A SPATIO-TEMPORAL SCENARIO OF HIV/AIDS IN VISAKHAPATNAM DISTRICT – A MEDICAL GIS APPROACH

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HIV/AIDS

Incurable Human Immuno deficiency Virus (HIV)

Acquired Immuno Deficiency Syndrome (AIDS)

Health is a broad concept; it is not simply a biological phenomenon but is also influenced by various social, economic and political determinants
Any country development is also depends on the public health which reflects the health care system consisting the good hospitals in the required locations and conducting proper awareness programs on the diseases.

The HIV epidemic not only affects the health of individuals, it impacts households, communities, and the development and economic growth of nations.

Early marriages, poverty and flesh trade, lack of proper awareness about safe sex, etc. are responsible for spreading AIDS. Most of those living with HIV reside in low and middle income countries.
GIS

Geographical Information System (GIS) is attached to many operations and has many applications related to engineering, planning, management, transport, logistics, insurance, telecommunications, business and health.

The success of the HIV/AIDS control program mainly depends on the accurate identification and geographical reconnaissance of high-risk areas.

Modern mapping approaches such as computerized GIS are economical, efficient, and supportive of other health systems, web transferable and rapidly becoming user friendly due to decision support approach.
Globally, estimated 35.3 (32.2–38.8) million people were living with HIV in 2012. There were 2.3 (1.9–2.7) million new HIV infections globally and 1.6 (1.4–1.9) million AIDS deaths in 2012.

It is estimated that around 2.4 million people are living with HIV with an adult prevalence of 0.31%.

It is observed that this epidemic is largely concentrated in the industrialized South and North-East of India.

The highest estimated adult HIV prevalence is found in Manipur (1.40%), followed by Andhra Pradesh (0.90%), Mizoram (0.81%), Nagaland (0.78%), Karnataka (0.63%) and Maharashtra (0.55%).
Year wise HIV cases in Andhra Pradesh
(Source: APSACS Reports)
Study area

• The Visakhapatnam district is situated on the sea shore of “Bay of Bengal” between 17°41’18.16″N lat 83°13’07.53″E long.

• Visakhapatnam district divided into 43 mandals occupies an area of 11,161 sq. km.

• The area is well connected by road, rail, sea and air-ways. It is often called “city of destiny” the best tourism destination in Andhra Pradesh. Visakhapatnam district registered HIV positive 2,177 cases in 2012.
Study area

Location map and Mandal wise HIV cases in Slums/villages in 2012
It is clear that the whole new registered cases are varying quantitatively but the mandal which has the highest positive cases remains in the highest position similarly the mandal which has the lowest cases remains lowest for the years (Fig.3). This study is mainly focusing on spatio-temporal change of HIV cases besides causative parameters in Visakhapatnam district.

Year wise HIV cases in Visakhapatnam district (Source: District AIDS control office)
Materials and Methods

Data used in the study

• Survey of India Toposheets on 1:50,000 scale.
• Visakhapatnam district handbook 2012 for locating Tourist places and PHCs.
• Statistical details of HIV/AIDS cases in Visakhapatnam district (Source: District AIDS controller).
• FSWs and MSMs information from different NGOs.
• Urban slums details collected from GVMC.
• Field observations on Dhabas and Truck repair centres along the National Highway.
Slums/Villages

Low income groups are mostly residing in urban slums and in rural villages. The urban slums in GVMC area and rural villages of low income group are considered.

Observed, urban slums/villages are more vulnerable and affecting group than the urban posh areas.

To assess this, multi-ring buffer with 0-1 KM around them as one region and 1-2 KM is considered as another. Weights were assigned on the basis of slums/villages and Urban areas in the study area.
Dhabas and Truck Repair Centre

Truck drivers are highly mobile spend long hours on road-ways and they are away from their families. Their need for entertainment and female companionship, coupled with relative solvency compared to the rest of the population, makes them very likely to use the services of commercial sex workers in stop-over towns near major transportation routes.

So, dhabas and truck repair places near Anakapalle, and Thagarapuvalasa along the National Highway-5 is studied. Observed FSWs are mobile and by-pass roads are having more of this nature.
Tourist Places

Tourism is a significant contributor to the economic wealth in the world. So, tourist places are the high risk zones due to more visitors comes from all over the world.

Foreign tourists are coming by merchant ships and Air. If they stay long period they may go for sex with locals, which is also one of the causative parameters for spreading HIV.

Araku often called as “Andhra Ooty” attracting tourists mostly from West Bengal, Orissa and other parts of India.

Due to poverty and unawareness, local tribes are becoming prey in flesh trade in Araku and surrounding areas and this is the reason for more number of positive cases registered.

Though the number of cases is relatively few in Araku in comparison to Visakhapatnam urban, but most of the locals acquiring from the tourists.
Transportation Network

• The Visakhapatnam city in the study area is well connected by Road, Sea, Rail and Air ways. The National Highway-5 (NH-5) is entering from Tuni and passing through the major cities like Addaroad, Elamanchili, Anakapalli, Visakhapatnam and Thagarapuvalasa.

• Except Viskahapatnam, remaining four areas are having close vicinity with rural areas.

• Rural people used to migrate to the urban municipalities in search of work. Mostly they are working as coolies as daily wage workers or as workers in hotels, etc.

• In Visakhapatnam most of the daily wage workers are from the tribal areas of Araku, Paderu, etc. they are illiterates and they may not have idea about safe sex and spread of HIV.
Transportation Network and HIV cases in 2012
Literacy

- Precautionary measures must be followed to arrest HIV transmission through social, blood, mother to child.

When people aware about the HIV/AIDS and the ways of HIV transmission from one person to others, makes people a bit safer than without knowing that.

Successful management of HIV requires patient understanding and ability to act on treatment information. It is observed from the Figure 6, the impact of literacy in the HIV transmission is very low.

Significantly, the areas having high literacy rate is also suffering with high incident rate. It implies people are negligent or presume that the partner may not have the disease.
Literacy rate and HIV cases in 2012
<table>
<thead>
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<th>Number of FSWs</th>
<th>Class Weight</th>
<th>Number of MSMs</th>
<th>Class Weight</th>
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<tr>
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<tr>
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Female Sex Workers (FSW)

Visakhapatnam has cosmopolitan culture and population with Female Sex Workers (FSWs) concentration varies from place to place.

It is observed that higher FSWs are in Visakhapatnam urban and Anakapalli.

The HIV cases are almost proportional to the number of FSWs in that area.

Figure 4 shows the relationship between the Female Sex Workers and HIV positive cases in Visakhapatnam district.

In that map, each dot indicates 4 FSWs in that mandal and percentage HIV cases is shown with color intensities.
Mandal wise HIV cases and FSWs in Visakhapatnam District
The information about Men who Sex with Men’s (MSMs) is not clear in all parts of the study area.

Collected the information in 15 Mandals which are having high number of MSMs and rest are considered as negligible.
<table>
<thead>
<tr>
<th>Slums/Villages Weight – 9</th>
<th>Dhabas Weight – 7</th>
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HIV/AIDS Intensity

The various thematic maps are generated by using GIS and assigned with different weightages of numerical value to derive the HIV intensity levels.

In past, several studies are done to use GIS for health. Snow (1854), made the hypothesis that cholera might be spread by the infected water supplies more than one and half century ago using maps to demonstrate the spatial correlation between cholera deaths and contaminated water supplies in the area of Soho.

HIV/AIDS intensity map is prepared on the basis of weights assigned to the thematic maps. It has been classified into five zones namely very high, high, moderate, low and very low (Fig.7).
HIV/AIDS intensity map in Visakhapatnam district
Psychology of AIDS patients

- Psychology of HIV patients
  1. Unbelievable and suspect attitude
- Stage-1
  2. Argue with the doctors and reports may be false
  3. Introspection about the deeds

- Stage-2
  1. Blame the god
  2. Express sense of un-controlling
  3. Emotional imbalance
  4. Doubtfulness regarding any change in the body
  5. Disappointment
GIS supports evaluation, monitoring and planning any area health related issues. GIS supported by spatial data and health data can give the information for effective planning to decrease the HIV/AIDS patients in an area.

GIS is used not only for environmental monitoring, and also used as an effective tool to manage and monitor diseases. As health is largely determined by spatial factors GIS is the powerful tool for analysis of spatio-temporal changes.

In Visakhapatnam district, HIV virus is majorly transmitting through vertical transmission.

The proposed new PHCs in the Visakhapatnam district are to be in Visakhapatnam city, Anakapalli, Paderu, Araku Valley.

Observed, in this study that the HIV/AIDS is in decreasing trend owing to efforts of the Government and NGO organizations.

Similarly, advertisements in different forms are also motivating people on this issues, except illiterates and tribals in the area. The authors opined apart from regular medication, Psychologist counseling is also required in order to overcome social stigma.
THANK YOU