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Abstract

Globally dengue is one of the most important vector borne diseases. In 2019 the Americas experienced one of the largest outbreaks recorded, with over 3 million cases. This retrospective study was used to identify common syndromic surveillance markers associated with dengue in Saint Lucia. Undifferentiated fever, acute respiratory infections or fever with respiratory signs and gastroenteritis were found to be significantly associated with the occurrence of dengue. Public health authorities and clinicians can use the information generated in this study to develop preventive programs and management strategies for dengue specific to Saint Lucia.

Doctoral Capstone

Problem

Dengue causes significant morbidity and loss of productivity which is a burden to the resources of developing countries.

The epidemiology of the disease is known to differ within populations and across geographic locations.

No published work on the epidemiology of the disease in Saint Lucia is evident.

Identifying if any of the regularly syndromic surveillance markers is associated with dengue in Saint Lucia will assist with early identification of cases and possible outbreaks allowing for effective public health interventions.

Purpose

This retrospective quantitative study was used to determine if the regular syndromic surveillance markers undifferentiated fever; acute respiratory infection or fever and respiratory symptoms (ARI or FRS); fever with hemorrhagic symptoms (Fever with HS); fever and neurological symptoms (fever and NS); and gastroenteritis are associated with the occurrence of dengue in Saint Lucia.

Significance

Most of the research on dengue has been focused on larger countries and there is a dearth of published information on the disease in Saint Lucia.

The morbidity, mortality and loss of productivity have the potential to heavily impact the service driven Saint Lucian Economy.

It is difficult to identify the disease based only upon clinical presentation because of similarity to other diseases including COVID-19.

The earlier identification of dengue cases will assist in the earlier management of the disease possibly leading to earlier successful resolution and mitigation of unwanted outcomes.

Early recognition of cases can assist public health authorities to identify and control outbreaks before significant spread occurs.

Theory or Framework

This study was underpinned by the **ecological theory of disease**. The main tenet of the theory is that the occurrence of disease is impacted by multiple factors including host, pathogen and environmental factors (Palmer et al., 2016; Smith et al., 2005).

Relevant Scholarship

The Pan American Health Organization reported over 3 million cases of dengue in the Americas in 2019, the highest number ever recorded in that region (Mitchell, 2019).

There is limited use of bed-side tests, with confirmatory diagnosis relying on PCR tests in most cases which may delay appropriate treatment (Zhang et al., 2015).

Dengue fever is manifested as a flu-like illness with high fever, pain behind the eyes, headache, myalgia and arthralgia, nausea, vomiting, swollen lymph nodes or rash clinical signs that are not specific to the disease (Muller et al., 2017).

The limited window for maximum efficiency of PCR testing underscores the importance of early identification of suspect dengue cases for confirmatory diagnosis (Guzman & Harris, 2015).

Research Question

What syndromic disease marker undifferentiated fever, acute respiratory infection or fever and respiratory symptoms (ARI or FRS), fever with hemorrhagic symptoms (Fever with HS), fever and neurological symptoms (fever and NS), and gastroenteritis is most predictive of dengue fever in Saint Lucia?

Participants

A convenience sample included all of the cases of syndromic surveillance from the Ministry of Health and Wellness, Saint Lucia between 2009 and 2017. Incomplete cases were excluded.
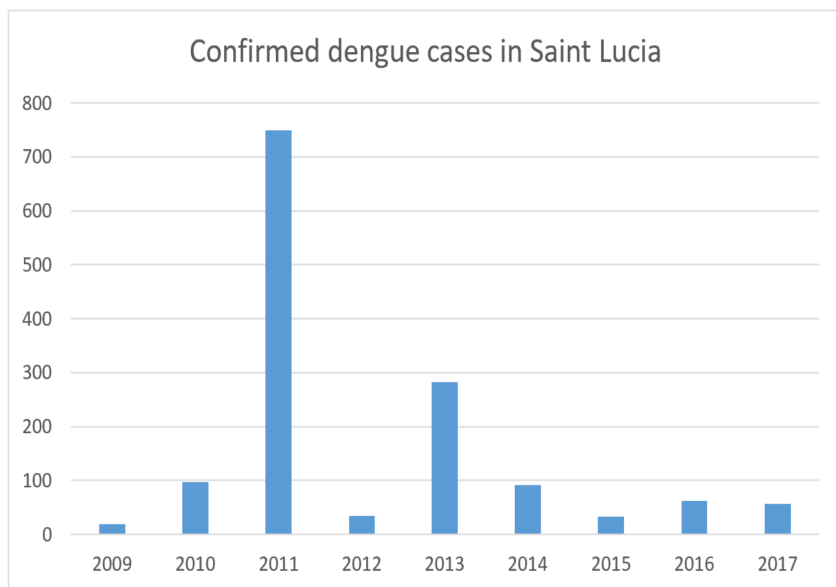
Procedures

The deidentified data were accessed from the Ministry of Health and Wellness, Saint Lucia syndromic surveillance database.

The key variables of undifferentiated fever, acute respiratory infection or fever and respiratory symptoms (ARI or FRS), fever with hemorrhagic symptoms (Fever with HS), fever and neurological symptoms (fever and NS), and gastroenteritis were operationalized at the individual case level and categorically grouped as positive or negative for the condition.

Analysis

Chi-square analysis was used to determine the independence of the data.

Variables found to have a significant association with the occurrence of dengue chi-square analysis were then subjected to logistic regression analysis.

Confirmed dengue cases in Saint Lucia

Findings

Undifferentiated fever, acute respiratory illness and gastroenteritis were found to be significantly associated with dengue in Saint Lucia.

Logistic regression model of syndromic markers and dengue in Saint Lucia 2009-2017

	Sig.	O.R.	95% C.I. for O.R.	
			Lower	Upper
Undifferentiated fever***	0.000	2.053	1.623	2.597
ARI or FRS Positive***	0.000	5.25	3.559	7.745
Gastroenteritis*	0.035	1.617	1.036	2.526

*p<.05, **p<.01,***p<.001

Interpretation

The results of the study suggest the value of using syndromic data in the early identification of dengue in Saint Lucia.

The failure to identify the fever with hemorrhagic signs may underscore the difficulty of identifying hemorrhagic signs in persons with darker complexions.

Fever with respiratory signs, was the most strongly associated variable with the occurrence of dengue and suggests these cases should be more carefully evaluated on presentation.

Limitations

Other factors may have impacted the occurrence of dengue across this time span of the study.

There were also many physicians involved in examining the patients over this period of time which will inherently introduce information bias.

The suspect cases were included in the negative cases because they were not confirmed positive and some of these suspect cases may have been positive. The correct identification of these cases may have influenced the outcomes of the analysis and allowed a different insight to the relationship between clinical variables and dengue in Saint Lucia.

Recommendations

For Healthcare in Saint Lucia:

- Update national communicable manual of Saint Lucia to include dengue as a differential diagnosis for cases of gastroenteritis

- Present the outcomes to clinicians in Saint Lucia

- Increase the data collected in syndromic surveillance

For Future Research

- Continue to explore the relationship between the syndromic markers and dengue in Saint Lucia

- Similar and comparative research in other small islands of the Caribbean

- Compare clinical diagnosis against laboratory diagnosis of dengue cases

Social Change Implications

Reducing the burden of dengue will allow reallocation of resources which can lead to the improvement of the quality of life.

Reduction of school days lost can improve life outcomes for the population.

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