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ScienceDirect

Procedia Engineering 212 (2018) 101–108

Procedia Engineering

www.elsevier.com/locate/procedia

7th International Conference on Building Resilience; Using scientific knowledge to inform policy and practice in disaster risk reduction, ICBR2017, 27 – 29 November 2017, Bangkok, Thailand

Identify the risk for leptospirosis disease during flooding periods (Special reference to Medirigiriya Divisional Secretariat Division in Polonnaruwa district).

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Abstract

Natural disasters have been entangled with life of human directly or indirectly. Flooding after heavy rainfall is one of the terrific and most common hazards which can have serious influences on human health by creating suitable environments to form water borne diseases. Leptospirosis is one of the major diseases caused by flooding in Sri Lanka. Thus, this study identifies the effects of floods especially on the spread of leptospirosis in Sri Lanka.

Three distinct data sets were used for this study: the first was the records retrieved from Disaster Management Centre and Disaster Management Unit of Medirigiriya DS office regarding the retrospective rainfall and flooding incidents recorded during 2004-2016; the second was derived from the Regional Director Office of Health Service (RDHS) to recognize the number of leptospirosis cases recorded during the selected period; and the third data set was collected using a questionnaire survey administered to people affected by leptospirosis disease in Medirigiriya. A chi-square test was used for statistical analysis and Arc GIS 10.3 was used for map analysis.

The study could identify a clear relationship between floods and leptospirosis outbreaks in Medirigiriya as majority of victims could be identified in areas subjected to floods during the past years. According to the risk map, Atambaoya, Tissapura, Viharagama, Medirigiriya and Diulankadawala Grama Niladgari divisions were identified as more vulnerable areas for the disease than the other areas. In addition to floods, muddy paddy farming and livestock rearing practices are also reasons for the spread of the disease among people. Farmers who engage in muddy paddy fields were identified as the most vulnerable group to leptospirosis as they use contaminated paddy water to wash their faces and hands, drink and fulfill sanitary requirements. Direct ways of exposure to flood water including walking through contaminated water, doing water sports without wearing protective costumes also let the bacteria to sketch human body.

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Peer-review under responsibility of the scientific committee of the 7th International Conference on Building Resilience.

Keywords: leptospirosis; flood; outbreaks

1877-7058
Peer-review under responsibility of the scientific committee of the 7th International Conference on Building Resilience
10.1016/j.proeng.2018.01.014

1. Introduction

An organism is a component of the environment itself while geo system is considered to be contacted with all the components of the earth and human life, especially, the human health. For examples, pure air for human respiration is given by the atmosphere and clean water for drink is given by the hydrosphere. However, when the air for respiration and water for drinking have been polluted, it causes ill health to human beings. Likewise, imbalances in the geo system always cause severe problems in organisms, especially through the hydrosphere.

Floods are considered as most commonly documenting hydro meteorological disasters which can cause damages to both human lives and their properties. But the consequences of these types of disasters may double, if the flood water contaminate with faucal materials and toxic chemicals. This may lead to changes in health, becoming a threat to human beings, multiplying the existing health problems.

The severe current climate change intensifying the imbalance of water cycle resulted from an increasing air temperature, more water evaporates into the air, and warmer air holds more water vapor, which can lead to more intense rainfall and rainstorms, causing major problems like extreme floods.

Breakdowns in sanitation systems, contamination of drinking water and direct contact with contaminated water increase fears of water-borne diseases, such as typhoid fever, cholera, leptospirosis and hepatitis A. The only epidemic-prone water born infection which can be transmitted directly from contaminated water is leptospirosis (rat fever), a zoonotic bacterial disease. Transmission occurs through the contact of the skin and mucous membranes with water, damp soil or vegetation (such as sugarcane) or mud contaminated with rodent urine [1].

Leptospirosis is more common in tropical and sub-tropical areas during rainy weather or flooding periods. In the developing world, the disease most commonly occurs among farmers and the poor people in cities. In the developed world, it most commonly occurs in those involve in outdoor activities in warm and wet areas [2].

Sri Lanka is a tropical country with annual rainfall varying from < 1500 mm in the dry zone to 5000mm in the wet zone and is considered one of the most flood affected countries in south Asia. Thus, the performances of leptospirosis in different regions of the country vary according to climatic conditions. In Sri Lanka, leptospirosis is reported throughout the year. The outbreak is peak at the time of the monsoons, a smaller one in March to May, and a larger one from October to December [3].

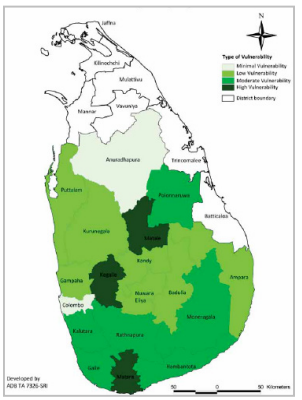

Fig. 1. Vulnerability to leptospirosis

Data Source: Ministry of Environment, 2011

As illustrated in Fig. 1, from the 9 districts in which the leptospirosis is common, Polonnaruwa is ranked the 8th place with moderate vulnerability to the disease [4]. The average leptospirosis incident rate in Polonnaruwa from 2004-2008 was 12.64 cases. By considering the major floods recorded in Sri Lanka from 1957-1995, the Ministry of Social Services has created flood indexes for each district. According to this, Polonnaruwa district was recorded between 40-60 flood index [5]. Spillover of an irrigation tank or a river is the major cause behind severe floods.

Apart from the other regions, floods in Medirigiriya seem to be more frequent and cause severe damages for human lives and their properties. Similar to these long-time flood events, increasing trend of leptospirosis outbreaks is also very common in Medirigiriya than other regions in the district. Records retrieved from the RDHS imply there were 400 confirmed leptospirosis cases were recorded within the region from 2004 to 2016. Furthermore, in 2008,