

“Health Surveillance System using a Web Application”

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Abstract:

Generally, the health of the people in the state will be governed by observing the reports submitted by the health care centers . But the analysis of the given data is restricted to certain limits.

By using Gis when each and every patient’s address is mapped in separate layers classified with respect to their health issue and this can be done by using a web application at every hospital’s reception and the data is transmitted to the ministry of health where the analysis becomes quite efficient and the changes for betterment of the health of the people in a particular area can be made. Even the spread of viral diseases can be detected before any loss. To know the extents of analysis, I used Esri arc gis to map the data in different layers and thought this would be great if comes to reality.

To make that happen .we can use Esri maps and the mapped layers can be updated and displayed in frequent intervals of time by using the esri’s libraries. The efficient analysis can be carried out by using the Esri’s Arc Map software at the Health ministry end.

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Introduction:

In the present day situation of increasing health issues and viral infections day by day, the governance of the public health has become complicated. The diseases are mainly categorized into two types, communicable diseases and non communicable diseases (NCD's).At present, people are suffering with numerous chronic Non Communicable diseases(NCD's).In the world NCD'S are the reason behind 63% of all cases of deaths. Communicable Diseases are the sudden outbreaks like Ebola, Swine-Flu that cause huge loss in a short period. These can be solved in the real time by a simple idea.

"What gets measured gets done."

-Anonymous

For the effective Measurement of these diseases, we need an effective public health surveillance systems in our country. Public health surveillance is the ongoing systematic collection, analysis, and interpretation of data, closely integrated with the timely dissemination of these data to those responsible for preventing and controlling disease and injury ([Thacker and Berkelman 1988](#)). The main idea of this paper is to develop an efficient surveillance system that collects and analyses data in real time and with the use of Gis and a Web application.

Need for an Efficient Public Health Surveillance System:

The main factors responsible for the Outbreak of these diseases are the Environmental conditions. To control them we must have a strong observation on the environments where majority of the affected people are living. But it is not possible to have a strong observation over the entire nation with the current Surveillance systems present available for the government. At present emerging and re emerging diseases are being reported for National Centre for Disease Control (NCDC).But this was not adequate .Details of surveillance are not available, the coverage in the entire country is not complete. In the present system involving government public health officials for the data collection and reporting, To a large extent it depends on the whims and fancies of those officials .

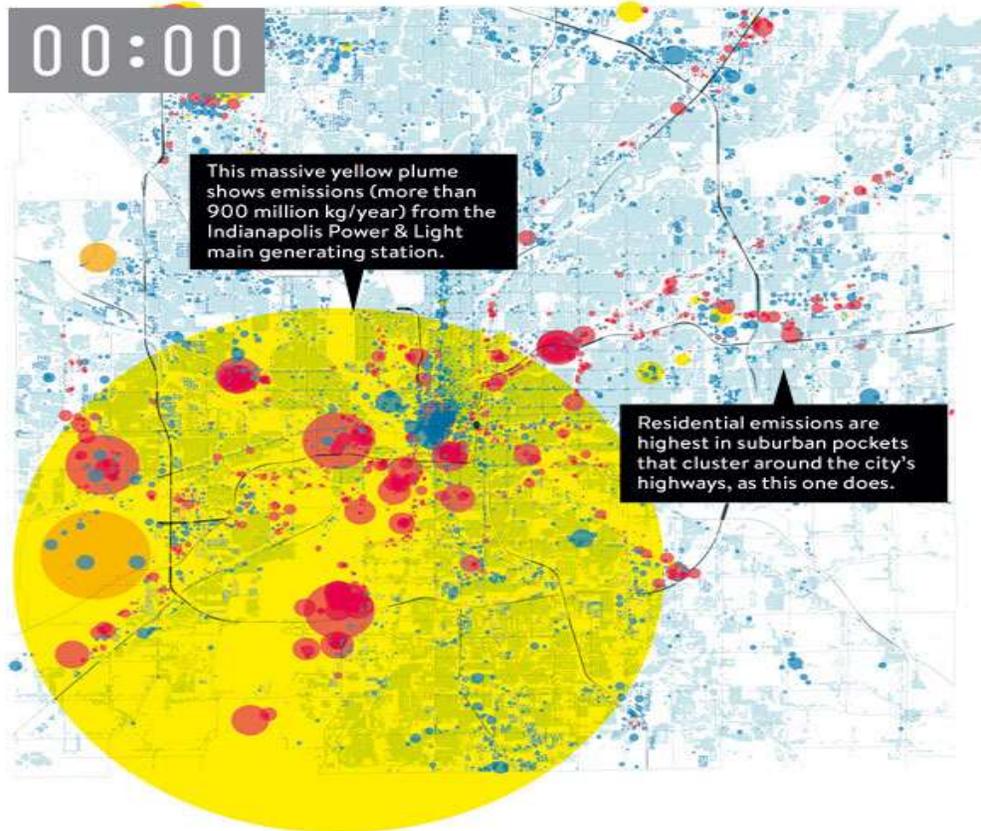
In the case of Communicable diseases which outbreaks suddenly must be dealt in real time. Generally the data generated at such outbreaks is not the realtime data, and it is analysed after the epidemic is over not at the time of outbreak which is of no use. So we have to develop an efficient surveillance system to collect the data in real time and must be analysed before the epidemic is over.

Health Surveillance System :

To create an effective surveillance system a web application that is capable of data collection transmission and analysis up to an extent is sufficient .For more analysis we can use Esri's Arc map. The web application is under the process of construction. This web application mainly uses the products of Esri such as map layers and shape files of locations .

Major Features of Web Application:

- A web application that involves different layers of GIS data is the major part of this surveillance system. It will be an effective method of data collection.
- This web application must work at each and every hospital and health centre where the addresses of each and every patient is stored on a map.
- This application also consists the other data involving environmental factors like pollution data (Air& water), Sanitation data etc of each and every area of the country.
- The application consists of different map layers named based on different health issues.
- Each layer shows the locations of the people suffering with different health issues.
- This data is stored in a database which is hosted by a server operated by the health ministry.
- There will be a backend application for reviewing the data from the database.
- The application allows to compare the pollution data layers and location data layers with each other to find the environmental conditions of the specific area.
- An example of the pollution layer which shows the carbon emissions is shown in fig1.
- An example of showing the NCD affected patients and the pollution data of Bhubaneswar showing in a single layer is shown in fig2.



CARBON EMISSION SOURCES

- | | |
|---------------|---|
| ● RESIDENTIAL | ● AIRPORT |
| ● COMMERCIAL | ● → ● RELATIVE AMOUNT OF EMISSIONS PER YEAR |
| ● INDUSTRIAL | |
| ● TRANSPORT | |
| ● UTILITIES | |

Fig:1 – Carbon emissions in indianapolis

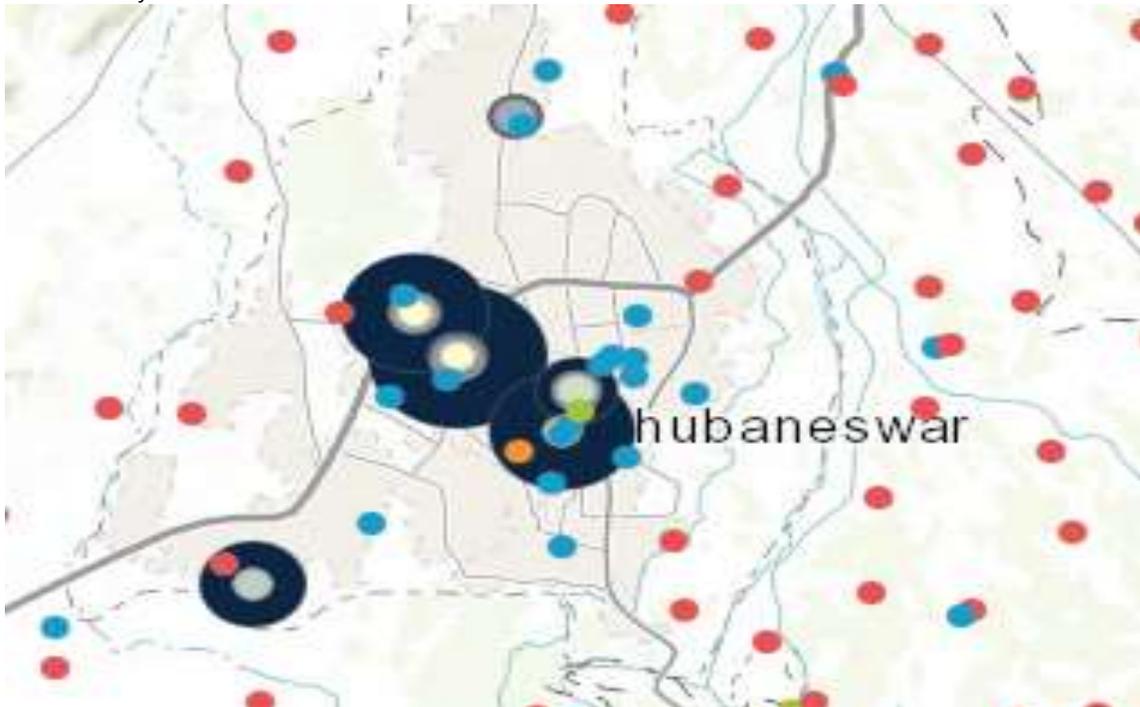


Fig:2 – circles showing the pollution data of Bhubaneswar and blue dots showing asthma affected people and red dots showing chronic diseases(only sample data)

General Working of a surveillance system:

The web application that collects data will be present at each and every hospital and health centers. The locations of the different patients suffering with different diseases are marked in the different layers of the map .The remaining details of the patient are saved as the attributes for the location such as name , employment , severity of his disease etc. This data is constantly updated to the database through internet .This data can be easily reviewed at the ministry end and downloading the required layer of disease and analysis must be done by downloading and comparing the disease layers with the different layers of data like air pollution data, water quality data, rain fall data etc from the website .This can be done by using Arcmap software and real time analysis can be made.

working of surveillance system in case of solving Communicable disease:

Let us assume that a sudden outbreak of flu is occurred in an area. Then each and every patient who got affected rushes to the hospital and their location data is collected primarily and stored into a new layer

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named flu layer. Data from all the hospitals in the area is updated into the layer. Then this data goes on increasing as the patients who got affected by the flu increase. When this data is viewed properly, we can find some patterns about areas where more people are affected and the reasons behind the spread of flu can be obtained in real time so that the spread of the disease can be stopped immediately and we can also get the information about factors responsible for the flu are known and proper measures can be taken in the real time to save the people from the epidemic.

Working of surveillance system in case of solving non communicable diseases

Let us take some of the non communicable diseases like chronic diseases and Asthma. Let's get started by mapping the locations of people suffering with these diseases and the data is stored into new layers named with their respective disease names and this data is updated into the database. When this data is reviewed, we cannot find any kinds of patterns solely. But when we combine these disease data layers with the air pollution data layer, water pollution data layer and other layers of data about different environmental factors, we can get different patterns like areas having more pollution will have more number of asthma patients and effective measures can be taken to control the pollution in the area and also protective measures can also be suggested to the people for not getting affected.

Conclusion

“The health of people is the foundation upon which all their happiness and all their powers as a state depend”

– Benjamin Disraeli, British Prime minister.

The public health expenditure in India (total of centre and state governments) has remained constant at approximately 1.3% of the GDP between 2008 and 2015, and increased marginally to 1.4% in 2016-17. This is less than the world average of 6%. Note that the National Health Policy, 2017 proposes to increase this to 2.5% of GDP by 2025.

Including the private sector, the total health expenditure as a percentage of GDP is estimated at 3.9%. Out of the total expenditure, effectively about one-third (30%) is contributed by the public sector. Two thirds of the expenses made by the governments is going into trashcan due to the lack of an effective health surveillance system.

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With the help of an effective surveillance system the funds can be used effectively and people are going to lead a healthy and a happy life.

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