An Analysis of Dengue Fever in Thiruvananthapuram Corporation, Kerala - A GIS Approach

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Abstract: Medical Geography (Health Geography) is the branch of Human Geography that deals with the Geographic aspects of health, (status) and health care system. It seek along with related disciplines such as medical Anthropology medical sociology and health Economics to improve our understanding of the various factors which affected of the population and hence individual. Health is a common theme in most culture. In fact, all communities have their concepts of health as part of their culture. Among definition still used, probably the oldest is that health is the “absence of disease”Health has evolved over the centuries as a concept from an individual concern to a world wide social goal and encompasses the whole quality of life. The widely accepted definition of health is that given by the World Health Organization (1948) in the preamble to its constitution, which is as follow. Objective of this study. To study concept of Dengue fever its symptoms, causes, diagnosis, prevention and treatment. To analyse the dengue fever in Kerala during the year-2003.To analyse the month wise incidences of dengue in Thiruvananthapuram District (2003-2008)To analyse the Taluk wise distributions of dengue fever in Thiruvananthapuram district.To analyse the trend of dengue in Thiruvananthapuram district from (2003 to 2008).To analyse the spatial distributions of dengue in Thiruvananthapuram corporation (2006) To analyse the spatial distributions of dengue in Thiruvananthapuram corporation in 2008. To analyse the month wise registered dengue causes in Thiruvananthapuram corporation during (2006-2008).To analyse the spatial variation of dengue in Thiruvananthapuram corporation during the year 2006 and 2008.The city lies between the latitude of 8026” to 80 32’N and longitude 76 53” and 770 1 E. It is bounded by Karamana river on the south eastern sides. The lakshadweep sea lies on the west of the city. The city occupies the south west portion of peninsular India. As the study was intended to investigate the Geo spatial analysis of dengue in Thiruvananthapuram corporation. The study was carried out at various levels. At the micro level a broad analysis has been made for the entire state. But recent data is most available. Hence the study is restricted to 2003 only. At the next level, Thiruvananthapuram district as a whole has been studied intensively. At the micro level, all the wards of Thiruvananthapuram Corporation has been studied systematically.The people of study area are highly educated and they have aware about dengue. But the people participation in control of Aedes mosquito is very low in the study area. The Government of Kerala NGO’s voluntary organisation, residential association and student organisation are take necessary steps to control the Aedes mosquito and conduct the awareness programme for the public and analysis of the present study the investigator used Arc GIS 9.1.

Keywords: Diagnosis of Dengue Fever, Epidemiology of Dengue in Kerala, Prevention of the Disease.

1. Introduction

Medical Geography (Health Geography) is the branch of Human Geography that deals with the

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Geographic aspects of health, (status) and health care system. It seek along with related disciplines such as medical Anthropology medical sociology and health Economics to improve our understanding of the various factors which affected of the population and hence individual. Por John Blunden (1972) “Disease Diffusion studies” the Analytical approaches Disease Diffusion, Health care and Health Behaviours. In his studies mainly to described about the introduction and spread through the British Isles of bubonic plague, a disease carried by a species of rate and transferred to man by the flea. The analyatical approaches consist of diseases Diffusion, location and allocation and accessibility model health behaviour, and traditional medicine both physical and Social-Economically and cultural factors contribute to the spread of diseases. Egunjobi.L (1975) “Prevalent disease in the North of Oyo study prevalent Diseases in the North of Oyo state, Nigeria. In his studies to deal with the environmental and nutritional determint of the health problems in the North part of Oyo state of Nigeria. It is found that water storage may have significant contributor to the health problems of the people especially in the rural area. Linda M. White ford (1997) “studied that the Ethno ecology of Dengue fever. The main objective of his study were conducted an ethnography of dengue fever, describe the household ecology of needs aegypti, identify constraints to community-participation activities, and propose feasible mean to overcome the constraints.Kawaguchi Akira Sasaki Michael Boots, (2003) studied on a Dengue Virus serotypes so distantly related enhancement and limiting serotypes similarity between Dengue virus strains. In objective of his studied Dengue virus, the causative agent of dengue fever has four major serotypes characterized by large genetic and immunological distance. Classical dengue fever causes and mathematical model is represent that describes the epidemiological dynamics of two serotypes dengue virus.C Armstrong (1869-1970) studied on a Dengue fever, and its importance of this disease Geographical distribution Etiology and epidemiology influence of economic status crowding in this disease.S. Matta, S.Bhalla, D Singh, S.K Rasania. S singh (2006) studied on knowledge. Attitude as practice on dengue fever a hospital based study.Health is a common theme in most culture. In fact, all communities have their concepts of health as part of their culture. Among definition still used, probably the oldest is that health is the “absence of disease”, Health has evolved over the centuries as a concept from an individual concern to a worldwide social goal and encompasses the whole quality of life.

2. Aim and Objectives

The Important objective of this study.

2. To analyse the dengue fever in Kerala during the year-2003.
3. To analyse the month wise incidences of dengue in Thiruvananthapuram District (2003-2008)
4. To analyse the Taluk wise distributions of dengue fever in Thiruvananthapuram district.
5. To analyse the trend of dengue in Thiruvananthapuram district from (2003 to 2008).
8. To analyse the month wise registered dengue causes in Thiruvananthapuram corporation during (2006-2008).
9. To analyse the spatial variation of dengue in Thiruvananthapuram corporation during the year 2006 and 2008. 3. Study Area
The city lies between the latitude of 8°26’ to 8°32’N and longitude 76°53’ and 77°1 E. It is bounded by Karamana river on the south eastern sides. The Lakshadweep sea lies on the west of the city. The city occupies the south west portion of peninsular India. Thiruvananthapuram city represents a typical medium sized city in India, having its own peculiar characteristics and problems. Till recently there was hardly any planning for the development of the city. It is only recently that Thiruvananthapuram development Authority was established for the planned development of the city and the adjoining areas. Nearing the status of million city makes the problem associated with the Thiruvananthapuram city more. Even though not an industrial city which attract a population of workers and job seekers, the rapid increase in the population is a growing menace which will affect all the development programmes and facilities associated with the city.

Figure 1: Location Map

3. Methodology

As the study was intended to investigate the analysis of dengue in Thiruvananthapuram Corporation. The study was carried out at various levels. At the micro level a broad analysis has been made for the entire state. But recent data is most available. Hence the study is restricted to 2003 only. At the next level, Thiruvananthapuram district as a whole has been studied intensively. At the micro level, all the wards of Thiruvananthapuram Corporation has been studied systematically. The present study relies upon primary as well as secondary data. The primary data were collected from direct field visits and observation. Secondary data obtained from district medical office (DMO), Thiruvananthapuram and National Rural Health Mission, Thiruvananthapuram Department of Community Medicine Medical College Thiruvananthapuram, Office of the Ministry of Health, Government Secretariat Thiruvananthapuram. A data base is prepared showing attribute of spatial entity for the present study following data were collected from secondary sources. The District wise dengue in Kerala, Taluk and month wise dengue cases in Thiruvananthapuram district (2003 and 2008) and ward wise data from Thiruvananthapuram.
Figure 2: Administrative ward Map

4. Drainage

The Karamana and Killiar are the two most important rivers flowing thorough the city. The Karamana river originates from western ghats, (Chemmundi Motta) and is the eastern boundary of the city. Killiyar is a small stream which raises in the Nedumangad hills. Its coarse is generally towards the south and it flows through the middle of the city Killiyar joins the Karamana river at Kalladimughan near Thiruvallam. Killiyar irrigates the rise lands by means of channels taken off from it and supplies water to some of the principles tanks in the area. The other three minor streams mainly Ulloor thodu, Pattom thodu and Vanchiyoor thodu joint together at Kannamoola and flow to Akkulam lake.

Figure 3: Drainage Map
5. Geo Spatial Analysis of Dengue in Thiruvananthapuram Corporation

5.1 Dengue Fever in Kerala

Table 4.1 shows that distribution of dengue fever cases in Kerala. This table revealed that dengue fever cases are reported from almost all the districts of Kerala. The reported dengue fever cases in percent varies from 1.38 percent in Wayanadu district to 22.25 percent in Trivandrum district. The dengue fever cases of 10% or more reported from Thrissur (10.23%) Malappuram (15.40%), Trivandrum (22.25 %) and rest of the districts had less than 10 percent of dengue fever cases. Thiruvananthapuram district is highly affected by dengue in 2003, because of rapidly increasing population, rainfall in seasons, water receptacles (Coconut shell, Plastic materials, flower pots etc) and socio economic conditions.

<table>
<thead>
<tr>
<th>SI No</th>
<th>District</th>
<th>Dengue Fever Cases</th>
<th>Percentage of Cases</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Trivandrum</td>
<td>789</td>
<td>22.25</td>
</tr>
<tr>
<td>2</td>
<td>Kollam</td>
<td>186</td>
<td>5.24</td>
</tr>
<tr>
<td>3</td>
<td>Pathanamthitta</td>
<td>166</td>
<td>4.69</td>
</tr>
<tr>
<td>4</td>
<td>Alappuzha</td>
<td>220</td>
<td>8.20</td>
</tr>
<tr>
<td>5</td>
<td>Kottayam</td>
<td>191</td>
<td>5.39</td>
</tr>
<tr>
<td>6</td>
<td>Idukki</td>
<td>226</td>
<td>6.38</td>
</tr>
<tr>
<td>7</td>
<td>Eranakulam</td>
<td>319</td>
<td>8.99</td>
</tr>
<tr>
<td>8</td>
<td>Thrissur</td>
<td>363</td>
<td>10.23</td>
</tr>
<tr>
<td>9</td>
<td>Palakkad</td>
<td>147</td>
<td>4.14</td>
</tr>
<tr>
<td>10</td>
<td>Malappuram</td>
<td>546</td>
<td>15.40</td>
</tr>
<tr>
<td>11</td>
<td>Kozhikode</td>
<td>69</td>
<td>1.94</td>
</tr>
<tr>
<td>12</td>
<td>Wyanad</td>
<td>49</td>
<td>1.38</td>
</tr>
<tr>
<td>13</td>
<td>Kannur</td>
<td>154</td>
<td>4.34</td>
</tr>
<tr>
<td>14</td>
<td>Kasargode</td>
<td>121</td>
<td>3.41</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>3546</td>
<td>100</td>
</tr>
</tbody>
</table>

Table: 1: District wise Dengue Fever Cases in Kerala – 2003

Figure 4: District wise Dengue Fever Cases in Kerala, Dengue fever in Thiruvananthapuram District
Table 2: Month wise incidence of cases in Thiruvananthapuram District 2003-2008

<table>
<thead>
<tr>
<th>Month</th>
<th>2003</th>
<th>2004</th>
<th>2005</th>
<th>2006</th>
<th>2007</th>
<th>2008</th>
</tr>
</thead>
<tbody>
<tr>
<td>No of Cases</td>
<td>No of Cases</td>
<td>No of Cases</td>
<td>No of Cases</td>
<td>No of Cases</td>
<td>No of Cases</td>
<td>No of Cases</td>
</tr>
<tr>
<td>January</td>
<td>22</td>
<td>21</td>
<td>15</td>
<td>68</td>
<td>33</td>
<td>23</td>
</tr>
<tr>
<td>February</td>
<td>29</td>
<td>29</td>
<td>7</td>
<td>61</td>
<td>18</td>
<td>27</td>
</tr>
<tr>
<td>March</td>
<td>18</td>
<td>16</td>
<td>14</td>
<td>29</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>April</td>
<td>6</td>
<td>15</td>
<td>7</td>
<td>20</td>
<td>1</td>
<td>7</td>
</tr>
<tr>
<td>May</td>
<td>3</td>
<td>31</td>
<td>16</td>
<td>69</td>
<td>16</td>
<td>9</td>
</tr>
<tr>
<td>June</td>
<td>70</td>
<td>47</td>
<td>35</td>
<td>41</td>
<td>60</td>
<td>17</td>
</tr>
<tr>
<td>July</td>
<td>248</td>
<td>72</td>
<td>126</td>
<td>70</td>
<td>64</td>
<td>58</td>
</tr>
<tr>
<td>August</td>
<td>152</td>
<td>28</td>
<td>114</td>
<td>94</td>
<td>21</td>
<td>47</td>
</tr>
<tr>
<td>September</td>
<td>71</td>
<td>25</td>
<td>80</td>
<td>59</td>
<td>28</td>
<td>53</td>
</tr>
<tr>
<td>October</td>
<td>87</td>
<td>18</td>
<td>33</td>
<td>53</td>
<td>6</td>
<td>47</td>
</tr>
<tr>
<td>November</td>
<td>47</td>
<td>11</td>
<td>20</td>
<td>51</td>
<td>16</td>
<td>48</td>
</tr>
<tr>
<td>December</td>
<td>32</td>
<td>23</td>
<td>45</td>
<td>41</td>
<td>22</td>
<td>172</td>
</tr>
<tr>
<td>Total</td>
<td>785</td>
<td>336</td>
<td>512</td>
<td>656</td>
<td>290</td>
<td>503</td>
</tr>
</tbody>
</table>

That month wise incidence of Dengue cases in Thiruvananthapuram District during the period of 2003-2008. The table revealed that dengue fever cases were reported from every month. Large number of Dengue fever cases were reported during the month of July in the year 2003 (248). Onset of south west monsoon season in Kerala from June to September and North East Monsoon from October to November. The lowest Dengue cases were reported during the month of April and March. The climate is one of the most important factors for Dengue Fever. That the year wise Dengue cases in Thiruvananthapuram district from 2003-2008. The year 2003 was severely affected and 785 cases were reported. Lowest Dengue Cases (290) was reported in 2007.

![Month Wise Incidences of Cases Reported in Thiruvananthapuram Corporation (2003-2008)](image)

Figure 5: Month Wise Incidences of Cases Reported
Table 3: Year wise Dengue Cases in Thiruvananthapuram District in 2003-2008

<table>
<thead>
<tr>
<th>SI No.</th>
<th>Year</th>
<th>Dengue Cases</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2003</td>
<td>785</td>
</tr>
<tr>
<td>2</td>
<td>2004</td>
<td>336</td>
</tr>
<tr>
<td>3</td>
<td>2005</td>
<td>512</td>
</tr>
<tr>
<td>4</td>
<td>2006</td>
<td>656</td>
</tr>
<tr>
<td>5</td>
<td>2007</td>
<td>290</td>
</tr>
<tr>
<td>6</td>
<td>2008</td>
<td>503</td>
</tr>
</tbody>
</table>

Table 4: Taluk Wise Dengue Cases in Thiruvananthapuram -2006-2008

<table>
<thead>
<tr>
<th>Taluk</th>
<th>2006 No. of Dengue cases and %</th>
<th>2007 No. of Dengue cases and %</th>
<th>2008 No. of Dengue cases and %</th>
</tr>
</thead>
<tbody>
<tr>
<td>TVM</td>
<td>400 (62.11%)</td>
<td>158 (55.43%)</td>
<td>362 (72.99%)</td>
</tr>
<tr>
<td>Nettattinkara</td>
<td>125 (19.40%)</td>
<td>55 (19.29%)</td>
<td>74 (14.91%)</td>
</tr>
<tr>
<td>Nedumangadu</td>
<td>55 (8.54%)</td>
<td>24 (8.42%)</td>
<td>38 (7.67%)</td>
</tr>
<tr>
<td>Attingal</td>
<td>23 (3.58%)</td>
<td>18 (6.31%)</td>
<td>8 (1.61%)</td>
</tr>
<tr>
<td>Chirayankizhu</td>
<td>41 (6.37%)</td>
<td>30 (10.52%)</td>
<td>14 (2.82%)</td>
</tr>
<tr>
<td>District Total</td>
<td>644 (100%)</td>
<td>285 (100%)</td>
<td>496 (100%)</td>
</tr>
</tbody>
</table>

Reveals Taluk wise Dengue cases in Thiruvananthapuram district in 2006 and 2008. Almost all the taluk are affected by Dengue during the period. Thiruvananthapuram taluk was severely affected by dengue and Attingal taluk was least affected during the period. Reported total cases in Thiruvananthapuram districts are in 2006, 285 cases in 2007 and 496 cases in 2008. The Thiruvananthapuram. Taluk accounts 62.11%, 55.43% and 72.99% in the above mentioned period. Attingal was a least contribute during the period of 3.58% in 2006, 6.31 in 2007 and 2.82% in 2008. The second largest affected taluk is Neyyattinkara taluk. The registered dengue cases were 19.40% in 2006, 19.29% 2007 and 14.91% in 2008.

6. Dengue Fever in Thiruvananthapuram Corporation

Month wise Dengue cases in Thiruvananthapuram Corporation during 2006 and 2008 is shown in the table 4:4. The highest cases were reported in the month of December 2008. The lowest cases are reported during the month March, April and May. No Dengue Cases were reported in May 2008 was due to the changes in the weather and preventive measures taken by the Government.
Table 5: Monthly Dengue Cases in Thiruvananthapuram Corporation 2006-2008

<table>
<thead>
<tr>
<th>Month</th>
<th>No of Dengue Cases</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2006</td>
</tr>
<tr>
<td>January</td>
<td>10</td>
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<tr>
<td>February</td>
<td>10</td>
</tr>
<tr>
<td>March</td>
<td>10</td>
</tr>
<tr>
<td>April</td>
<td>10</td>
</tr>
<tr>
<td>May</td>
<td>26</td>
</tr>
<tr>
<td>June</td>
<td>9</td>
</tr>
<tr>
<td>July</td>
<td>18</td>
</tr>
<tr>
<td>August</td>
<td>21</td>
</tr>
<tr>
<td>September</td>
<td>20</td>
</tr>
<tr>
<td>October</td>
<td>18</td>
</tr>
<tr>
<td>November</td>
<td>15</td>
</tr>
<tr>
<td>December</td>
<td>11</td>
</tr>
<tr>
<td>Total</td>
<td>168</td>
</tr>
</tbody>
</table>

Month wise distribution of Dengue Fever in Thiruvananthapuram Corporation in 2006-2008

Table 6: Dengue Fever Affected Wards in Thiruvananthapuram Corporation -2006

<table>
<thead>
<tr>
<th>Total Reported Cases</th>
<th>Name of Wards</th>
<th>Total Number of Wards</th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt; 3</td>
<td>1) Ambalathara</td>
<td>45</td>
</tr>
<tr>
<td></td>
<td>2) Anayara</td>
<td></td>
</tr>
<tr>
<td></td>
<td>3) Beemapalli</td>
<td></td>
</tr>
<tr>
<td></td>
<td>4) Chalakuzhi</td>
<td></td>
</tr>
<tr>
<td></td>
<td>5) ChengalChoda</td>
<td></td>
</tr>
<tr>
<td></td>
<td>6) Edapazhanji</td>
<td></td>
</tr>
<tr>
<td></td>
<td>7) Enchakal</td>
<td></td>
</tr>
<tr>
<td></td>
<td>8) Fort</td>
<td></td>
</tr>
<tr>
<td></td>
<td>9) General Hospital Area</td>
<td></td>
</tr>
<tr>
<td></td>
<td>10) Jagathy</td>
<td></td>
</tr>
<tr>
<td></td>
<td>11) Kalakumudi road</td>
<td></td>
</tr>
</tbody>
</table>
An Analysis of Dengue Fever in Thiruvananthapuram Corporation, Kerala - A GIS Approach

<table>
<thead>
<tr>
<th>Number</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>12)</td>
<td>Kanjirampara</td>
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<tr>
<td>13)</td>
<td>Mannamoola</td>
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<tr>
<td>14)</td>
<td>Kesavadasapuram</td>
</tr>
<tr>
<td>15)</td>
<td>Killipalam</td>
</tr>
<tr>
<td>16)</td>
<td>Kochar road</td>
</tr>
<tr>
<td>17)</td>
<td>Kochuvili</td>
</tr>
<tr>
<td>18)</td>
<td>Kuravankonam</td>
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<tr>
<td>19)</td>
<td>Mannamoola</td>
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<tr>
<td>20)</td>
<td>Mulavana</td>
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<tr>
<td>21)</td>
<td>Murinjapalam</td>
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<tr>
<td>22)</td>
<td>Museum</td>
</tr>
<tr>
<td>23)</td>
<td>Muttathara</td>
</tr>
<tr>
<td>24)</td>
<td>Nedumcadu</td>
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<tr>
<td>25)</td>
<td>Panavila</td>
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<tr>
<td>26)</td>
<td>Paruthippara</td>
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<tr>
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<td>Peyad</td>
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<tr>
<td>28)</td>
<td>Pulayanar Kotta</td>
</tr>
<tr>
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<td>PuthenChanda</td>
</tr>
<tr>
<td>30)</td>
<td>Rajaji Nagar</td>
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<td>Sangumugham</td>
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<td>Sreevaraham</td>
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<tr>
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<td>Swathy Nagar</td>
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<td>Thamalam</td>
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<td>36)</td>
<td>Thampuranmukku</td>
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<td>37)</td>
<td>Thrikkannapurma</td>
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<tr>
<td>38)</td>
<td>Ulloor</td>
</tr>
<tr>
<td>39)</td>
<td>Union Bank</td>
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<td>41)</td>
<td>Valiya thura</td>
</tr>
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<td>Vanrose Junction</td>
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<td>Vattivila</td>
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<tr>
<td>44)</td>
<td>Vazhuthakkadu</td>
</tr>
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<td>45)</td>
<td>Vettukadu</td>
</tr>
<tr>
<td>46)</td>
<td>Chackai</td>
</tr>
<tr>
<td>47)</td>
<td>Chalai</td>
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<tr>
<td>48)</td>
<td>Kowdiar</td>
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<td>Pappanamcode</td>
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<tr>
<td>53)</td>
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<td>Poojappura</td>
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<td>56)</td>
<td>Thirumala</td>
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<td>57)</td>
<td>Thycaud</td>
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<td>59)</td>
<td>Vattiyoor kavu</td>
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<td>60)</td>
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<td>61)</td>
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3-6 15

6-9 3
An Analysis of Dengue Fever in Thiruvananthapuram Corporation, Kerala - A GIS Approach

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Figure 7: Dengue Fever Affected Wards in Thiruvananthapuram Corporation

Dengue affected wards in Thiruvananthapuram Corporation in year 2006 is shown in the table 4.6. There are 67 wards affected by the Dengue in 2006. Dengue (0-3 cases) is reported at Ambalathara, Beemappalli, Jagathy, Nedumcadu, Vellayambalam, Kannammoola and other wards. The next category is 3-6 cases are found in 15 wards of Thiruvananthapuram Corporation. They are Kumarapuram, Kunnukuzhi, Vallakkadavu, Vattiyoor kavu, Kowdiar, Nalanchira, Pappanamcode, p eroorkada, poojappura, sasthamangalam, Thirumala, Thycaud, Vellayambalam.

There are 6-9 cases reported in 6 wards of Thiruvananthapuram Corporation. The affected wards are Manacaude, and Poonthura and others. High concentration of dengue cases are reported Karamana(14) and Medical College (13) There are two wards severely affected by dengue during the 2006.(Map)

Table 7: Dengue Fever Affected Wards in Thiruvananthapuram Corporation -2008

<table>
<thead>
<tr>
<th>Total Reported Cases</th>
<th>Name of Wards</th>
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<td>Kumarapuram</td>
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<td>9)</td>
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<td>13)</td>
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<td>Pongumoodu</td>
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<td>53)</td>
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The table shows that Dengue affected wards in Thiruvananthapuram Corporation in year 2008. There are 73 wards are affected by the Dengue. Low concentration of dengue are reported in Palayam, Statue, Ambalathara, Killippalam, Pallithura, Vellayambalam, Kumarapuram, Pettah, Vazhuthacadu, All saints, Attukal, Jawaharnagar, Kaithamukku and Kuravanconam wards. The next category is 3-6 cases are found in 14 wards of reported from Thiruvananthapuram corporation. They are Thycaud, Kanjirampara, Medical college, Kannammoola, Pappanamkode, Palayam, Statue, Vanchiyoor. There are 6-9 cases reported in 6 wards of Thiruvananthapuram corporation. The affected wards are Thirumala, Peroorkada, Poonthura, Manacaude, and others. High concentration of dengue cases are reported Thirumala (9), Pattom (11) Vallakkadavu (10) and Karamana (14). Karamana ward is severely affected by dengues.

![Figure 8: Distributions of Dengue Fever Cases-2008](image-url)
In Thiruvananthapuram Corporation, 67 wards were affected by dengue fever in 2006 and 73 wards in 2008. The coastal wards are not affected. The wards located in the eastern side are highly affected (Map) is due to the structure of landforms (see relief Map). Below 1-3 cases were recorded in 45 wards in 2006 and 49 wards in 2008. Between 3-9 cases were reported in 18 wards in 2006 and 20 wards in 2008.

7. Summary and Conclusion

7.1 Summary

Medical Geography (Health Geography) is the branch of Human Geography that deals with the Geographic aspects of health, (status) and health care system. It seek along with related disciplines such as medical Anthropology medical sociology and health Economics to improve our understanding of the various factors which affected the population and hence individual. Health is a common theme in most culture. In fact, all communities have their concepts of health as part of their culture. Among definition still used, probably the oldest is that health is the “absence of disease”, Health has evolved over the centuries as a concept from an individual concern to a world wide social goal and encompasses the whole quality of
life. The widely accepted definition of health is that given by the World Health Organization (1948) in the preamble to its constitution, which is as follow. “Health is a state of complete physical, mental and social well being and not merely an absence of disease or infirmity.”

7.2 The Concept of Disease

There have been many attempts to define disease Webster defines disease as “a condition in which body health is impaired a departure from a state of health an alteration of the human body interrupting the performance of vital functions”. The Oxford English Dictionary defines disease as “a condition of the body or some part or organ of the body in which its function are disrupted or deranged” from an ecological point of view disease is defined as “a maladjustment of the human organism to the environment” Forum a sociological point of view disease is considered a social phenomenon occurring in all societies. The WHO has defined health but not disease. The term “disease” literally means without ease” (uneasiness) disease, the opposite of ease-when something is wrong with bodily function. “Illness”- referred to a state of presence of a specific disease but also to the individuals.

Illness: is a subjective state of the person who feel aware of not being well.
Sickness: is a state of social dysfunction i.e., areole that the individual assumes when ill.

7.3 Diseases agent-man-Disease

The germ theory of disease, through it was a revolutionary concept led many epidemiologist to take one-side view of disease causation. That is they, could not think beyond the germ theory of disease. It is now recognized that a disease is rarely caused by single agent alone but rather depends up on a number of factor which contribute to its occurrence.

7.4 Epidemiological Triad

The germ theory of diseases has many limitations. There are other factor are relating to the host and environment which are equally importance to determine whether or not disease will occur in the exposed host. This demand border a concept of disease causation that synthesized the basic factors of agent host and environment. The above model-agent, host and environment-has been in use for many years. It helped epidemiologists to focus on different causes of factor, especially with regard to infectious diseases.

Dengue fever is an infections disease carried by mosquito. It is found mostly during and shortly after the raining season in tropical and subtropical areas, Africa, south east Asia, and china, India, Middle east, Caribbean and until and South America and Australia. Worldwide Dengue Distribution 2006 Red epidemic dengue Blue. Aedes out breaks resembling dengue fever have been reported out History (Gubler 1998). Dengue fever is the most common. Estimates of the extent of the disease are in the range of 30-60 million infections each years, and an undermined percentage of these will show clinical diseases. Dengue has been spreading and occurs in most of the tropical world. An outbreak of dengue fever in India has killed dozens of people and infected around 3000 people, including within the capital New Delhi. The illness was reported in Delhi just two ago where the outbreak had reported in the medical institution All India Institute
of Medical Sciences (AIIMS) were currently there are 19 cases of the disease among the are medical staff and a medical student. Dengue is a mosquito disease and is the most common arboviral illness transmitted globally is caused by infection with 1 of the 4 sero types of dengue fever virus. The presents study is entitled as “An Analysis of dengue fever in Thiruvananthapuram corporation, Kerala: A GIS Approach” The major objectives of the present study are: To detailed study of dengue fever, trend and spatial distributions of dengue in Thiruvananthapuram District (2003-2008) and Thiruvananthapuram Corporation 2006 and 2008.

As the study was intended to investigate the Geo spatial analysis of dengue in Thiruvananthapuram corporation. The study was carried out at various levels. At the micro level a broad analysis has been made for the entire state. But recent data is most available. Hence the study is restricted to 2003 only. At the next level, Thiruvananthapuram district as a whole has been studied intensively. At the micro level, all the wards of Thiruvananthapuram corporation has been studied systematically. The present study relies up on primary as well as secondary data. The primary data were collected from direct field visits and observation. Secondary data obtained from district medical office (DMO), Thiruvananthapuram and National Rural Health Mission, Thiruvananthapuram Department of community medicine Medical college Thiruvananthapuram, Office of the Ministry of Health, Government Secretariat Thiruvananthapuram. A data base is prepared showing attribute of spatial entity for the present study following data were collected from secondary sources. The District wise dengue in Kerala, Taluk and month wise dengue cases in Thiruvananthapuram district (2003 and 2008) and ward wise data from Thiruvananthapuram. To the analysis of the present study the investigator used Arc GIS 9.1 version and Micro Soft Excel.

7.5 Major Findings

i. Dengue is a flu-like viral disease spread by the bite of infected mosquitoes. Dengue hemorrhagic fever is a severe, often fatal complication of dengue. Female mosquitoes “Aedes Aegypti” carry the virus that causes dengue fever.

ii. Symptoms of typical uncomplicated dengue usually start with in 5 to 6 day after a person has been bitten by an infected mosquito some common symptoms are: Vomiting, Increasing in temperature a rash, and a headache, Lower back pain and general weakness, Red eye and eye pain, Sever and muscle pain, Swollen lymph nodes, Soles of the feet and palms of the hands also turn and red and swell.

iii. A doctor can diagnose dengue fever by performing a blood test. The test will show whether the blood sample contains dengue virus or antibodies to the virus.

iv. A virus causes dengue, there is no specific medicine or antibiotic to treat it for typical dengue the treatment is purely concerned with relief of the symptoms (symptomatic).

v. Aspirin and honsetoridal anti-inflammatory drugs should be avoided. Acetaminophen and codeine may be given for severe headache and for the joint and muscle pain there is no specific treatment for dengue person with dengue fever should rest and drink plenty of fluids. They should be kept away from mosquitoes for the protection of others.

vi. The best way to prevent dengue is to take special precautions to avoid contact with mosquitoes.

vii. Dengue cases are reported almost all the month in Thiruvananthapuram District during the period from (2003-2008). Large number of dengue are reported during the month of July and very low in March and April.
viii. Dengue was severely affected in the year 2003 (785 cases) and the fluctuated trend was observed during the period of 2003-2008 in the district.

ix. Thiruvananthapuram Taluk was highly affected by dengue during the year 2006 (62.11%), 2007 (55.43%) and 2008 (72.99%). Attingal was least affected Taluk in Thiruvananthapuram District.

x. The very few cases are reported during the month of March, April and May 2008 in Thiruvananthapuram Corporation.

xi. There are 67 wards are affected by dengue in Thiruvananthapuram Corporation in (2006) Manacaud, Poonthura, Karamana and Medical college wards are severely affected in 2006.

xii. During the year 2008, there are 73 wards are affected by the dengue. Severely affected wards are Thirumala, Pattom, Vallakkadavu and Karamana.

xiii. The dengue affected wards are increased from 67 wards in 2006 to 73 wards in 2008.

xiv. The dengue cases are also increased from 168 in 2006 to 200 cases in 2008.

7.6 Conclusion

Dengue is an enigmatic disease largely because it does not have a specific antidote nor a vaccine is available against this infection. In spite of the fact that in India, Dengue was first reported in 1940’s the first case of confirmed dengue infection. From Kerala was reported in 1997 only. Since 2001 occurrence dengue increased in Kerala and outbreaks were reported rapidly from most of the Central and Southern District. The human factor has obviously played and important role in dispersing the vector species in the hitherto uninvited area in the study area and created conducive environment for man mosquito conduct and temporal distributions of Aedes in Thiruvananthapuram which has a tendency to displays Aedes aegypti from its habitats. The people of the state are no far near-universal literacy and pride in personal hygienic and environmental cleanliness Kerala achieved population stabilization and <20 infant mortality rate move than two decades ago. Among all Indian states Kerala enjoy the highest life expectancy earlier mosquito. Surveys in Kerala had shown the absence of Aedes and aegypti mosquitoes. Indeed the entire western costal regions was free of Aedes and aegypti. But now Aedes mosquitoes are increase in Thiruvananthapuram, especially in Corporation area. It is due to Anthropogenic activities such as rapidly increase in slum population water receptacles, coconut shell, plastic materials, flower pots, socio economic condition and changing of life style.

The people of study area are highly educated and they have aware about dengue. But the people participation in control of Aedes mosquito is very low in the study area. The Government of Kerala NGO’s voluntary organisation, residential association and student organisation are take necessary steps to control the Aedes mosquito and conduct the awareness programme for the public.

7.7 Suggestions

- Identification of region specific sources and sources reduction are the important measures to taken control the problem.
- All health workers and grass root level functionaries should be given, training to overcome the problem.
An Analysis of Dengue Fever in Thiruvananthapuram Corporation, Kerala - A GIS Approach

- Disease control and monitoring committee as cells at State, District, Block, Panchyath and Ward level must be established.
- Assessment of personnel at various level is another measure. Training of all health care personal including doctors, nurses and health works must be concluded.
- Identification of peak time and areas may help to give special performance to these area.
- Public awareness programmes also help to control the problem.
- Sources reduction requires an accurate knowledge of the breeding habits of mosquitoes.
- City corporation to clean up and got rid of water holding containers such discarded tins, empty pots, broken bottle. Coconut shells and other artificial collection of water should be clean affected areas.
- Improve the water management.
- To improve the wast management.

References

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10. Donald.S, Burke Ananda Nisalak, 1988, ‘A Prospective Study of Dengue infections in Bankok; Armed forces Research Institute of Medical Sciences; Bangkok, Thailand.