the month of May 2020 which recorded 866502 cases countrywide (Figure 3).

A linear regression analysis of the relationship between number of tests conducted and the number of confirmed cases showed a strong relationship between the two variables. Firstly, an R Square of 0.83, $f(38.0)$, $p > 0.000269$ indicated that 83% of the variation in confirmed cases can be explained by the number of tests conducted. Furthermore, tests conducted ($\beta = 1.26$) was a predictor of confirmed cases with a strong correlation of 0.9 (Table 2).

Table 1: Descriptive statistics for Malaria cases in Zambia from August 2019 to June 2020 by case type.

| | Suspected | Tested | Confirmed |
|--------------------|-------------|------------|-------------|
| Mean | 648071.5 | 633501 | 370089.2 |
| Standard Deviation | 357779.5365 | 407234.916 | 294466.4943 |
| Minimum | 92668 | 89360 | 27057 |
| Maximum | 11057559 | 1088917 | 866502 |
| Sum | 6480715 | 6335010 | 3700892 |

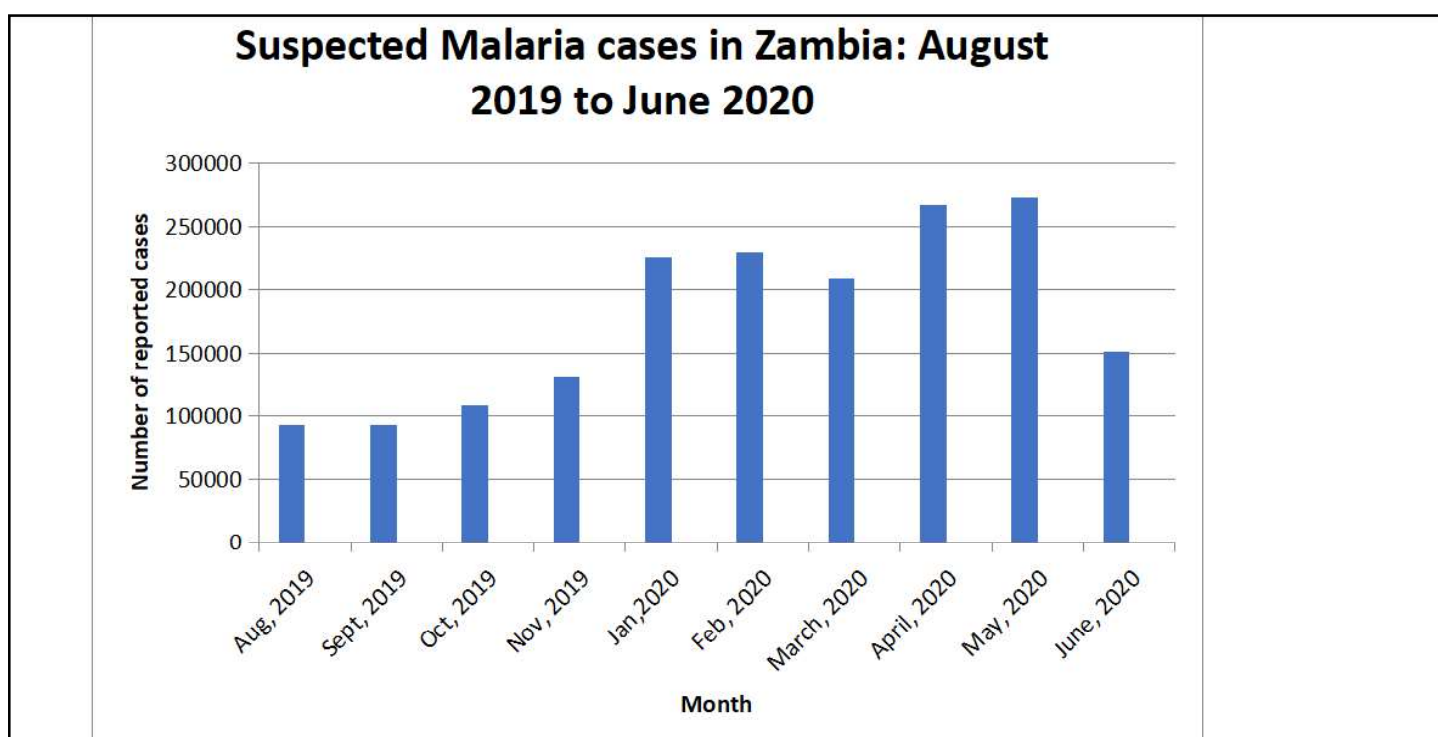


Figure 1: IDSR reported Suspected Malaria cases in Zambia from August 2019 to June 2020.

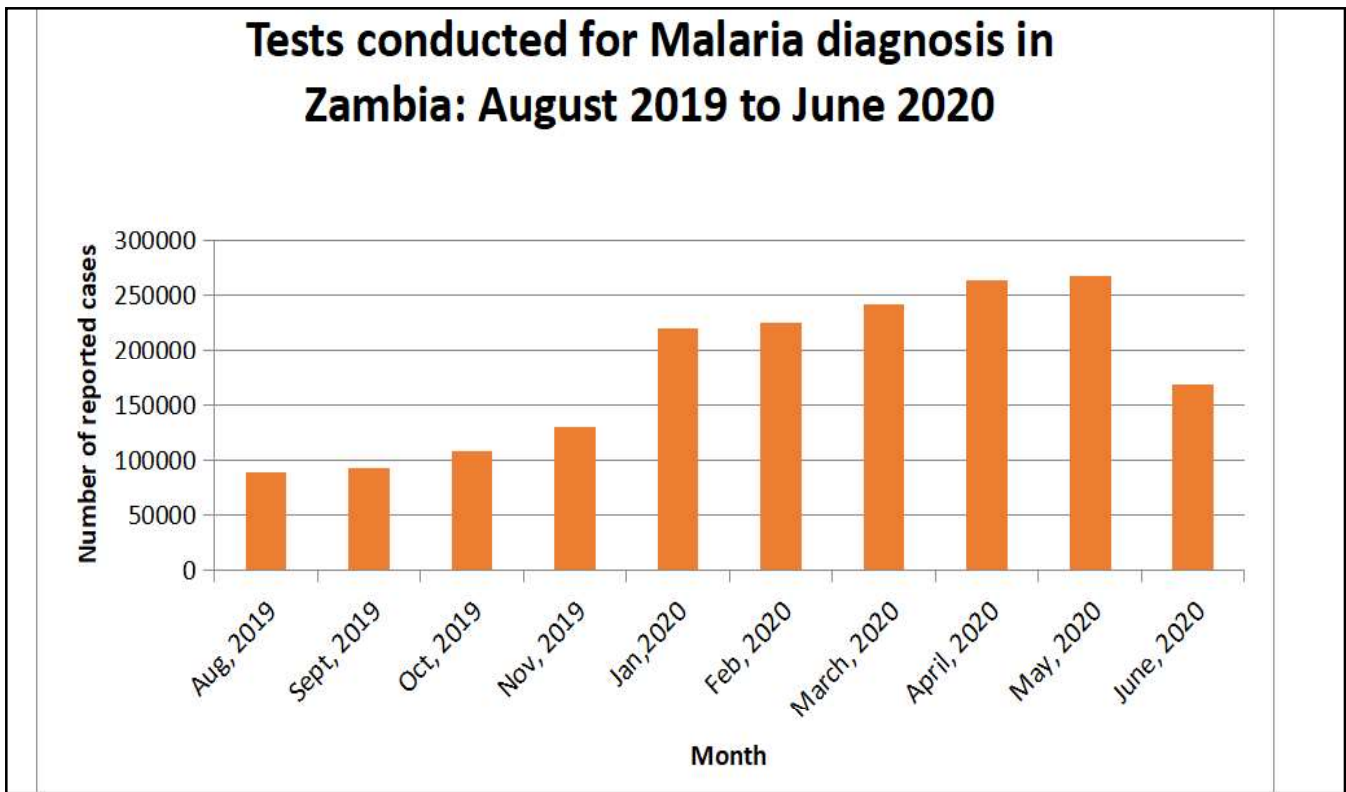


Figure 2: Tests conducted for Malaria diagnosis in Zambia between August 2019 and June 2020.

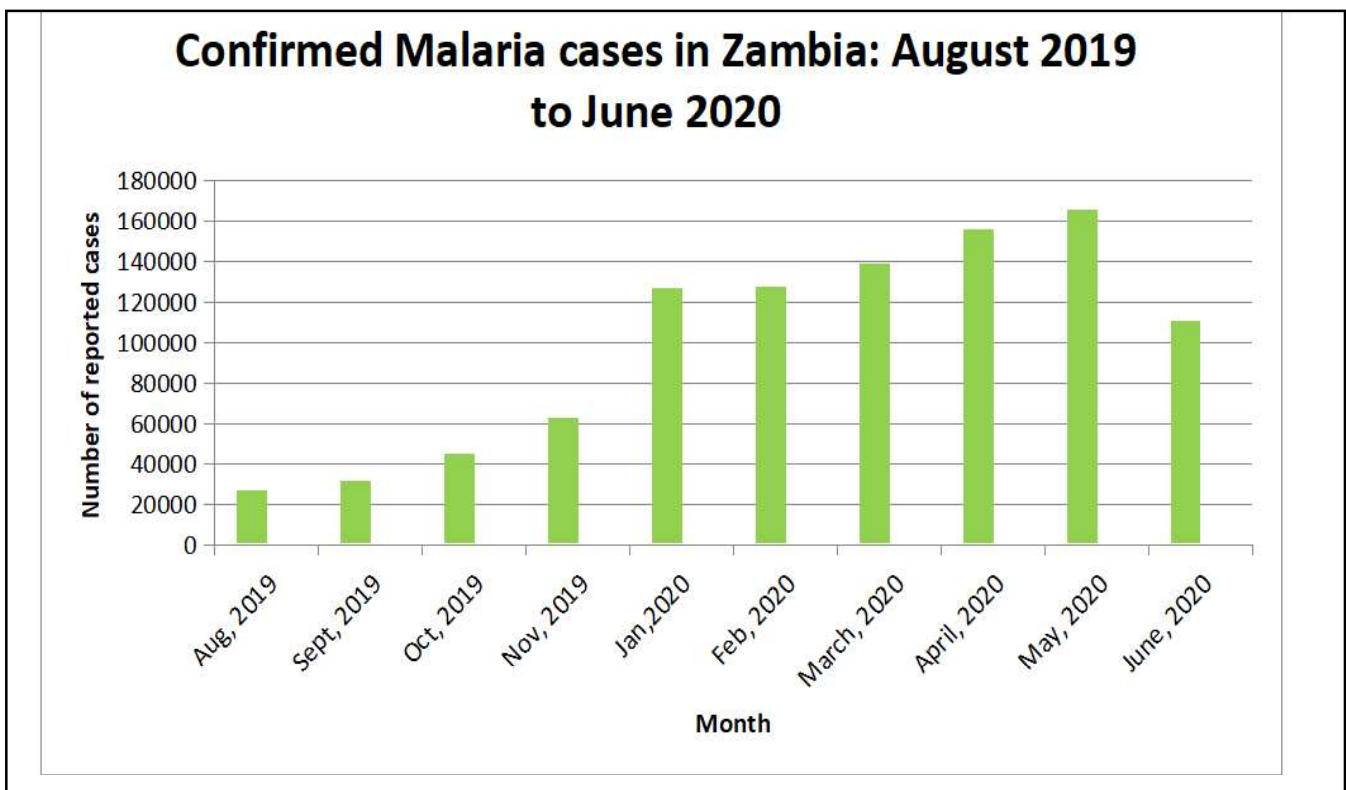


Figure 3: IDSR reported Confirmed Malaria cases in Zambia from August 2019 to June 2020.

Table 2: Linear regression analysis between tested and confirmed cases

| Variables | Model 1 | | | |
|--------------|----------|-----------|---------|----------|
| | <i>B</i> | <i>SE</i> | β | <i>r</i> |
| Tested cases | 168277.9 | 0.2 | 1.26* | 0.90 |

Discussion

The study revealed that Zambia is committed to malaria testing with a steady increase from March, 2020 to June, 2020. Within the review period, the Zambian ministry of health in the 10 months has conducted a total of 6335010 tests with the lowest number of tests being 89360 tests and the highest being 1088917 tests.

The increase in Malaria testing is a good sign on the part of the healthcare system. However, it is not certain as to whether the increase in testing is as a result of the strength in the capacity of the healthcare system or it is because of the increase in malaria related cases that prompt the testing. Interestingly, the increase in malaria testing seems to coincide with the outbreak of COVID-19 pandemic in Zambia. However this is another research area that may need attention.

Interestingly, the findings also revealed an alarming rise in confirmed malaria cases between August, 2019 and June, 2020.

The number of cases seemed to rise sharply from March 2020 to June 2020. Very recent literature has demonstrated concern on the potential of Covid-19 in halting the progress interventions fighting and preventing malaria [5, 6, 7]. Therefore the rise in cases may be facilitated by a COVID-19 strained healthcare system. This may imply that the current rise in cases may be facilitated by the COVID-19 pandemic of which the increased number of confirmed cases may also be due to the increase in malaria testing. Furthermore, linear regression as well revealed a statistically significant and strong positive relationship between the number of tested cases and the number of confirmed cases. This shows that the number of cases tested strongly predictive influence on the number of confirmed cases.

Therefore, this means that increasing the testing of malaria is most likely to reveal the increased incidence of malaria in the Zambian community.

Increasing the testing could be useful in treatment focussed interventions.

Lastly, the results showed that the number of confirmed Malaria positive cases have been on the rise within the 10 months captured in the study. The number of confirmed cases in August 2019 was 27057 and the highest was 866502 cases. This rise in cases calls for concern from stakeholders because this means that Malaria as a pandemic may need more attention and re-evaluation of current preventive measures by stakeholders. The findings of increased confirmed cases may be owing to and highlight a potential reduction in the good adherence rates to available Malaria intervention measures alluded by previous studies [1, 8, 9, 10, 11]. The complexity of diseases as well as mode of diagnosis, as explained by previous research, would be very helpful considerations for shaping future targeted intervention measures [12, 13, 14].

Conclusion

In conclusion, it is certain from these findings that cases of malaria are raising. In the period of 10 months as covered in the study, the period beginning March onwards shows a sharp rise in tested and confirmed cases. This is indicative that despite the possibly Covid-19 induced strain on Zambia’s healthcare system, the ministry of health and other stake holders should prioritize prevention measures targeting Malaria aside covid-19 intervention to reduce the possibility of any malarial epidemic.

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