

Dengue Fever Outbreak and its Implication on Education in the State of Kassala

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ABSTRACT

In Sudan, dengue is an endemic disease and is considered a major public health threat by the World Health Organization. In the state of Kassala, the total cases of dengue from August 8 to December 9 are 3691 with an incidence rate of 1.5/1000. This paper aims to review how education might get affected with dengue fever outbreaks. The frequent outbreaks and disease *endemicity* mean an ongoing infection through the year, for which stopping education will be a real difficulty for schools and universities. Schools and universities need to undergo student empowerment to do mosquito spray campaigns every week preferable on Fridays.

Key words: Dengue fever, Kassala, outbreak, review

INTRODUCTION

Dengue is a mosquito-borne viral infection causing a severe flu-like illness and, sometimes, causing a potentially lethal complication called severe dengue. The incidence of dengue has increased 30-fold over the past 50 years. Up to 50–100 million infections are now estimated to occur annually in over 100 endemic countries, putting almost half of the world's population at risk.^[1]

Dengue is caused by a virus of the *Flaviviridae* family and there are four distinct, but closely related, serotypes of the virus that causes dengue (dengue virus [DENV-1, DENV-2, DENV-3, and DENV-4]). Recovery from infection provides lifelong immunity against that particular serotype. However, the cross-immunity to the other serotypes after recovery is only partial and temporary.^[2] Subsequent infections (secondary infection) by other serotypes increase the risk of developing severe dengue. Once infectious, the mosquito is capable of transmitting a virus for the rest of its life. The *Aedes aegypti* mosquito is considered the primary vector of DENV. It lives in urban habitats and breeds mostly in man-made containers. The extrinsic incubation period (EIP) takes about 8–12 days when the ambient temperature is between 25 and 28°C.^[3] *A. aegypti* is a daytime feeder; its peak biting periods are early in the morning and in the evening before sunset.^[4] The first dengue vaccine, Dengvaxia® (CYD-TDV) developed by Sanofi Pasteur, was licensed in December 2015 and has now been approved by regulatory authorities in 20 countries. As such, the use of the vaccine is targeted for

persons living in endemic areas, ranging from 9 to 45 years of age, who have had at least one documented DENV infection previously. For countries considering vaccination as part of their dengue control program, pre-vaccination screening is the recommended strategy.^[5,6]

DENGUE WORLDWIDE OVERVIEW

There has been a substantial increase in reports of dengue infections to date in 2019 compared with the same time period in 2018. The majority (85%) of the 1,049,000 cases reported during the past 3 months were reported by Brazil, the Philippines, Mexico, Nicaragua, Thailand, Malaysia, and Colombia. In addition to autochthonous cases of dengue reported by France and Spain in September 2019, Spain reported the first case of sexual transmission of dengue described in men who have sex with men. The total number of dengue fever cases in the Americas topped 2 million the week ending August 3, according to recent Pan American Health Organization data. The 2,028,164 cases reported to date are higher than the annual totals reported during the most recent 2 years (2017–2018) and are lower than the annual totals reported during the 2015–2016 epidemic cycle. Of the total cases, 846,342 (42%) were laboratory confirmed and 12,268 (0.6%) were classified as severe dengue. Seven hundred and twenty-third deaths were reported in the Americas. Brazil saw the most cases with 1,748,473 and 485 deaths. Other countries reporting the high number of cases include Colombia (71,736), Nicaragua (55,289), Honduras (42,346), and Mexico (39,770).^[7,8] According to the World Health Organization (WHO), cases continue to be reported in Benin, Reunion, Sudan, and Tanzania. Benin has reported 19 suspected and 11 confirmed cases of dengue fever, including two deaths between May 10 and October 17, 2019 (6 months duration). These cases

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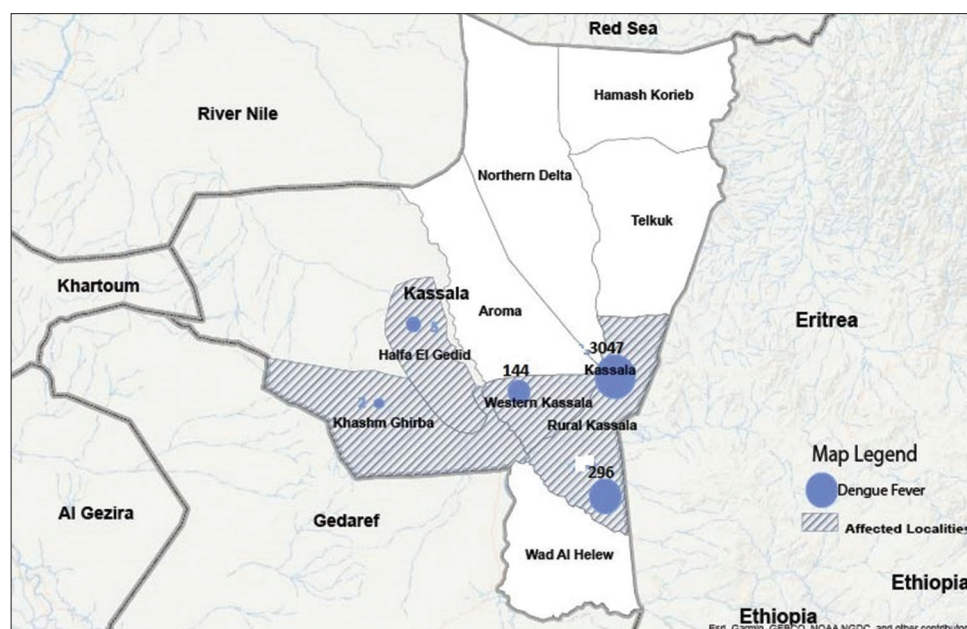


Figure 1: A map showing the distribution of cases in localities of Kassala state until December 9, 2019

were reported from Atlantique, Littoral, Oueme, and Couffo departments.^[9,10]

According to the WHO, dengue is a mosquito-borne viral infection causing a severe flu-like illness and, sometimes, causing a potentially lethal complication called severe dengue. Approximately, half of the world's population is at risk and it affects infants, young children, and adults. The incidence of dengue has increased 30-fold over the past 50 years. Up to 50–100 million infections are now estimated to occur annually in over 100 endemic countries, putting almost half of the world's population at risk.^[11,12]

DENGUE IN SUDAN

In Sudan, dengue is an endemic disease and is considered a major public health threat. Over the past 20 years, major outbreaks of dengue fever have occurred in different parts of the country causing significant morbidity and mortality.^[12,13] The Federal Ministry of Health, Republic of Sudan, has recently declared an outbreak of dengue fever in Kassala state that started from August 8, 2019. The Eastern part of Sudan, particularly the Red Sea and Kassala, are the most affected states. In recent years, these states have experienced frequent outbreaks of dengue throughout the year including dengue hemorrhagic fever.^[5,14]

In Kassala, phylogenetic analysis revealed that the isolated virus sequences belong to the cosmopolitan genotype of DENV serotype 2.^[7,15]

On October 10, 2019, the Sudan International Health Regulations and National Focal Point notified the WHO

of 99 suspected cases of dengue fever in Kassala state. The first reported case presented to the health facilities on August 8, 2019, with symptoms including high-grade fever, headache, joint pain, and with or without vomiting. From August 8, 2019, to November 4, 2019, a total of 1197 suspected cases of dengue fever including five deaths have been reported from seven states: Kassala (1111 cases; 3 deaths), West Darfur (43 cases; 1 death), North Darfur (29 cases; 1 death), the Red Sea (9 cases; 0 deaths), South Darfur (3 cases; 0 deaths), Gadarif (1 case; 0 deaths), and North Kurdufan (1 case; 0 deaths). Dengue fever is endemic in Sudan. Several outbreaks have been documented in 2010, 2013, and 2017.^[9,16]

According to the Centers for Disease Control and Prevention, the risk for dengue in Sudan is frequent or continuous, "Frequent or continuous" risk means that either frequent outbreaks occur or transmission is ongoing.^[11,17] Frequent outbreaks of dengue are considered to be associated with an increased risk for endemicity of the disease.^[12,13]

CURRENT SITUATION IN THE STATE OF KASSALA

The total cases of dengue from August 8 to December 9 are 3691 with an incidence rate of 1.5/1000. The peak number of new cases was on week 47 and the incidence decline to 356 cases on week 49 [Table 1 and Figure 1].^[8,14]

DENGUE AND SCHOOL INVOLVEMENT

Within endemic zones in México, mosquito-free schools are difficult to find, costs associated with campaigns

Table 1: Distribution of dengue fever cases per week

Epidemic week/year	Number of cases per week
Epidemic week 33	2
Epidemic week 34	5
Epidemic week 35	9
Epidemic week 36	0
Epidemic week 37	8
Epidemic week 38	9
Epidemic week 39	20
Epidemic week 40	21
Epidemic week 41	36
Epidemic week 42	206
Epidemic week 43	287
Epidemic week 44	330
Epidemic week 45	518
Epidemic week 46	558
Epidemic week 47	633
Epidemic week 48	568
Epidemic week 49	356

focusing on cleaning schools are very low and results seem to be promising.^[15] If properly involved and guided, schoolchildren can be an asset to mosquito-borne disease control; the education sector could be an important partner in dengue fever/dengue hemorrhagic fever control.^[6,16]

Schools, universities, and technical and further education (TAFE) colleges can have lots of places for dengue mosquitoes to breed. With the number of people coming to and from campus each day, a dengue mosquito carrying the virus can spread dengue fever very quickly, to many people. This is why it is essential that schools, universities, and TAFE colleges check around their campus every week and remove or treat any containers capable of holding water and over the summer holiday period, consider using a residual insecticide to reduce dengue breeding. Roof guttering should be cleared of any debris before the break and again before school returns.^[17]

PREVENTION AND CONTROL

The proximity of mosquito vector breeding sites to human habitation is a significant risk factor for dengue as well as for other diseases that these species transmit. At present, the main method to control or prevent the transmission of DENV is to combat the mosquito vectors. This is achieved through the prevention of mosquito breeding in and around houses and places of work, schools and health facilities, personal protection from mosquito bites, community engagement, reactive vector control, active mosquito, and virus surveillance.^[2,10]

CONCLUSION AND RECOMMENDATIONS

In the state of Kassala, the frequent outbreaks and disease *endemicity* mean an ongoing infection through the year, for which stopping education will be a real difficulty for schools and universities.

Schools and universities need to undergo student empowerment to do mosquito spray campaigns every week preferable on Fridays considering the EIP of the mosquito which is 8–12 days. Classrooms and dormitories should be the target for routine spray campaigns by the student volunteers to prevent potential transmission.

The schools and universities need to consider a possibility of outbreaks during the rainy seasons in their educational schedules for the curriculum to avoid any delays as a result of a possible epidemic. Vaccines need to be considered for students with a previous history of infection.

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