

Impact Of the 2014/2015 Ebola Virus Disease Epidemic on Malaria Cases and Control in Some West African Countries. A Mini Review

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Abstract Ebola hemorrhagic Disease (EHD) is a severe, often fatal disease in humans and nonhuman primates (monkeys, gorillas, and chimpanzees) that has appeared sporadically since its initial recognition in 1976. Malaria is a life-threatening disease caused by *Plasmodium* that is transmitted to people through the bites of infected mosquitoes. Increased malaria prevention and control measures are dramatically reducing the malaria burden in many places. Disease outbreaks and catastrophes can affect countries at any time, causing substantial human suffering, deaths, and economic losses. Ebola virus disease outbreak in Western African countries; Guinea, Liberia and Sierra Leone caused the cases of malaria to increase and death rate from malaria also increased in that region. Capacity health systems and external health related aid to Guinea, Liberia and Sierra Leone increased in combating the disease neglecting malaria. The lack of balanced investment in the health systems contributed to the challenges of controlling and combating malaria cases. Ebola caused a spike in malaria cases in the three West African countries heavily affected by the disease which have undermined previous efforts to curb malaria. Thousands of malaria cases went untreated in Guinea in 2014 as people with symptoms avoided health clinics for the fear of being sent into isolation at Ebola treatment centers as the early symptoms of malaria mimic those of Ebola virus disease. Ebola overwhelmed health care systems in the year 2014, making adequate care for malaria impossible and disrupted the distribution of bed nets in the affected areas. Rather than label one disease as more important than the others, equal attention or near equal attention should be given to all the diseases of the public health concern to lower the death tolls for all of them. Malaria control efforts must be kept on track during an Ebola epidemic so that progress made in malaria control is not jeopardized.

Keywords: ebola, malaria, disease, impact, West Africa

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1. Introduction

Ebola hemorrhagic Disease (EHD) is a severe, often fatal disease in humans and nonhuman primates (monkeys, gorillas, and chimpanzees) that has appeared sporadically since its initial recognition in 1976. The disease is caused by infection with Ebola virus, named after a river in the Democratic Republic of the Congo (formerly Zaire) in Africa, where it was first recognized [11]. Signs and symptoms typically start between two days and three weeks after contracting the virus with a fever, sore throat, muscular pain, and headaches. Thereafter vomiting, diarrhoea and rash usually follow, along with decreased function of the liver and kidneys [17]. At this time some people begin to bleed both internally and externally [17]. The disease has a high risk of death, killing between 25 and 90 percent of those infected, with an average of about 50 percent [16]. The virus spreads by direct contact with

body fluids, such as blood, of infected human or other animals [17]. This may also occur through contact with an item recently contaminated with bodily fluids [17]. Semen or breast milk of a person after recovery from EVD may still carry the virus for several weeks to months [3]. Fruit bats are believed to be the normal carrier in nature, able to spread the virus without being affected by it.

Malaria is a life-threatening disease caused by *Plasmodium* that is transmitted to people through the bites of infected mosquitoes. Increased malaria prevention and control measures are dramatically reducing the malaria burden in many places. Non-immune travellers from malaria-free areas are very vulnerable to the disease when they get infected [26]. According to the latest estimates, released in December 2014, there were about 198 million cases of malaria in 2013 (with an uncertainty range of 124 million to 283 million) and an estimated 584, 000 deaths (with an uncertainty range of 367, 000 to 755, 000) [24]. Malaria mortality rates have fallen by 47% globally since

2000 and by 54% in the WHO African Region [3]. Most deaths occur among children living in Africa where a child dies every minute from malaria [3]. Malaria mortality rates among children in Africa have been reduced by an estimated 58% since 2000.

Disease outbreaks and catastrophes can affect countries at any time, causing substantial human suffering, deaths, and economic losses [20]. If health systems are ill equipped to deal with such situations, the affected populations can be very vulnerable [22]. The latest Ebola virus disease outbreak in Western African countries of Guinea, Liberia and Sierra Leone caused the cases of malaria to increase and death rates from malaria also increased in that region [21]. Capacity health systems and external health related aid to Guinea, Liberia and Sierra Leone increased in combating the Ebola virus disease [21], neglecting malaria. This lack of balanced investment in the health systems contributed to the challenges of controlling and combating malaria cases.

2. Outbreak of Ebola in the West African Countries 2014 - 2015

The World Health Organization reported a major Ebola outbreak in Guinea, a western African nation in March, 2014 [2]. The disease rapidly spread to the neighboring countries of Liberia and Sierra Leone. On 8 August, 2014, the disease was declared to be an international public health emergency by World Health Organization, urging the world to offer aid to the affected region. On 21st June, 2015, 27, 479 suspected cases and 11, 222 deaths have been reported [18].

3. Effect of Ebola Epidemic on Malaria Cases and Control

Ebola caused a spike in malaria cases in the countries heavily affected by the disease which have undermined previous efforts to curb malaria [21]. Thousands of malaria cases went untreated in Guinea in 2014 as people with symptoms avoided health clinics for the fear of being sent into isolation at Ebola treatment centers as the early symptoms of malaria; fever, headache, and body aches mimic those of Ebola virus disease [3]. US researchers surveyed 60 facilities in Ebola-affected regions of Guinea and 60 in areas unaffected by the virus. Study teams reviewed malaria case management indicators from registers from January to November in 2013 and 2014, and interviewed health-care workers, comparing the data with previous years before Ebola outbreak. They found around 74,000 fewer malaria cases than expected were seen at health facilities in the country in 2014 compared with pre-Ebola years [2]. In Guinea, the numbers of people seeking treatment at outpatient clinics dropped by up to 42% and the numbers seeking care for suspected malaria were down by 69% , fewer oral malaria drugs were given, (24% reduction) and fewer injections, by 30% reduction than the year 2013 [2]. In districts affected by Ebola, the numbers of community health workers actively working also dropped from 98% before Ebola to 74%, while those treating malaria dropped to less than half [2].

Guinea, Liberia and Sierra Leone which are the three West African countries most affected by the latest Ebola virus disease epidemic are also countries with high year round malaria transmission [4]. Estimates of Plasmodium falciparum parasite infection prevalence among children aged 6–59 months in Liberia, Sierra Leone, and Guinea are 45% [13], 46% [14] and 47% [6] respectively. Before the Ebola epidemic, malaria was responsible for approximately 30% of pediatric consultations, 25% of hospitalizations, 14% of hospital deaths, and 12,000 total deaths annually in Guinea [15 and 16]. In Liberia, malaria was responsible for 40% of all outpatient and inpatient visits and 33% of inpatient deaths [8]. Malaria continues to be a life threatening disease in these Ebola stricken countries, and the risk of malaria associated morbidity and mortality in these countries is now made greater because of the reduction in healthcare services and access to those services [2]. Patients living in these three countries most affected by Ebola are at risk for malaria, whether or not they have Ebola.

The children's wards of malaria hospitals throughout West Africa became increasingly deserted. The medical personnel that used to attend to these patients were re-stationed to help contain the latest Ebola outbreak [9]. In Liberia, Sierra Leone and Guinea which were most affected by Ebola, malaria was responsible for the death of 7,000 people in 2012, and these are expected to increase due to the lack of resources to fight against and eradicate this deadly virus [9]. Ebola has early symptoms similar to Malaria, and because of this, it became more difficult to keep track of who has malaria and who is dying from it.

Past measures to contain malaria in West Africa have been somewhat positive, with Guinea and Sierra Leone meeting their targets in the year 2013, for the distribution of bed nets. Unfortunately, the efforts were not as well received in Liberia. Now, with the country trying to contain Ebola as well, malaria cases will eventually increase [9]. Ebola overwhelmed health care system in the year 2014, making adequate care for malaria impossible and disrupted the distribution of bed nets in the affected areas [12]. The public health facilities and community health workers which are the two major avenues for delivering life saving medicine to patients with malaria was substantially compromised by the Ebola virus disease epidemic [2].

Malaria is usually the main cause of visits to health facilities in Guinea, accounting for more than 30% of visits to health facilities. However, during Ebola epidemic the number of people presenting with fever at outpatient clinics fell dramatically across the health facilities, dropping by nearly 42% in certain age groups in worst affected areas [2]. People were afraid to go to the hospital, not just because they don't want to get in contact with Ebola but because they don't want people thinking they have Ebola. If malaria care ceased completely in the year 2014 as a result of the Ebola epidemic, untreated cases of malaria would have increased by 45% in Guinea, 88% in Sierra Leone, and 140% in Liberia in 2014. This increase will be equivalent to 3.5 million additional untreated cases, with 10, 900 additional malaria attributable to deaths. Mass drug administration and distribution of insecticide-treated bed nets timed to coincide with the 2015 malaria transmission season could largely mitigate the effect of Ebola virus disease on malaria [12].

The high case fatality ratio of Ebola disease, coupled with high transmission to health-care professionals and low specificity of early symptoms of Ebola virus disease, placed extraordinary strain on health systems in these countries. As a result, few patients had access to health-care facilities, with many facilities closed. In those still open, fear of the disease has decreased outpatient attendance to as low as 10% [4]. The near cessation of malaria control led to resurgence in malaria cases and deaths, reversing progress made over the past decade [15]. It was estimated that cessation of distribution of insecticide-treated bed nets because of the Ebola epidemic led to a further 0.84 million (0.80 million to 1.01 million) cases of malaria in 2014, representing a 9.5% (8.7–12.8) increase. Moreover, this additional burden could accelerate sharply in 2015 if bed net use does not recover, with an estimated 2.7 million (1.9 million to 3.8 million) additional cases if coverage does not return to previous levels before the rainy season [12].

Malaria and Ebola share some of the same initial symptoms and people often come to Ebola treatment center with malaria thinking they have Ebola, which puts

them at risk for contracting Ebola. Symptoms of malaria overlap considerably with symptoms of Ebola, which may result in misclassification of malaria as Ebola and Ebola as malaria. The World Health Organization recommended that blood samples for laboratory diagnosis of malaria should not be collected in areas with Ebola unless adequate personal protective equipment is used. If a malaria diagnostic test is not done, treatment and control measures for malaria become difficult.

West Africa's fight to contain Ebola has hampered the campaign against malaria which is a preventable and treatable disease. In Gueckedou, near the village where Ebola first started killing people in Guinea's tropical southern, doctors had to stop pricking fingers to do blood tests for malaria [20]. In Guinea, where half of the 12 million people have no access to health centers, about 15,000 Guineans died from malaria last year, 14,000 of whom are children under five years [4]. In comparison, about 2,446 people in Guinea have died from Ebola, according to statistics from the World Health Organization. The U.S. President's Malaria Initiative came to a halt in Guinea during the Ebola epidemic.

Table 1. Countries With Widespread Ebola Transmission.

Country	Total Cases (Suspected, Probable, and Confirmed)	Laboratory Confirmed Cases	Total Deaths
Guinea	3,781	3,326	2,521
Sierra Leone	13,387	8,694	3,951
Total	17,168	12,020	6,472

[5].

Table 2. Countries With Former Widespread Ebola Transmission and Current, Established Control Measures.

Country	Total Cases (Suspected, Probable, and Confirmed)	Laboratory Confirmed Cases	Total Death
Liberia (As of May 9, 2015)	10,666	3,151	4,806
Liberia (After June 28, 2015)	6	6	2
Total	10,672	3,157	4,808

[5].

Table 3. Malaria Cases and Death rates in the three most affected Ebola Western African Countries 2014.

Country	Population Rate	Reported Malaria Cases	Cases among Children under 5	Reported deaths
Guinea	10,628,972. (As of April, 2014).	3,700,000	14,000	15,000
Liberia	4,397,000. (As of July, 2014).	1,400,000	5,900	6,100
Sierra Leone	6,205,000. (As of July, 2014).	2,200,000	8,500	8,900
Total		7,300,000	28,400	30,000

[10].

Table 4. Reported Malaria Cases and Deaths, 2013

Country	UN Population	Suspected Malaria Cases	Presumed and Confirmed Malaria Cases	Microscope/RDTs Performed	Microscope/RDTs Positive	Impatient Malaria Cases	Malaria attributed deaths
Guinea	11,745,189	775,341	775,341	-	211,257	12585	108
Liberia	4,294,077	2,202,213	1,483,676	1,962,757	1,244,220	-	1191
Sierra Leone	6,092,075	2,576,550	1,715,851	2,562,657	1,701,958	38,568	4326

[25].

4. Conclusion

It would be a major failure on the public health system to have a lot of people die from malaria in the midst of the Ebola epidemic. People affected by malaria are much higher than the number affected by Ebola worldwide. But Ebola attracted much more media attention so

governments and international aids were pressured to do much more and donors started donating a lot of money and resources to the control and elimination of Ebola neglecting the fight that had been on in combating malaria. This caused early detection of malaria parasite to come down. Rather than label one disease as more important than the other, equal attention or near equal attention should be given to all the diseases of public health concern to lower the death tolls that may arise from all of them.

Improving access to presumptive malaria treatment and prevention measures during an epidemic should be emphasized in order to reduce malaria fevers and death and to reduce burden on health systems during this period. Malaria control efforts must be kept on track during an Ebola or any other epidemic so that progress made in malaria control is not jeopardized. Efforts to reinforce malaria care delivery in the Ebola affected countries should be focused on reconnecting healthcare workers and health facilities with the communities they serve and whose trust they need to regain.

Competing Interests

The authors wish to state that there are no competing interests.

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