Comparison of Waterborne Diseases in the United States Before and After Storm Events in 2017

Alexandra Daverede
University of South Florida St. Petersburg

Introduction

Increased rain and flooding after hurricanes and tropical storms can spread water borne bacteria and parasites that cause disease. After Katrina in 2005, the Center for Disease Control recorded an increase in water borne bacteria Vibrio infections.

In this study only storms that made landfall in the mainland of the United States in 2017 were examined. This includes hurricanes Harvey, Irma, and Nate, as well as tropical storms Cindy and Emily. Four water borne diseases were examined including Cryptosporidiosis, Giardiasis, Shigellosis, and Vibriosis. Cryptosporidiosis and Giardiasis are caused by microscopic parasites while Shigellosis and Vibriosis are caused by bacteria.

The week the storms made landfall and the following week make up the “During” time period in this study. The two weeks before the “During” time period make up the “Before” time period, and the “After” period are the following two weeks after the “During” period.

For states not hit by a storm, the average number of cases and percentage of total cases during the same time period were taken. For states impacted by a storm only cases from the weeks of impact were included. This ensures that the data from each state for each time period is comparable and the map of the total number of cases per state can put those numbers into perspective.

References available upon request.

Figure 1: Maps of the Average and Percent of the Combined Cases of Diseases in Relation to Hurricanes

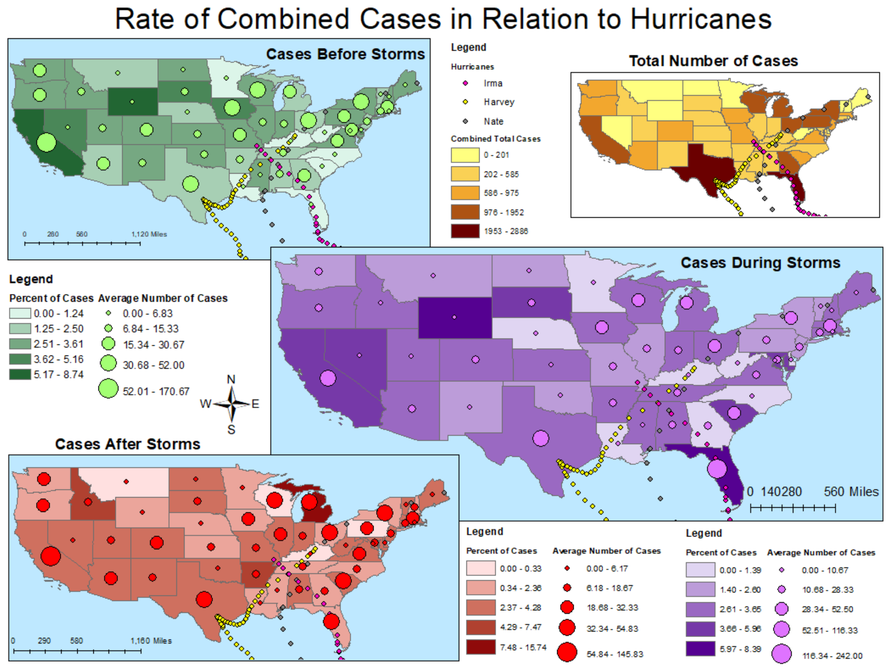
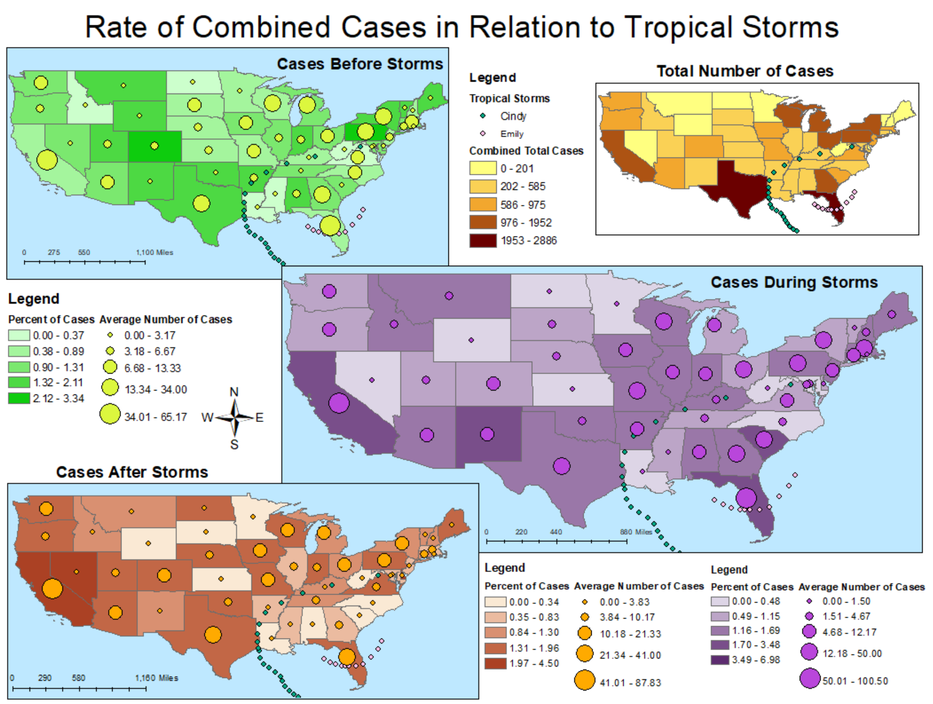


Figure 2: Maps of the Average and Percent of the Combined Cases of Diseases in Relation to Tropical Storms



Methods

Disease case data was collected from the Center for Disease Control. Storm data was collected from NOAA. The base map of the United States was taken from the United States Census Bureau. Maps created with the use of ArcMap.

Results

Florida saw a dramatic increase in cases after hurricane Irma, jumping from 0 reported cases in the two weeks before Irma to 484 cases in the two weeks during and directly following Irma’s landfall. This is the equivalent of 242 cases per week and is 8.39% of the total cases reported in Florida in 2017. In the two weeks following Irma’s landfall, only 82 cases were reported, which is 1.42% of the total cases.

Conclusion

Florida was the only state that appeared to have a dramatic increase in cases directly following a hurricane, which is shown in the “Cases During Storms” map in Figure 1. For reference, “Cases After Storms” includes data from the two weeks following the storm event which ideally would closely match the “Cases Before Storms” data. The cases in Florida follow this pattern and that implies that the increase in cases are directly related to the Storm activity. Although this pattern is weaker in Figure 2, when the storm is only a Tropical Storm. Mississippi and Texas also show a slight increase in the “Cases During Storms” map in Figure 1, however they continue at the same rate and do not show a decrease in the “Cases After Storms” map, so it is difficult to determine whether they are directly related to a storm event. Additionally, these diseases do increase in the summertime which is when all of these storms occurred. Since these diseases are waterborne and occasionally foodborne it is difficult to compare the storm affected states to unaffected states, especially given the different rates of disease in the unaffected states. Unfortunately, there is not room in this report to include the results from the individual diseases, if this interests you please contact me and I will provide you with a copy of the accompanying paper.