DETERMINANTS OF EPIDEMIC SUSCEPTIBILITY AND THE ROLE OF ICTs: A PRELIMINARY FRAMEWORK FOR ACUTE TYPE RESPONSE IN KERALA STATE

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Abstract: In a developing nation such as India, the national government is pursuing the pathway of ICT supported decentralized programs, to combat endemics, in the social contexts of each State. The State of Kerala, which has been an exemplar for development, has become susceptible to endemics, brought in by urbanization and non-resident Indian population and compounded by environmental disasters. In this paper, the authors contend that the psyche of the community which has changed from social amity to self-interest need to be re-awakened with the power of ICTs and Internet, so as to efficiently combat endemics. The authors propose a preliminary framework for emergency responses based on the ICS developed by FEMA in USA and recommended by the Indian national government, to suit the context of the State.

Keywords: Epidemics, ICT, ICS, Acute response framework, Kerala.

Introduction and Research Motivation

The World Health Organization defines a disease that exhibits large inter-annual variability as an epidemic (WHO, 2004). According to NICD (2009a) many communicable diseases tend to be endemic in India. They spread by long known pathogens, which arise and persist under conditions created by inappropriate development patterns. Deficient scientific planning has lead to the build up of many areas without planned infrastructure or societal development in India. The National Centre for Disease Control has stated that an effective surveillance system is essential for planning, implementation, and monitoring of the various disease control programs that the central government has implemented in India (NICD, 2009a).

A number of the epidemic prone communicable diseases have a seasonal and cyclical trend, which can be discerned through surveillance systems (NICD, 2009b). The risk of exposure to communicable diseases is associated primarily with the size and characteristics of the population including the demographic structure, the amount and availability of safe water and functioning latrines, the nutritional status of the population, the level of immunity to vaccine preventable diseases such as measles, and the level of access to health care services (WHO, 2007). Various factors promoting communicable disease transmission interact synergistically during emergencies such as mass population movement and resettlement in temporary locations, overcrowding, economic and environmental degradation, impoverishment, scarcity of safe water, poor sanitation and waste management, absence of shelter, poor nutritional status as a result of food shortages, poor access to health care (Connolly et al., 2004) and also environmental changes.

Rate of spread of these diseases, is as important as the genesis of their outbreak. In communicable diseases, the number of new cases occurring in a period of time is dependent on the number of infectious persons within a susceptible population and the degree of contact between them. The degree of contact depends upon many variables like proximity (expressed by population density) of populations; seasonality and climate factors etc. (Webber, 2004). Densely populated areas are perpetually under the threat of such diseases. Reducing the exposure to risk is a crucial part of protecting these highly vulnerable populations. While individuals fall sick and may require diagnostic and therapeutic procedures from the medical system, it is the overall assessment of the cause of the disease and how to control them that will most rapidly solve the problem at the community level (Webber, 2004). A systematic assessment of risk of communicable diseases, based on the best available evidence, is necessary to guide interventions designed to mitigate this increased risk (WHO, 2007). Evidence should essentially contain history/context of the outbreak, the geographical location, the first case etc., as well as detailed information on the cases reported, confirmed, treated, cured and deaths that have occurred in this connection. In the specific context of India, wherein the government takes the responsibility of providing health care to its citizens, the strength and efficiency of the health care delivery system has a crucial role in developing preparedness for outbreak control.

The Integrated Disease Surveillance Project or IDSP is a project that was launched in India in 2004 following the recommendation of various expert committees on health. It is a decentralized, State-based surveillance program (Thakur, 2006). It proposes a comprehensive strategy for improving diseases surveillance and response through an integrated approach, which enables rational use of resources for disease control and prevention (NICD, 2009d). The project aimed to “…(1) to establish a decentralized State based system of surveillance for communicable and non-communicable diseases, so that timely and effective public health actions can be initiated in response to health challenges in the country at the state and national level; (2) improve the efficiency of the existing surveillance activities of disease control programs and facilitate sharing of relevant information with the...
health administration, community and other stakeholders so as to detect disease trends over time and evaluate control strategies (MHFW, 2004). In addition to the core diseases which were to be under surveillance for all the States in India, each of the states were able to identify up to five additional conditions for which surveillance was initiated. However, the recurrent outbreaks of diseases despite the presence of this surveillance program highlight the weaknesses of the existing system.

The state of Kerala has occupied an eminent position in the development debate since the early 1970s. The policy-makers of the State followed a successful ‘basic-needs-first’ strategy, which prioritized the improvement of socio-economic standards of its population (in terms of education, health, food and social security) and implemented an extensive program of land reform, which has been widely viewed as one of the most successful outside socialist countries (Heller, 1995). Conversely, the State has also received much attention from global scholars, as an ‘enigma’ and a ‘paradox’ to many economists and development experts Wallich (1995). The “Kerala Model of development” has been captured as follows: “ (1) a set of quality of life indicators coinciding with low per capita incomes, both distributed across nearly the entire population of Kerala; (2) a set of wealth and resource redistribution programs that have largely brought about the high material quality-of-life indicators and (3) high levels of political participation and activism among ordinary people along with substantial numbers of dedicated leaders at all levels. Kerala’s mass activism and committed cadre were able to function within a largely democratic structure, which their activism had served to reinforce” (Franke and Chasin, 2000). The Kerala model of health has been promoted as ‘Good Health at Low Cost’. Kerala has been heavily influenced by socialist political ideology. The electoral victory of the Communist Government in 1957, in the State, was considered a socio-political milestone by the world. The ideology has helped the State build its own model of health, which is touted to reach the masses, at low cost.

In this paper, the authors present an analysis of the reasons behind the declining performance of Kerala, and suggest an ICT based format, based on the Incident Command System developed by Federal Emergency Management Agency in the USA, for improving detection of and response to epidemics/endemics. Data for this purpose was collected from a decade, i.e. from 1991-2001, for supporting the proposed model. Policy changes, economic reforms and framework have been considered in the context of this paper, up to date. In the global context, the proposed framework may also be relevant to other developing economies or small countries, which may be in a similar state of development.

Determining Epidemic Susceptibility in Kerala State

The factors influencing susceptibility of a community to epidemic prone communicable diseases are divided into background and health service factors. The most powerful background factors that facilitate spread of an epidemic are population growth, which results in increase in the population density and urbanization. The health service factors include planning, systems of health care delivery and their impact on degree of susceptibility of the community to communicable diseases.

Background factors:

An analysis of the decadal growth rate of Kerala (Census of India, 2001) shows that the rate had been at a higher rate from 1941 to 1971 and since then has declined (Table I).

<table>
<thead>
<tr>
<th></th>
<th>Total</th>
<th>Rural</th>
<th>Urban</th>
<th>% living in urban areas</th>
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<tbody>
<tr>
<td>1901</td>
<td>63.9</td>
<td>59.4</td>
<td>4.5</td>
<td>7.04</td>
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<tr>
<td>1911</td>
<td>71.5</td>
<td>66.2</td>
<td>5.3</td>
<td>7.4</td>
</tr>
<tr>
<td>1921</td>
<td>78.0</td>
<td>71.2</td>
<td>6.8</td>
<td>8.72</td>
</tr>
<tr>
<td>1931</td>
<td>95.1</td>
<td>85.9</td>
<td>9.2</td>
<td>9.67</td>
</tr>
<tr>
<td>1941</td>
<td>110.3</td>
<td>98.3</td>
<td>12.0</td>
<td>10.88</td>
</tr>
<tr>
<td>1951</td>
<td>135.5</td>
<td>117.2</td>
<td>18.3</td>
<td>13.50</td>
</tr>
<tr>
<td>1961</td>
<td>169.0</td>
<td>143.5</td>
<td>25.5</td>
<td>15.01</td>
</tr>
<tr>
<td>1971</td>
<td>213.5</td>
<td>178.8</td>
<td>34.7</td>
<td>16.25</td>
</tr>
<tr>
<td>1981</td>
<td>254.5</td>
<td>206.8</td>
<td>47.7</td>
<td>18.74</td>
</tr>
<tr>
<td>1991</td>
<td>290.9</td>
<td>214.1</td>
<td>76.8</td>
<td>26.4</td>
</tr>
<tr>
<td>2001</td>
<td>318.4</td>
<td>235.7</td>
<td>82.7</td>
<td>25.97</td>
</tr>
</tbody>
</table>
A related observation is an increase in population density. Kerala is a small state with an area of 38,863 sq.km and it is the second most densely populated state in India. The density of population according to 2001 census is 819 persons per square kilometer, as compared to 435 persons/sq km in 1961, thus almost doubling between 1961 and 2001. In 2001, out of 14 districts, eight had density above the state average. Considering details on reported cases of Leptospirosis and Dengue fever suggests a correlation between population density and prevalence of communicable diseases (Table III). Districts with population density above the state average reported the highest number of cases of these two communicable diseases.

Table III
District Wise Details Of Cases Treated Of Dengue And Leptospirosis - 2003 – 2005

<table>
<thead>
<tr>
<th></th>
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</thead>
<tbody>
<tr>
<td>Thiruvananthapuram</td>
<td>709</td>
<td>739</td>
<td>512</td>
<td>48</td>
<td>80</td>
<td>49</td>
</tr>
<tr>
<td>Kollam</td>
<td>176</td>
<td>186</td>
<td>33</td>
<td>80</td>
<td>84</td>
<td>56</td>
</tr>
<tr>
<td>Pathanamthitta</td>
<td>150</td>
<td>166</td>
<td>22</td>
<td>70</td>
<td>122</td>
<td>74</td>
</tr>
<tr>
<td>Alappuzha</td>
<td>214</td>
<td>220</td>
<td>78</td>
<td>118</td>
<td>136</td>
<td>485</td>
</tr>
<tr>
<td>Kottayam</td>
<td>188</td>
<td>191</td>
<td>28</td>
<td>342</td>
<td>692</td>
<td>121</td>
</tr>
<tr>
<td>Idukki</td>
<td>223</td>
<td>226</td>
<td>78</td>
<td>170</td>
<td>249</td>
<td>172</td>
</tr>
<tr>
<td>Ernakulam</td>
<td>297</td>
<td>319</td>
<td>128</td>
<td>191</td>
<td>251</td>
<td>311</td>
</tr>
<tr>
<td>Thrissur</td>
<td>325</td>
<td>363</td>
<td>30</td>
<td>97</td>
<td>164</td>
<td>114</td>
</tr>
<tr>
<td>Palakkad</td>
<td>143</td>
<td>147</td>
<td>3</td>
<td>7</td>
<td>21</td>
<td>199</td>
</tr>
<tr>
<td>Malappuram</td>
<td>533</td>
<td>545</td>
<td>8</td>
<td>20</td>
<td>44</td>
<td>49</td>
</tr>
<tr>
<td>Kozhikode</td>
<td>66</td>
<td>69</td>
<td>9</td>
<td>50</td>
<td>101</td>
<td>57</td>
</tr>
<tr>
<td>Wayanad</td>
<td>41</td>
<td>49</td>
<td>4</td>
<td>64</td>
<td>104</td>
<td>24</td>
</tr>
<tr>
<td>Kannur</td>
<td>151</td>
<td>130</td>
<td>15</td>
<td>32</td>
<td>48</td>
<td>79</td>
</tr>
<tr>
<td>Kasaragode</td>
<td>116</td>
<td>121</td>
<td>98</td>
<td>54</td>
<td>66</td>
<td>40</td>
</tr>
<tr>
<td>State total</td>
<td>3332</td>
<td>3541</td>
<td>1046</td>
<td>1343</td>
<td>2162</td>
<td>1716</td>
</tr>
</tbody>
</table>

Urbanisation and increased population density in a background of unplanned urban area development inevitably leads to an inefficient solid waste disposal system, poor sanitation facilities, and inefficient and insufficient supply of drinking water (SCMS, 2009). The gravity of such a situation was strongly felt when the garbage crisis in the city of Cochin had grown to unmanageable levels by the end of June 2007. The acute water crisis in parts of Kochi city is an example for insufficient and inefficient supply of drinking water (SCMS, 2009). Conversely, migration that increases population sizes or alters patterns of infectious diseases may result in changing needs of health care (Gilliams et al., 2007). Today’s highly mobile, interdependent and interconnected world provides myriad opportunities for the rapid spread of infectious diseases, and radio nuclear and toxic threats, which is why updated and comprehensive regulations are necessary. Infectious diseases are now spreading geographically much faster than at any time in history. It is estimated that 2.1 billion airline passengers travelled in 2006; an outbreak or epidemic in any one part of the world is only a few hours away from becoming an imminent threat somewhere else (WHO, 2007). In India, the only legal provision to combat epidemic outbreaks is the Epidemic Diseases Act, 1897. The National Health Policy (2002) discusses the delivery of the National Public Health Programs and discusses the structure of the various specific disease based programs. However, lack of enforcement and timely action consistent with existing regulations renders the existing policies deficient.

Census 2001 data shows that in Kerala, in the intra-district migration category, 8,94,819 persons had migrated from rural to urban areas and 3,59,589 persons had migrated from urban to urban area. At the same time, in inter-district category, 3,84,660 people had migrated from rural to urban area and 1,78,929 persons had migrated from urban to urban area. The most frequent reasons for migration is quoted as work/employment, business, education, marriage etc. Migration, which introduces new members to a community poses a threat to the community’s critical and collective immunity level (herd immunity) and makes the community susceptible to outbreaks. The age composition of the state also has a very important role to play in the susceptibility to epidemics. The fertility and mortality declines have been felt in Kerala ahead of other states within India. The percentage of aged population (above 60 years) is increasing rapidly i.e. an increase from 5.9% in 1991 to 10.5% in 2001. Since it is the elderly people with already existing multiple complications who suffer the greatest degree of morbidity and mortality from communicable diseases, this aspect need special attention.

Two other background factors of importance are the community’s health culture and environmental and climatic factors. By health culture, we mean attitudes to health and illness, beliefs about the cause of various health problems and the community’s attitude to formal health services. Kerala, which is notable for the low mortality/high morbidity syndrome, is not described as having a poor health culture. However, still there do exist moderate regional variations largely due to occupational structure. The occupational structure decides the degree of economic access of the individual to the various health care services and thus determines the
health culture of the society. The potential impact of climate change on health, and on communicable diseases in particular is only beginning to be taken seriously in India. Environmental factors actually lay the base for the susceptibility of the locality to epidemic prone communicable diseases. The hot, humid, and dusty environment of this tropical state along with variable rainfall, profuse natural vegetation and patterns of plantation crops provides a fertile ground for promoting communicable diseases. The position of all these factors is such that they contribute positively to creating a backdrop favorable to the outbreak of communicable diseases in epidemic proportions. These ominous features are counterbalanced by a robust, well-developed health care system.

Health-service factors:

Kerala is known for “good health at low cost” and the foundation for this was provided by universal availability, accessibility and respectable performance of the government health care delivery system (Varatharajan, 2004). Lately, this scenario has been affected adversely due to the lack of scientific health planning; fiscal crisis of the state, and the resulting growth of the private sector (Narayan, P 2007). Health of a community or a nation is dependant on the effectiveness of its public health programs as well as the effectiveness of health service delivery. Performance of the health service system is crucial in determining the community’s susceptibility to communicable diseases.

The basic constraint of the health system in Kerala is that there is a lack of timely and robust health related data. Compiled, accurate information on incidence of diseases, inpatient and outpatient records, and diagnostic and treatment details is essentially unavailable. The government of India in its National Health Policy of 2002 acknowledged the absence of systematic and scientific population health statistics as a major deficiency in India (GOI, 2002). The situation becomes more complex and impossible in the powerful presence of an unrestrained private sector. Scientific health planning is impossible in the absence of scientific information. Accurate information, scientific analysis, and thorough interpretation are required for scientific planning. This requires detailed information compiled from the basic functioning units such as the Primary Health Centers, private clinics/hospitals, and practitioners. Therefore, issues begin due to paucity of an efficient health information system and scientific health planning.

The fiscal crisis in the state has very serious implications on health care. The government was unable to clear huge arrears of payments to suppliers of medicines and consumables for hospitals. Public healthcare institutions increasingly face the problem of resource constraints. There is a clear shortage of medicines, doctors and other infrastructure in public health sector. The critical gap in manpower in health services is another important factor affecting the performance of the public health care sector. Interestingly, when the government’s share in health expenditure is interpreted, it can be seen that a dizzying increase in the salary component in revenue expenditure has led to a cut back on supplies and maintenance; the cutback was heavily felt by the district and taluk hospitals (Kutty, 1999). Government sector, which had made possible ‘good health at low cost’ was swiftly withdrawing, paving the way for the private sector, which was quick to react, and aggressively entered the field to fill the void. As a result, the private sector, today services the unmet healthcare needs, resulting in commercialization of health care – implying high healthcare costs and denial of service to persons unable to pay (Varatharajan, 2004). While the private sector fares extremely well, this situation creates an economic inaccessibility to health care services for those in lower socioeconomic groups.

Given the resource constraints in public hospitals, it is not surprising that they face significant challenges in updating their equipment and delivering optimal standards of care. The existence of economic inaccessibility to private health care institutions creates social inequity in health care distribution and among the people at large.

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* Taluk is an administrative division which comes immediately under the district.
The Integrated Disease Surveillance Program aims at a scientific surveillance and response. However, the core diseases identified nationally does not always correspond with the incidents that are experienced by the state. This lack of concurrence critically impacts health planning. Figure I summarize the determinants of epidemic susceptibility in Kerala.

Figure I: Determinants of community epidemic susceptibility

Kerala is showing a trend of susceptibility to communicable diseases since 2003 (KER, 2006). The state in general and some districts in particular, has been experiencing the outbreaks of certain diseases during specific seasons (DHFW, 2009). The diseases, which had grown to epidemic proportions in the recent years, have been Chikungunya, Dengue fever, Leptospirosis and Viral fever. Leptospirosis has been repeatedly reported from the State of Kerala since 1989 (Kuriakkose et al., 2008). Some cases of Dengue deaths were reported in 1997 (Bandhopadhyaya et al., 1996). Japanese encephalitis and hepatitis A &B are causing grave concern (KER, 2006). It is a cause for concern that despite the significant strengths of the Kerala model, communicable diseases continue to be so prevalent.

Comprehensive disease surveillance system should be complemented and supplemented by public health action to generate efficient results. Public health action and surveillance are two interdependent processes. While surveillance is an ongoing process, public health action can be initiated in two different contexts – standard baseline processes which are meant to prevent the development of an epidemic, and an acute type response on a crisis mode with specific actions following an outbreak.

The model of crisis management proposed in this paper follows the general guidelines prescribed by The ‘Outbreaks Investigation And Control Training Module’ developed by the National Institute of Communicable Diseases, the apex body entrusted with the duty of supporting the central government in combating communicable diseases, in India (NICD, 2009d). This module has been designed to help in making decisions regarding investigations, specific interventions, and follow-up measures. It suggests that adaptations may be necessary at local levels depending on the field situations and available resources. The recommended preparatory action includes, identification of a nodal officer; strengthening the routine surveillance system; constituting an inter-disciplinary team; training of medical and other health personnel; listing of laboratories at regional/district/state levels; listing of high risk pockets in the rural and urban areas; establishing rapid
communication networks; undertaking IEC activities for community participation; ensuring that essential supplies are available at peripheral health facilities and buffer stocks are maintained at the district level; and setting up inter-departmental committees including non-government organizations (NGOs). The proposed acute response framework considers these recommendations and can be delivered through an Incident Command System (ICS), which is a management system used to achieve seamless interagency coordination during any type of emergency event (ASPH–CDC Project Report, 2005). Originally developed in the United States over 30 years ago, and still used there under the guidance of FEMA (Federal Emergency Management Agency), the ICS approach has become adopted in many nations around the globe, and has been recommended by the United Nations as an international standard. The remainder of this paper presents a suggested approach by which existing elements of the public health and governmental systems in Kerala could be modeled on an ICS approach to improve performance. The system as represented in Figure II (FEMA, 2009) has a modular organization structure, which concentrates on a top-down approach and centralized command.

Figure II – Basic ICS Structure

Acute Type Response Plan for Kerala – A Preliminary Framework

In an emergency situation, it is mandatory for any State to constitute a Rapid Response Team. However, the Disaster Management Policy of the State (DM Policy, 2009) suggests the operation of the Incident Command System or ICS, which, in actual terms has never been implemented. Although a few districts within the state have plans, the ICS is not being followed at present. Rather, medical teams from institutions undertake rapid response to emergencies. The suggested framework is modeled with the ICS and proposes to utilize the offices under the Directorate of Health Services and National Rural Health Mission, which are delivering public health services within the State.

The command is defined as an organized system of government departments and other agencies that are to be worked under a structured pattern for response and recovery. Departments and external agencies should be grouped into various ‘Emergency Support Functions’ as per their nature and type of assistance, they can provide in a crisis situation. The system described below is developed along the lines of the command system developed by the Federal Emergency Management Agency (FEMA) of the United States. “The system is flexible and can be used for incidents of any type, scope and complexity. ICS allows its users to adopt an integrated organizational structure to match the complexities and demands of single or multiple incidents” (FEMA, 2009). The Command sets response objectives and priorities and has overall responsibility for managing the incident or event. The command system has to gain control; set priorities; and establish and maintain internal and external lines of communication. The District Medical Officers in charge of the district can ideally function as the incident commander. In their activities, the commander has to be assisted by a
public information cum liaison officer. This officer must be the voice of the command system – talking, updating information to other forums and also liaison with various related departments like local self-government, revenue department, police etc. The local self-government unit functioning under the operations segment will assist them. Provisions can be given for additional command staff depending on the spread and seriousness of the disease.

The initial task of the command system is to gain control over the new situation. Keeping this in view, the command system is so designed that it has key locations established to manage the incident. This includes an Incident Command Post (ICP) where the Incident Commander or Unified Command group works - one per crisis incident. The next functioning unit of the command system is the Staging Area(s), where resources are delivered and kept while awaiting a specific assignment. More than one ICP may be established within a district itself depending on the gravity of the situation. Generally, accepted command priorities are preservation of lives (both the endangered public and members of the taskforce), situation stabilization, and maintaining continuity of government operations. Situation stabilization should include various aspects like source reduction and source destruction drives, information communication and education drives, contact tracing, evaluation of activities, etc. This should supplement already existing, planned government interventions.

Communication has a crucial role in the context of health care and health care delivery. At a community level, it influences the public agenda, advocates for policies, promotes positive changes in society and improves the delivery of health care services. The role of health care communication becomes indispensable during the time of an epidemic. Effective communication can inform, influence and motivate the individuals in to desired levels of responses. Initiation of a clear line of communication is crucial to containing the epidemic situation. Internal line of communication is usually limited to the intra-district, inter-district and district-state information sharing within the concerned departments. External line of communication includes providing public information, setting up media briefings, producing and distributing press releases, managing rumor control and also providing support for information, education and communication (IEC) activities. This forms the preliminary step in scientific data compilation as well. Public information, Safety, and Liaison departments usually support the command system. Public information department functions as the point of contact for the media and other organizations seeking information. Safety department monitors and maintains worker and workplace safety. Liaison department usually coordinates between command and other agencies and/or jurisdictions.

The incident command system is built around four major components. All these components work in the affected areas. They are Operations segment, Planning segment, Logistics segment and Finance and administration segment. During a crisis, the most important response has to come from the planning, operations and logistics management. Finance/administration will depend on already existing allocations or perhaps, the government can allow contingency funds, to deal with such situations.

Operations component is concerned with the management of the incident and reducing its impact. It directs and coordinates all tactical response activities in support of the strategic priorities established by command. This component includes a medical group, which includes doctors, nurses, and other essential paramedical staff. The laboratory group will include all elements of the lab support system, which is required to assist the other groups in facing the emergency. This might include existing regional laboratories and temporary and emergency lab infrastructure set up in war footing as well. The epidemiology group will include a group of inter disciplinary experts who will assess, analyse and make necessary projections and required recommendations. Case investigation, hospital surveillance for checking the suitability of interventions and current practices and contact tracing are some important functions of the epidemiology group.

In the Kerala context, the Medical Group can consist of the Medical Officer in charge of the respective Primary Health Centre (PHC), Staff Nurse, the Health Inspector (HI), a Junior Public Health Nurse (JPHN), Accredited Social Health Activists (ASHA) and a pharmacist. They can function from the respective PHCs. If in case of need for more than one service delivery point, they can function from the relief camps as well. The HI, JPHN and ASHAs will be in to field surveillance, reporting and disseminating information on the disease. They must be two-way communication channels acting between the hospital and the population at risk. The medical officer, the Staff Nurse and the pharmacist will have a purely medical function delivering both preventive and curative care. The Laboratory Group will be a functional unit with basic functions- mainly in to collecting samples, taking it to approved testing centers, bringing back results. In this function, they will work in association with the logistics department. It must also be equipped to conduct simple tests. The Epidemiology Group will be a multi-disciplinary group consisting of an epidemiologist, a microbiologist, and entomologist and preferably a clinician as well. The group can also include the specific national program officer (if applicable). This will be the onsite functional scientific group with the functions of case investigation, hospital based surveillance, contact tracing etc. This team will contribute to the planning department as well. They will deliver information, provide insights, and make projections, which will provide
a base for planning and crisis management. The next important component of the operations segment will be the Local Self-Government team. The presence of members who have a direct and personal access to the population will make the system more efficient. Government officials in the LSG department can liaison with other related department like revenue and police departments as well.

Planning: Collects, evaluates, and, when appropriate or so directed, disseminates information about the incident and response resources; develops an action plan to implement strategic and/or tactical objectives. Planning group consists of a Documentation Unit, which takes care of documenting information exhaustively and accurately. This will help in the creation of a comprehensive health information system, the primary requirement for scientific health planning. For this, they will depend on the field surveillance reports provided by the HIs JPHNs and ASHAs in the medical group, and also the hospital surveillance report provided by the epidemiology group. The resources unit is in charge of maintaining necessary inventory. It makes sure that all assigned personnel and resources have checked in at the incident (FEMA, 2009). This segment must assure the appropriate provision of essential staff, infrastructure, and medicine supplies and essential maintenance works. The team can ideally consist of the Deputy DMO, medical supplies officer and members from the Water Authority, Electricity Board, and Public Works Department.

The situation unit has to collect information from the documentation unit, make preliminary assessments, and communicate it to the authority. The unit is also in charge of developing health related social maps. This group can include the Block Arogyakeralam Co-ordinators and also the District Behaviour Change Communication Officers. Epidemiology unit included in the operations segment finds place here also. The scientific assessment and projection about the situation made by the unit is essential for planning. The technical expert group should consist of members from medical, engineering, biomedical and bio medical engineering fields, data management experts etc. They will have to make timely interventions and suggest suitable solutions for comprehensive planning.

Logistics section is in to the task of delivering equipment, supplies, facilities, services, specially trained personnel, and other resources in support of the incident response. This segment will have the busiest time during the operational change over when the system is gearing up to combat a crisis. Supply, facilities, ground support and medical units come under the logistics section. Supply unit takes supply orders, furnishes it, maintain stock registers, and distributes the needed items. This unit must come under the direct scan and support of the incident commander. The facilities unit is in charge of setting up, maintaining, and demobilizing all facilities in support of incident operations. This unit sets up the incident command post and runs the relief and rehabilitation camps (usually schools, community halls etc. available in the locality). Depending on the spread and seriousness of the disease, even temporary core medical units (with a doctor, two staff nurses and pharmacist) can function from here. The supply unit can have their office facilities set up in the same location. The facilities unit is in charge of local sanitation, food and water supply and also preventive care. The ground support unit is in charge of planning and delivering transportation facilities - including regular transportation of officials and population, supply delivery, mobile lab support, as well as ambulance facilities. They have to support the situation unit in creating and maintaining social maps and road maps. Traffic planning and control comes under their purview. The in house medical unit preferably consisting of a clinician, a qualified nurse, a pharmacist and a public health scientist have multiple roles to function- that of looking in to the health of the inmates of the relief camp, develop medical service delivery plans for the region coming under the respective PHC, review of results, and assisting in all paper works in reporting (cases, deaths and interventions). The documentation unit in the operations wing will assist them.

Finance/administration provides incident cost tracking, analysis, and recovery, time recording, resource procurement, and other emergency related financial and administrative services. This component will also be instrumental in making expenditure assessments during disasters and making approximately correct projections about funds required and communicating them responsibly to the authorities. While the functions of finance/administration are critical components of effective command and management, components of the finance/administration are not necessarily staffed on the incident scene. Wireless communication systems enable some of the finance/administration functions to be performed away from the incident scene, typically in the workstations where these functions where these functions would customarily be performed (FEMA, 2009). The finance/administration department, even if located in their original point of functioning, can effectively disburse the special contingency grant flowing in.

The different arms of the ICS enumerated above will need efficient ICT frameworks to realize their full potential and deliver cost-effective services. The Kerala government is in the process of developing a spatial data infrastructure – an RFP has been floated for this purpose. At the national level, the iHIND initiative aims to set up a national health information network for collecting and utilizing a variety of health information for both clinical sites such as hospitals and stand alone clinics, as well as facilities falling under the governmental public health umbrella. There are also efforts going on to develop an early warning and automated response system (EWARS) which will provide spatial decision support through use of remote sensing, GIS, and public health data (Babu 2008). The EWARS will function as an informatics scaffold on which different layers of
data can be connected. The combination of such IT modalities can lead to streamlined processes for the effective functioning of an ICS approach to epidemic response and disaster management.

Conclusions and Outlook

Communicable disease is a critical issue confronting communities worldwide and it has to be interpreted in social contexts. The solution devised for redress has to consider socio-cultural environment and planning need to give equal importance has to be given to civic engagement. Even through decentralization has been introduced in the Indian context to manage endemics, authorizing the States; the process is still deficient. For successful source reduction and source destruction activities related to endemics, citizen participation is crucial, particularly in efficient delivery of critical information and communication. Even though the Kerala State record is one of the best in India, the disease profile of the State is not confirming to the development of its index numbers with high incidents of both communicable and non-communicable diseases.

The dramatic development experienced in Kerala, in 1970s and 1980s was the result of the community consciousness and camaraderie in the society. The citizens of this State had a receptive social psyche, which has transmuted into a focus on self-interest, with the exodus to the Gulf countries and increase in wealth, resulting in an increasingly commercial minded, socially indifferent community. In combating communicable diseases that the State continues to face, the social consciousness needs to be re-awakened. The fashioning of an Incident Response System approach to the rational use and deployment of public health and related support services could aid in improving outcomes. Innovative use of ICT would be a key element in making these sorts of paradigm shifts a reality.

References


