EXECUTIVE SUMMARY

Title: EPIDEMIOLOGICAL INVESTIGATION OF DENGUE CASES IN
                             THE PROVINCE OF AKLAN FROM 2015 - 2019

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Background and Rationale of the Study

Dengue is a mosquito-borne, acute febrile illness that is an important public
health problem in tropical countries. In the early 1950's, the disease was described in
the Philippines as hemorrhagic fever or infectious acute thrombocytopenic purpura
(Quintos, 1954 and Lim, 1956). Dengue continues to cause considerable concern in the
country because of its widespread endemicity, the minimal success of vector control
strategies, the possibility of severe disease caused by sequential infection by a different
serotype, the potential for fatal outcomes and the consequent social and economic
burden. The four dengue virus serotypes circulate in the country where the disease is
predominantly reported among children (Bravo, 2014).

More than 77,000 suspected cases of dengue and 300 deaths were reported in
the first 20 weeks of 2019 in the Philippines. This is almost doubled the number of
reported cases during the same time period in 2018. Dengue cases remain high as the
rainy season approaches, with the Department of Health declaring a dengue outbreak in
four villages in the province of Negros Oriental in the Central Visayas Region. City and
municipal health officials, working with local authorities, have launched information

campaigns in the affected provinces. They have conducted house-to-house visits and have distributed treated mosquito nets. (OCHA, 1 Jul 2019).

According to the Situation Report of the WHO in September 2, 2019, between the 1st of January and 17th of August 2019, 229,736 dengue cases including 958 deaths were reported through the DOH National routine surveillance system, with a Case Fatality Ratio of 0.42% with a median age of 12 years, the most affected age group among dengue cases is 5-9 years old (23%). Similarly, the most affected age group among dengue deaths is 5-9 years (40%). The majority of dengue cases are male (52%), whereas the majority of dengue deaths are female (54%). DOH regional data showed that from January to July of 2019, Western Visayas had an average increase of cases computed at 236% compared with the period of 2018. Among the provinces in the Region, Aklan, Negros Occidental and Bacolod had the highest case fatality ratio at 0.7%.

The provincial government has declared a dengue outbreak in Aklan because of the alarming increase in cases in the province. In Aklan alone, the Provincial Health Office reported 2,121 dengue cases from January to July 2019, 157% higher than the 824 cases recorded in the same period of 2018. At least 85 barangays in Aklan have clustering cases of dengue (Cuachon, in Media Interview, 2019).

The data submitted by the Provincial Heath Office has reported a sharp surge in the number of dengue cases from January to August 24, 2019. Cases of the mosquito-borne disease reached 4,800 with 19 deaths; 335% higher compared to 2018 during the same period. Overall, Aklan has a dengue attack rate of 35.01%, the highest in Western Visayas.

The Provincial Health Office stated that the town of Kalibo is the hardest hit of the viral disease. The town of Balete experienced the highest dengue attack rate at 69.89%, followed by Kalibo with 61.57%. The municipality of New Washington has the highest

case fatality rate of 1.88%, followed by Nabas, Balete, Tangalan and Numancia. The rest of the municipalities had recorded a lower than 1% case fatality rate. There were 2,472 female victims, or 51 percent and 2,328 males affected by dengue. Patients aged 11 to 20 years old were most vulnerable with 1,578, or 33% followed by one year to 10 years old patients with 1,487. Of the 327 barangays, there were 127 dengue hotspots across the province.

According to Provincial Health Office, the Dr. Rafael S. Tumbokon Memorial Hospital in the town capital admitted 1,838 dengue patients or 39% of 4,800 cases. Health officials of the province of Aklan said that only 3% of dengue cases were outpatients, while the 97% were hospitalized. These statements strengthen the fact that dengue infection was very rampant, alarming, and possess great concerns that need immediate intervention. The local executive urged the public to maximize Rural Health units before bringing patients to hospitals to help decongest the district and the provincial hospitals in the province. The Provincial Health Office has strengthened measures to check breeding of mosquitoes and activated dengue fast lanes and hydration units in government and district hospitals.

In this study, it aimed to describe the provincial incidence by age and sex and other relevant epidemiological data and identify gaps in epidemiological knowledge requiring further research, but not to provide an exhaustive picture of the history of dengue in the country. Given the 3-5-year periodicity of dengue outbreaks (DOH, as quoted by the Undersecretary Duque, July 2019), it is estimated that at least half a decade of data would be necessary to provide an accurate image of recent evolution of epidemiology.

With those previous mentioned scenario, it is relevant to conduct an analysis of dengue fever from around the province of Aklan. It would be useful to assess geographic and temporal epidemiologic patterns, risk factors for severe disease, variations in clinical

management and changes in case-fatality rates. Therefore, performing research can improve diagnostics and dengue surveillance which is an essential way to prevent and control dengue transmission. Further, recent outbreaks of dengue in the province necessitate development of this study.

Objectives of the Study

General

This study aimed to describe the epidemiological characteristics of dengue cases in the Province of Aklan from 2015-2019.

Specific Objectives

Research Design

According to the World Health Organization (WHO, 2019), epidemiology is the study of the distribution and determinants of health-related states or events (including disease), and the application of this study to the control of diseases and other health problems. Various methods can be used to carry out epidemiological investigations: surveillance and descriptive studies can be used to study distribution; analytical studies are used to study determinants.

This study employed a descriptive-epidemiological analysis. A longitudinal study follows the same variables over time and makes repeated observations. In this study, age, sex, and the spatio-temporal patterns of dengue cases was observed over the period of five years, from 2015 to 2019. Longitudinal research designs described patterns of change and help established the direction and magnitude of causal relationships. Measurements are taken on each variable over two or more distinct time periods. This allowed the researcher to measure change in variables over time.

Study Population and Sampling Procedure

The study population of this investigation included all the dengue cases reported and documented by the Provincial Health Office of Aklan and the Department of Health. This study utilized secondary epidemiologic data that covered a five-year period of outbreak of dengue in Aklan from 2015-2019. Furthermore, this study was guided by a case definition as part of inclusion criteria. This pertains to all cases that are serologically diagnosed. Clinically diagnosed patients were excluded from this study.

Data Collection Procedure

Prior to data collection, a letter of request was sent to the Provincial Health Office and the Department of Health in Aklan, stating the objectives and the purpose of the study. After obtaining the approval from the offices, the acquisition of data was then facilitated, a record-based data gathering was done making sure that all the data gathered were complete. All information was accessed from the database of the Provincial Health Office and the Department of Health.

In addition, a letter was also sent to the Provincial Health Office of Aklan asking for the total population per municipality of the province from 2015-2019.

Ethical Consideration

Though this study only dealt with secondary data and no personal information were revealed in this investigation, it was still imperative to adhere to the ethical standards on research practice. The researcher still obtained consent from the sources of data duly approved by the university research committee. Moreover, the researcher was granted an exemption from the Ethics Review Committee for this research study. As mentioned, the study utilized secondary sources of data which were available in the Provincial Health Office of Aklan. This research study poses no threat to the subjects involved since no patient contacts were made. It solely depended on the information

freely available in the public domain. The analyses of these data sets were properly anonymized and permission to access and utilize these data was obtained.

Data Processing

Cognizant of the objectives of the study, the following data analytic tools were utilized to address it accordingly. Frequency and percentages presented in tables were used to describe the incidence of dengue cases in Aklan based on age, and sex. As to presenting the spatial patterns, Thematic Symbol Maps were utilized which displays the number of cases for each municipality of both the coastal and non-coastal areas across the 5-year duration from 2015 until 2019. Scatter plots were created for the temporal patterns of these cases per quarter of each year from 2015-2019. To observe the pattern of relationships between grouping variables such as age and sex towards the spatial-temporal variables like area and years, descriptive parameters were used as basis given that the study works on population data. For a clearer presentation of these spatial – temporal patterns across these grouping variable, line graphs were also utilized. For the association of the variables, age, sex, spatial, and temporal patterns, Cramer's V was utilized. The data analysis was conducted using R- Studio Software and Jupyter Notebooks; programming languages included R, Python and Html and SPSS.

Summary of Findings

1. The investigation revealed that for the period of 5 years, the year 2019 recorded the highest number of cases with a total number of 5788 confirmed cases while 2017 recorded the least number of dengue cases with a total of 726, averaging 900 cases for the entire surveillance period.

2. The age group of 13-30 years old consistently garnered a record of higher dengue cases compared to the other age groups for 4 years in 2015, 2016 2018 and 2019 with the exemption on the year of 2017 on which the age group of below 12 years old

garnered the greatest number of cases. The lowest number of dengue cases in Aklan for the five-year period was recorded among the age of those older than 60 years old.

3. No apparent trend as to specific group, male or female, dominated the dengue cases in the five-year surveillance period. A total of 5191 cases were recorded for males and 4949 cases for females from the five-year surveillance period with a difference of 242 cases or equivalent to 2.4%.

4. The third quarter of every year from 2015 to 2019 garnered the highest reported cases with an average of 1080 incidents of dengue infection classified under the Rainy Season (July to September). A gradual drop in the dengue cases occurred during the fourth quarter. In addition, the first and second quarters (January to June) of each year disclosed the least number of dengue cases wherein these months are categorized for the Dry Season.

5. The most affected age group among the dengue patients is 13 to 30 years old during the third quarter, which is classified under the Rainy Season.

6. No obvious pattern regarding a specific group between male or female emerging to be more vulnerable to the disease could be discerned based on the graphical display by year.

7. Kalibo and Numancia were consistent areas for the high incidence of dengue for the entire surveillance period in the Coastal areas, whereas Banga, Balete, Malinao, and Madalag also had the greatest number of dengue infection on the Non-Coastal area for the five-year surveillance period. In contrast, the municipalities in the Coastal areas such as Ibajay, Batan, and Nabas got the lowest incidence of dengue cases, and for the Non-Coastal areas were the municipalities of Libacao, Balete, Malinao, and Madalag.

8. There is clustering of high cases of dengue from 2015-2019 in areas near coastal regions such as Kalibo, Numancia, New Washington, and Malay.

9. Municipalities from the Non-Coastal areas, specifically central and southernmost part of Aklan (Lezo, Madalag, and Libacao) had consistently maintained lower dengue infection cases for the past five years.

10. As the year progresses, neighboring municipalities from the hotspots (Kalibo, Numancia, New Washington, and Malay) have a constant increase in dengue cases.

11. No specific age group was found to be more vulnerable to the disease in response to the change in weather condition.

12. No group by gender could be identified that was associated to seasonal variations and no association exists between the variables sex of the patient and the temporal patterns of dengue.

13. The area where the children reside could slightly impact the number of dengue cases among the younger victims of the disease. It is likely that those living in the coastal area, younger children such as 12 years and below would likely be contracted with the disease while those older children 13 to 30 years old would likely be in the Non-Coastal areas.

14. There is no relationship that exists between the variables sex of the patient and the location of her residence whether Coastal or Non-Coastal areas.

15. There is an absence of relationship between the temporal patterns (weather changes) and spatial patterns (coastal or non-coastal) when it comes to resurgence of dengue cases every year. Regardless of whether one lives in coastal area or in non-coastal area, there is no pattern that a specific season of the year brings any remarkable incidence of dengue in that area.

Conclusions

Based on the findings of the study, the following conclusions were drawn:

1. In terms of age, this study concluded that younger age is associated with the vulnerability of dengue infection. Based on the literature review, dengue infection relatively low throughout childhood and then increases rapidly through adolescence and early adulthood (Egger, 2007). This age group engages in more outdoor activities, giving them more chances of being exposed to infected mosquitoes.

2. The chance of contracting dengue remains high in the Coastal areas compared to the Non-Coastal areas. In addition, the age group of 13 to 30 years old is more vulnerable in acquiring the condition.

3. Across the years, whether a spike occurs in the incidence of dengue cases, the 13 to 30 age group still remains vulnerable to the disease.

4. The place where the younger population lives can slightly influence acquiring dengue infection.

5. There is not enough evidence that supports the connection between the spatial and temporal pattern of dengue cases in Aklan.

6. Kalibo is deemed to be the epicenter of the dengue outbreak.

7. Geographical location, especially places near coastal regions can contribute to one's vulnerability to dengue infection.

Recommendations

Department of Health, Center for Health Development, Western Visayas. The results of this study suggest that transmission of dengue is very focal. These results can inform regional health authorities to reduce dengue transmission by directing the surveillance and the mosquitoes control measures to those places with high dengue transmission.

Aklan Provincial Health Office. The system must ensure that surveillance is linked to response and to the ability to control or limit an epidemic by timeliness, which refers to the speed with which cases or alerts are detected and reported; and sensitivity which refers to the proportion of cases or alerts occurring in the geographical area or population detected by the system. Sensitivity is measured against a "gold standard", often laboratory confirmation, to determine the proportion of dengue signals detected by the surveillance system against all real or confirmed cases or alerts.

Municipal Health Officials. In setting up a surveillance system, consideration should be given to balancing the risk of an epidemic occurring, the value of early intervention in reducing the medical, social, and economic impact of the disease, and the finite resources available for investigation and control