Geographical Health Analysis Using Wavelet Tree

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Abstract: Health analytics encompasses the technologies and skills used to deliver business, clinical and programmatic insights into the complex interdependencies that drive medical outcomes, costs and oversight. Our main objective is to design a system to analyze health issues on location basis and analyze past history and future planning to overcome the issues in terms of medicine requirement, precautions, govt.policy reformation and future planning. Government and private organizations can gain insights to strengthen financial and budgetary performance, and improve the way health care is conceived and delivered for better outcomes across the entire spectrum of health industries. In this paper, we analysis regarding the past trend of diseases in 35 states and union territories of India. For better, fast and accurate analysis, we proposed and implemented geographical health analysis software using wavelet tree.

Keywords: Epidemiology, Wavelet Tree.

I. INTRODUCTION

Worldwide, there are approximately 56 million deaths annually and people predominately die of infectious diseases: lower respiratory infections, HIV/AIDS, diarrheal diseases, malaria and tuberculosis etc. is collectively accounted for almost one third of all deaths in the country like India [1]. The purpose of to design health analytics system is to bring the information together and create a comprehensive picture of health system in India. To develop a well- built Health Analytics System three things were needed, a central database containing the Health Related Information, a common coding system to classify the data, and resources to carry out the work. Even though in recent times the Government initiatives in public health have recorded some successes in areas such as eradicating smallpox and Guinea worm and also

There is regular decline in the number of cases of Leprosy, Polio, and Malaria etc. However India's achievements in health outcomes are only moderate as comparing to international standards [2]. Thus Health AnalyticsSystem the specific data that can help government bodies to improve health condition across India. Helping them in developing future strategies and plan to execute .Thus helping the government and NGO's and hospitals in enhancing the health condition in India.

II. RELATED TERMINOLOGY

Health analytics It makes extensive use of data, statistical and qualitative analysis, explanatory and predictive modeling which leads, supports and coordinates the acquisition, provision and use of clear, accurate and appropriate data and analyses it so that public health program and policy decisions can be made through internal and external partnerships[7].

Epidemiology is the science that studies the patterns, causes, and effects of health and disease conditions in defined populations. It is the cornerstone of public health, and informs policy decisions and evidence-based practice by identifying risk factors for disease and targets for preventive healthcare.

Avoidable deaths it refers to those that could've been avoided extremely easily with either the most basic or cheap medication or treatment.

Infected: a Person is said to be infected with a disease when he is invaded by the microorganism that carries the disease

Casualty: a person who is killed from a disease.

Public health refers to the science and art of preventing disease, prolonging life and promoting health through organized efforts and informed choices of society, organizations, public and private, communities and individuals. It is concerned with threats to health based on population health analysis. The population in question can be as small as a handful of people, or as large as all the inhabitants of a country

III.   BUILDING HEALTH ANALYTICS INFORMATION SYSTEM

Diseases such as dengue fever, hepatitis, tuberculosis, malaria and pneumonia continue to plague India. According to statistics India has a life expectancy of 64/67 years (m/f), and an infant mortality rate of 46 per 1000 live births and ranks 150 in list with other countries having a life expectancy of 80 above[8,9].

This is mainly because rural India contains over 68% of India's total population, and half of all residents of rural areas live below the poverty line, struggling for better and easy access to health care and services. Health issues confronted by rural people are many and diverse – from severe malaria to uncontrolled diabetes, from a badly infected wound to cancer. They aren't enough hospitals and clinics to treat the patients or they don't have the resources needed for the treatment [10].

Health Analytics Information System is built to provide valuable information to its users. It is built with the aim to provide the statistical information of diseases in states of India such as

* Threat level of a diseases in particular part of India such as infected, causalities etc. in recent years.
* To provide easy to understand description of diseases with information of symptoms, diagnosis, prevention and treatments available in different parts of India.
* To provide information about the standard of facilities available to cure these disease in each states and the money spent by the government on the infrastructure to prevent and cure the diseases in future.
* To provide information about the latest government policies and plans in the field of health and there current status of implementation.

So Health Analytics System can help the related NGO's, regulatory bodies, government, hospitals in understanding the current status of health across India and can deliver the crucial insights necessary to propel toward growth and success by:

* Getting new medications to patients faster.
* Providing regulatory bodies with evidence of drug safety and efficacy.

* Find new ways to cure or prevent the disease.
* Improving manufacturing processes and sales and marketing efforts.
* Identifying and developing the next generation of health care treatments.
* Identifying optimal strategies to commercialize treatments.

IV.   DATA COLLECTION AND PROCESSING

In our analysis we have gathered medical data of various disease in different states and union territories of India. The data has been collected from different government sites and surveys by different medical institutions in particular area of medical field. Data has been gathered by crawling of government and related sites where the data is available [11,12]. As shown in Figure 1, we have gathered most of the data about 35 states and union territories by crawling the government site http://cbhidghs.nic.in/ which contains real data about the person infected with disease and the casualty occurred in each state [13,14].

The analysis of data has been done in a way to provide easy to understand and valuable information about the statistics of health in different states of India to the users such as

* It should be able to clearly specify the status and trends of government plans in medical filed.
* It should be able to give a clear view of threat level of disease in different areas of India.
* It allows the users to provide the information of standard of facilities in different regions of India.

After the analysis we structured the data according to our needs so that they can be stored in the database such that we can easily fetch the data from database and represent it to the users.
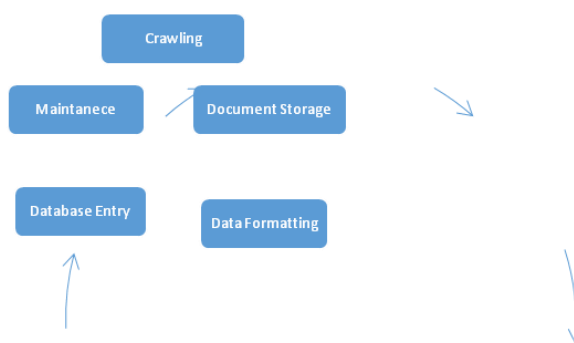

Figure1 Process of Data Collection

V. RESULT ANALYSIS

The trends or status of different disease is represented in the form of graph. The pictorialrepresentation helps end user to understand the past trend various diseases in various states so that they can use the data to assign more resources and provide better medicines to that particular state. Also we can find all the relevant data about latest news and trends about disease hospitals and advancements that are being done in field of medicine.

The data is represented in pictorial form because pictorial representation of the Clinical data combined with administrative data in the form of pictorial representation elements like bar graphs and pie chart can be helpful to demonstrate if the money being spent to improve population health is actually working. And, as digital data streams grow, analytics will become more critical to manage costs and use scarce resources wisely.

In this Analysis there are two type of charts that is used to represent the data are:

1) Bar Chart

As shown in Figure 2 and Figure 3, Two Bar graph one displays the number of people infected by a disease in a particular state over theyears andthe other to display the number of casualty that happened due to the disease.
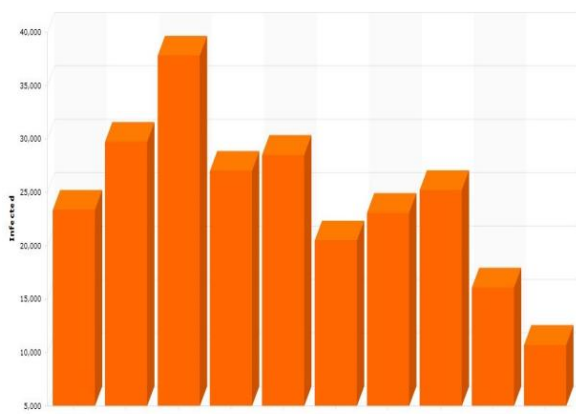

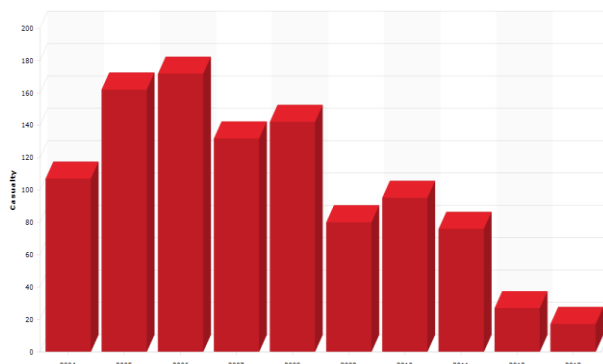Figure 2 Infected people due to Kala Azar in Bihar

Figure 3 Casualties due to Kala Azar in Bihar

2) Pie Chart

As shown in shown Figure 4 and Figure 5 two pie charts that compares data of the selected state with all the other states so that we should able to know which state has more number of infected and casualties than other in a particular year to understand the medical standard of a particular state.
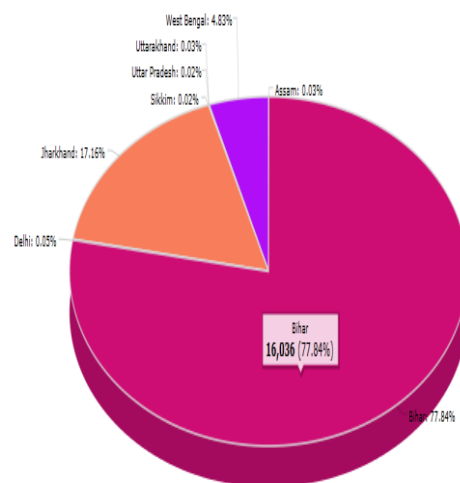

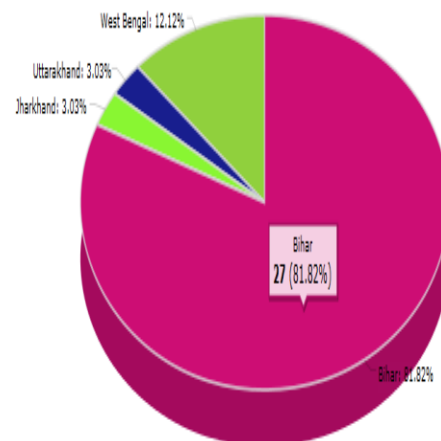Figure 4 Percentage of people infected by Kala Azar in all states

Figure 5: Percentage of casualties caused by Kala Azar in all states

VI. CONCLUSION

The Project can be used to conduct a systematic review of existing evidence, make use of vital statistics data, formulate precise definitions of disease and other variables, collect data in an even-handed manner, employ checks of reliability and validity of the data, and analyze the data with due attention to alternative explanations of the findings. On continuing to work forward on this project influences that can be made on public health like

Developing scientific knowledge and technology changes for better understanding of disease and approaches to studying it andexpanding social organization and investment in public health resources to increase the opportunities for epidemiologic research and application so that it can help the government and private organization in efficient allocation of resources.There is a great work that still needs to be done, the data of each districts can be stored so that the local organizations and state government can focus areas which need medical help and resources. By using spatial data and analyzing the trend of diseases near a particular region we can gain more insight how demographics affect the trends of epidemiology in that area ancan pin point the most affected areas so that we can analyze and root out the cause for diseases.

REFERENCES

[1] Brockington, C. Fraser. The history of public health. In: W. Hobson (ed), Theory and practice of public health. NY, Oxford, 1979, 1-8.
[2] URL http://www.sas.com/en_us/insights/health-analytics.html
[3] URL http://www.thehealthsite.com/diseases-conditions/what-ails-indias-healthcare-system/
[4] URL http://en.wikipedia.org/wiki/Health_in_India
[5] Committee for the Study of the Future of Public Health. The future of public health. Washington, DC,National Academy Press, 1988.
[6] Comstock, George W. Tuberculosis – a bridge to chronic disease epidemiology. Am J Epidemiol1986; 124:1-16.
[7] P.Elliot and D wartenberg, Spatial epidemiology Current approaches and future challenges.
[8] Environmental Health Perspectives June 2004. 112:998
[9] Website of the ESRI company "URL www.esri.com"
[10] Dubos, Rene. Man adapting. New Haven, CT, Yale, 1965.
[11] Dubos, Rene. The mirage of health. NY, Anchor, 1961
[12] Epidemiology Monitor. The future of epidemiology. Epidemiology Monitor 1999 (February); 21(2)
[13] Elmore, Joann G. and Alvan R. Feinstein. Joseph Goldberger: an unsung hero of American clinicalepidemiology. Ann. Intern. Med. 1994; 121:372-375.1986; 124:1-16.
[14] Epidemiology Monitor. The future of epidemiology. Epidemiology Monitor 1999 (February); 21(2)