



Prevalence and Severity of Asthmatic Symptoms in Grenada



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Abstract

Objective: The aim of this study was to investigate the connection between prevalence of asthma and geographical location in Grenada.

Methods: The data was downloaded from datadryad.org. The dataset consisted of 1374 patient data and 32 attributes. The study was carried out using SAS and RStudio. The age group of the participants was between 6 and 7 years old. For categorizing an individual as asthmatic “wheeling in the last 12 months” and the physician’s diagnose were considered as asthmatic attributes. For the dataset with a categorical dependent variable ANOVA, decision tree, logistic regression, and Artificial neural network analysis were utilized, to investigate the connection between area and asthma. **Result:** A total number of 1088 cases were used for the analysis, of which 305 were considered as asthmatic and 783 as normal cases.

Introduction

Asthma is most common childhood disease. Asthma causes inflammation in airway which interrupts in flow of air in bronchial causes suffocation and wheeling of chest while breathing. Study suggest that there is no longer increase in asthmatic patient but and review study of 2010 suggest that there is an increase in asthma prevalence in developing nations.

Some factors which triggers asthma are cold air, exercise, allergy (pollen, landfills, dust), and cigarette smoke. The reason to consider Grenada for study is its alarming increase in asthma patients. Saharan dust is transported all the way to Caribbean Sea, where its seasonal condition and dust make Grenada asthma prone region. In last 20 year, there is an alarming increase in asthmatics patient in Caribbean sea countries.

Grenada, a country of 334 km² with population of 105,897 has never had an asthma prevalence study. Grenada is divided into 8 parish. It is a tri-island nation with 94% of population lives in main land and 6% in two small island(Carriacou and Petite Martinique). Asthma is not only an significant burden on patient and caregiver, but also burden on health care system of Grenada. It is one of the main reason of absences on student in school which weaken the education system as well.

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Methods and Materials

Data: Data was collected by following guidance of ISAAC quaternaries. Data was categorical in nature with few independent and mostly dependent variable. Most common data was dichotomous. Data was tired to study on the basis of Area and the wheeling and doctor diagnosis were considered as oracle.

Data Analysis:- The studied was tired to carry out to find is their any correlation between area and number of patients affected. Also severity of asthma on the basis of area and asthma triggering factors.

Effect	Point Estimate	95% Wald Confidence Limits	
a_Cigarette_smoke2	0.548	0.334	0.901
b_Excessive_dust2	0.298	0.190	0.468
c_Burning_bush2	0.347	0.219	0.548
d_Pet_home2	0.884	0.508	1.541
Area Carriacou vs Saint Patrick	1.649	0.715	3.803
Area Petite Martinique vs Saint Patrick	4.397	0.493	39.192
Area Saint Andrew vs Saint Patrick	1.089	0.659	1.800
Area Saint David vs Saint Patrick	1.616	0.907	2.879
Area Saint George vs Saint Patrick	1.093	0.661	1.807
Area Saint John vs Saint Patrick	0.740	0.349	1.571
Area Saint Mark vs Saint Patrick	1.174	0.550	2.506

Figure 1 Odds Ratio

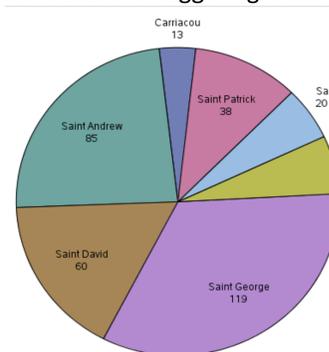


Figure 2. Patient Distribution

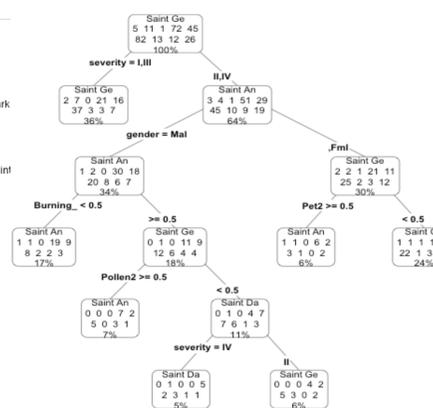


Figure 3. CP value for Tree.

Discussion

From the total considered cases for study, percentage of patient was 28%. As Grenada is divided into separate parish one main part of study was to find out significant variations. The area does not played as an major classifier for factors but severity of asthma showed an relation with area. According to classification tree 36% of St. George parish were coming under type I and III asthma severity.

```

> printcp(rpart.tree)
Classification tree:
rpart(formula = y.learn ~ ., data = x.learn)
Variables actually used in tree construction:
[1] cigarette_smoke2 Doctor_Asthema dust short_breath

Root node error: 280/926 = 0.30238

n= 926
CP nsplit rel error xerror xstd
1 0.471429 0 1.00000 1.00000 0.049915
2 0.042857 1 0.52857 0.53571 0.040042
3 0.010714 2 0.48571 0.50000 0.038932
4 0.010000 5 0.45000 0.52857 0.039825
> plotcp(rpart.tree)

```

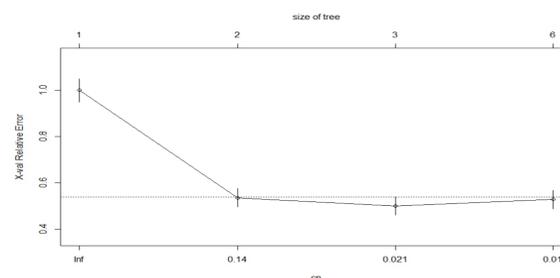
Results

Of total patient female and male percentage were 28.61% and 33.72%. According to last 12 month of wheeling attribute the parish with highest prevalence were St. George, St. David, and St. Andrew and the lowest was Petite Martinique.

According to logistic regression test the factor which trigger asthma most were Burning Bush, exercise ,and pet at home. On the other hand one way ANOVA suggested landfill as triggering reason. While the classification tree gave dust and cigarette smoke as primary result. For classification tree the confusion matrix showed an accuracy of 59.51%, which was better than artificial neural network. The accuracy of ANN according to K-mean method was 28%.

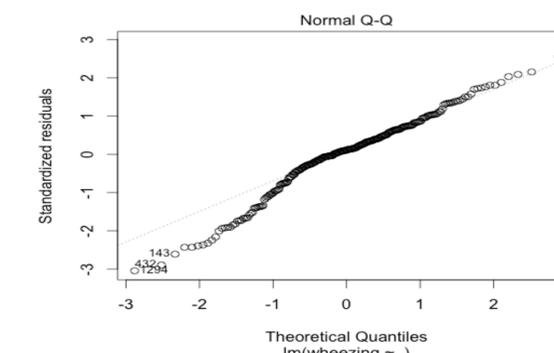
Classification tree on the basis of Area and severity showed that St. David, St. George and Carriacou patients belong to level III severity, while Petite Martinique and St. Patrick patient belong to severity level II and St. Andrew, St. John and St. Mark belong to level IV severity.

Of the total patient, 230 visited to doctor for asthma, with an average of 2.82 %.

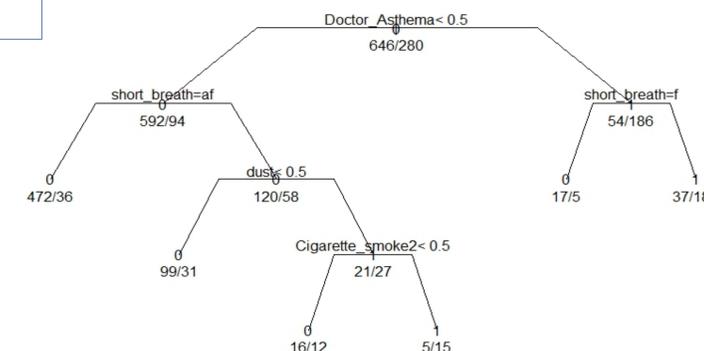


Graph-1 explain size of Tree

Plot



Tree-1. Classification on the basis of triggering factors.



References

- <http://datadryad.org/resource/doi:10.5061/dryad.q68m1>
- <http://bmjopen.bmj.com/content/5/10/e008557>
- <http://www.nhlbi.nih.gov/health/health-topics/topics/asthma>
- https://www.researchgate.net/publication/272844010_Saharan_dust_climate_variability_and_asthma_in_Grenada_the_Caribbean

Guided By-

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