Response of the health system in Nipah outbreak in Ernakulam district: A qualitative analysis

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ABSTRACT

Background: Nipah is an emerging zoonotic disease that is transmitted through contaminated food or directly between people. Recently, Nipah virus infection was confirmed in Kochi, Kerala, making it the fourth outbreak reported in India. However, due to its good epidemic response, the health system of Kerala was able to control it in a timely manner. **Objective:** To qualitatively analyse the response of the health system of Kerala in controlling the Nipah outbreak (2019) by identifying the enabling factors and the challenges faced by it. **Methods:** A qualitative study was conducted using grounded theory approach. Key informant interviews were conducted till data saturation was reached. The audio recorded data was translated, transcribed and was manually coded and thematically analysed. **Results:** The major enablers for its apt response were identified to be effective communication, good line of control, effective division of work, intersectorial coordination, strong leadership, political commitment, resilient public private partnership and support groups, past experiences in disaster management, quick procurement of medicines and availability of lab facilities. On the other hand, the challenges identified were initial confusions, lack of standard operating procedures/guidelines for epidemic management, complacency, lack of effective zoonotic surveillance, media management and community participation. **Conclusion:** This study attributes the success of the outbreak response to the strong leadership and political commitment. In order to prevent recurrences in the future, there is a need to build a resilient health system through capacity building and further strengthening of the surveillance system.

Keywords: Ernakulam, health system, Nipah virus, outbreak, qualitative analysis

Introduction

Nipah virus (NiV) is a zoonotic virus, and it is usually transmitted from animals to human. However, it can also be transmitted through contaminated food or directly between people.[1] It has been found that fruit bats of Pteropodidae family are the natural hosts for the virus; however, no apparent disease has been noticed in these bats. Several ecological and anthropogenic factors have been thought to be responsible for such emerging zoonotic infections.[2] In an infected individual, it can cause a range of illnesses from being asymptomatic to acute respiratory illness and fatal encephalitis.[3] Although only a few outbreaks were known, owing to its high case fatality rate (estimated at 40–75%), it has posed a serious threat to public health.[4]

The first outbreak was reported in Malaysia in 1999. In fact, the name itself originated from 'Sungai Nipah', a village in the Malaysian Peninsula where pig farmers had become ill with encephalitis.[5] Over the past few years, outbreaks were reported in several parts of South East Asia, mainly Bangladesh and twice in Kerala, the southernmost state in India. The disease had hit Kerala, consecutively in 2018 and 2019, and had resulted in the death of 17 people (2018).[6]

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During the last outbreak, which happened in Ernakulam district in Kerala, in 2019, it was observed that people from various departments had come together immediately to support the State to manage the outbreak. Proper population-based surveillance and a robust outbreak preparedness is the key to managing emerging viral infections.[7,8] To be prepared for such similar outbreaks in future, it is essential to learn how the same was managed in Kerala. This study was, therefore, aimed at qualitatively analysing the response of the health system in Kerala, during the outbreak. Identifying the factors that supported the health system and the challenges faced by the authorities in controlling the outbreak will undoubtedly aid in future epidemic preparedness and control activities.

Methods

A qualitative study using grounded theory approach was conducted after obtaining Institutional Ethical committee Clearance (IRB-AIMS-2020-176). The district administration had formulated a team consisting of members from different departments for controlling the Nipah outbreak. The list of all the members who actively contributed to the outbreak control activities was collected and 12 key stakeholders who played a crucial role was then purposively selected for in-depth interviews. Following prior appointment, the key informants were interviewed at their respective offices in Ernakulam district. Informed consent and permission for audio recording was obtained from the participants prior to the start of the study. Each interview lasted for 30–45 min. It was conducted using an in-depth interview guide which was developed after extensive formative research. Interviews were conducted till data saturation was reached.

All the interviews were conducted in the local language Malayalam and it was audio recorded. It was later transcribed verbatim and translated into English. The transcripts were then manually coded and emerging themes and subthemes were identified. Using data triangulation, conclusions were made.

Result

In order to get a holistic perspective regarding the response of the health system in the control of the Nipha epidemic, 12 Key informants who were actively involved in the various epidemic control activities in the district were identified and interviewed. The key informants included a medical officer who was working in the control cell, six community medicine specialists out of which four were directly involved in surveillance and contact tracing, while two of them were in charge of training of trainers' sessions, two consultants from a private institution where the case was being treated, one Junior Health Inspector who was involved with patient transport and three volunteers from *'Anbodu Kochi'* a relief organization.

It was observed that only few of them on the team had a past experience of managing epidemics or disasters. Most of them were new to the concept of investigation and management of epidemics. Those who had experience in the past had either worked in the H1N1 control program or for disaster relief during Cyclone Ockhi of 2017 and the 2018 Kerala floods. It was observed that this past experience aided them in effectively functioning in emergency situation.

"I had a general idea on how things would go, due to my experience during H1N1 outbreak in the past."- Consultant in Infectious Disease and Hospital infection control.

Enablers

The study was able to highlight a number of enablers that played a vital role in the successful implementation of the epidemic control activities, and they are as follows:

Effective communication and good line of control

All the key informants stated that they came to know about the epidemic even before it was disclosed to the media and general public. They were briefed by their respective heads of the department, and they were asked to carry out the necessary actions at the earliest to control its spread. Therefore, it was evident that no time was lost between the identification of an outbreak and the implementation of the control activities.

"…a call came from district health team. They mentioned that there is a good chance that it could be Nipah and so we have to start all the necessary activities regarding the same." – Community Medicine specialist who was involved with Contact Tracing.

Division of work

The key informants stated that a joint meeting was called immediately at the collectorate by the district collector under the chairmanship of the health minister. It was attended by the health secretary, district medical officer, public health experts and heads of various departments. During this meeting, the core epidemic control team was formed. Specific roles and responsibilities were allotted to each member of the team based on their specialities and technical skills. Separate teams were formed for patient management, contact tracing, maintenance of call centre and help line, ambulance services, home quarantining, supply of food to quarantined household, psychological counselling services, burial of dead bodies if any, etc.

"I felt that the leadership was good….the health secretary was able to explain everything with clarity….they were able to identify a team quickly…they were very clear about our responsibility…. this (political - administrative commitment) is the biggest point.there was full support….The laziness, we sometimes talk about in the context of govt, was not seen there. Everyone executed their role at the highest level." – Community medicine specialist, who is also a part of the PEID Cell (Prevention of Epidemics and Infectious Disease Cell)

It was observed that clear division of labour prevented confusion and wastage of time. Most of the participants stated that the

authorities in the top had a clear idea of how to manage the situation, and hence, quick decision making and implementation was carried out. The valuable lessons learnt from the 2018 Nipah outbreak enabled them to give proper directions to the team.

"… Health minister and Health Secretary gave us a specific task, to identify all the contacts. They asked us to make a complete list of contacts". – Doctor specialized in Community Medicine.

Intersectoral coordination

One of the enablers identified was the perfect sync within and between the different departments and also between different levels of the hierarchy. Since multiple departments were working together simultaneously it was important that all were oriented and updated about the situation. Therefore, daily meetings were held in the evening to review the activities for the day. These meetings were attended by the health minister or the education minister along with the principal secretary. Prompt directions were given then and there to address the new problems that arose. No time was lost between decision making and implementation. There was effective coordination within as well as between the different departments.

"Different units worked on different aspects of the control. Since we had a consolidated meeting every evening, all us were updated on what was happening. It was more of an horizontal system rather than a vertical system"- public health professional.

Strong leadership and political commitment

The most important enablers according to all the participants were the exemplary leadership and political–administrative commitment shown by the authorities. Right from the initial days, throughout the outbreak, every aspect was directly handled by the health minister. At the administrative level, the principal health secretary was present throughout the entire duration coordinating the various activities. This kind of a leadership was an inspiration for everyone working in the team. The representatives from other political parties were too in support of the system. The general consensus was that the political system of Kerala stood with the team at the time of need.

"The health sector in Kerala is strong. That is what is being reflected here… So with, with strong political and administrative commitment there are no barriers at all." – Doctor involved in contact tracing.

"…the Health Minister had the maximum clarity about how to manage the epidemic and was guiding us efficiently……Health secretary too had very specific formats for it." – Public health specialist.

Strong public private partnership and support groups

Another positive aspect observed was the existence of an efficient public private partnership. The index case was diagnosed at a private hospital, and with the full cooperation of the government sector, the patient continued to be hospitalized at the private hospital for the entire duration of his treatment for 2.5 months. Also, public health specialists from the private medical colleges

were mobilized to run the 24 h call canters, helpline units and support in contact tracing activities. This strong partnership was seen at all levels. Even ambulance drivers were quickly mobilised and was ready in just a call away. It was found that the common thread between the different agencies was woven much before the epidemic, and this successful partnership can be attributed to the *'Unite for Healthy Ernakulam'* movement. This helped to bring together the different support groups in the district who can be approached at the time of epidemic/disaster.

"The Unite for healthy Ernakulam is a mission chaired by the collector. The intersectoral co-ordination was smooth in Ernakulam because of UFHE…. Private sector engagement is an important component of it. UFHE had already created a system where both private sector and public sector work together. This made things a lot easier" – Public Health Specialist.

Past experiences

Another major advantage the State had was the previous experience in handling Nipah outbreak in Kozhikode in 2018. The Kozhikode team was mobilized on the second day of the outbreak itself. They shared their experiences and lessons learnt during the previous epidemic with the Ernakulam team and prepared them. This worked as a template for the entire operation. According to two separate doctors,

"We had a previous model in place (Kozhikode model), which was efficient; and a very committed team"

"…. Things were easier for us because they came and shared their experiences"

Ernakulam too had a system in place for managing such emergencies. A disaster management team for quick response had been created during the Kerala floods in 2019. This team known as *Anbodu Kochi* consisting of young energetic volunteers with IT skills also aided in the control activities by setting by the call centre and maintaining it. Since all these systems were already in place, the plans were implemented within a short span of time without much delay.

"….Ernakulam has an emergency co-ordination team that was formed during the floods. When nipah happened, they were contacted and they responded immediately." – Public health specialist.

"Last Flood was the main reason – that is the reason why I was called. During flood some of us had assembled without anybody calling us – so that was the reason why we were again called this time." – Doctor who was working in the control centre.

Quick procurement of medicine

It was observed that limited research has been done on Nipah in the past and effective medications were unavailable for it. The health system had to import the Ribavirin, the only proven therapy from outside the country. The state health system made it a point to ensure that the drug was made available at the earliest.

According to a specialist in infectious diseases, *"the only treatment option available was Ribavirin, which was procured in record time. We informed the state on Saturday that we needed the drug after getting the report and on Sunday we got started treating the patient with Ribavirin."*

Availability of lab facilities

Another enabler identified was the timely setting up of the point of care (POC) lab in the district. This aided in the quicker screening of probable cases and delivery of reports much faster. The support provided by the NiV team also aided in the process.

According to a specialist in infectious diseases, *"A microbiologist was assigned to supervise the setting up of the POC lab. Operational staff with vehicle and sufficient Viral transport medium were also made available. This wasn't the situation during the 2009 H1N1 outbreak. The logistics was completely taken care off and this aided in quick reporting – making it extremely effective."*

Challenges faced

Even though the enablers were found to numerous, there were some strong challenges too. The challenges identified were as follows.

Initial confusion at other hospitals

Although the disease had struck the state a year back, it was still a new disease to practitioners in Ernakulam. The fact that everyone was witnessing it for the first time, clubbed with the fear resulted in unnecessary case referrals to the Government medical college. This increased the burden at the apex centre.

"We had a few unnecessary referrals from the private side. So I felt they didn't understand the case definition of a suspect. So some unnecessary admissions were made resulting in wastage of resources." – Infectious disease specialists.

Lack of standard operating procedures (SOPs)/guidelines for epidemic management

When enquired about the challenges faced, the lack of having a preparedness plan at hand was identified to be a major one. Although people were mobilized quickly, a standard operating procedure was not present regarding how to go about managing an epidemic. Even though initiatives were taken to formulate SOP or guidelines following the first Nipah outbreak in Kozhikode, it did not materialize. This could probably be due to the fact that nobody expected another wave this quickly the very next year. Probably, having a SOP at hand would have given more clarity to the team members and would also be useful in the future.

"…there was no clear protocol ready. Probably we must've never expected another wave." – Health Inspector.

Complacency

A feeling of complacency on the part of the officials was also pointed out as a barrier. A feeling that diseases might not recur anytime now would have made the officials to let their guard down. However, complacency will continue to remain a challenge well into the future as well.

".I had attended state level meetings (earlier).maybe the information on being vigilant, probably wasn't passed down…all of us thought that none of us will be affected." – Community Medicine Specialist.

Lack of effective zoonotic surveillance

Another major barrier was the lack of zoonotic surveillance in the State. It had to depend on external agencies which resulted in delay.

"We don't have an effective zoonotic surveillance system…there is a need to strengthen our veterinary and forest departments in this regard…" – Community Medicine specialist.

Media management

Another major challenge identified was media management. Even though, all the participants were positive about how media was managed in general, it was definitely identified to be a challenge. Information needed to be transferred to the population without causing panic. Barring a few isolated issues, the district administration was quick to track and control the negative information that was disseminated in the social media. In order to ensure correct transmission of information, all media updates were made only through one official source. Special precautions were taken to prevent leakage of any classified information.

"Everyone was informed about the nature of classified information, so we never discussed it with anyone. We even used to get calls to the control room, asking for latest updates. Sometimes they'll fake it saying they're calling from vigilance etc., But we were careful not to divulge any such details. It was very clear that information should reach the public only through one route." – Doctor in charge of the control cell at the collectorate.

Community participation

On enquiring about the role of community, most participants stated that, in general, the fear associated with the disease was less in Ernakulam than in Kozhikode. This could be due to the fact that only one case was detected and there was no mortality. The public was very supportive and was willing to corporate with the health system. However, some participants felt that more awareness needs to be created in the community. The citizens needed to be made aware of the working pattern of the public health system and the need to cooperate with the local JHI/HI/ PHC Medical Doctor.

According to one public health specialist, *".scare was less in Ernakulam reason being; we didn't have any sudden deaths. It was contained with one case itself. So, a panic situation was not there. Kerala community is known to help everyone. They stay together in such scenarios. There were isolated incidents, but in general if you look at it, it was a very supportive community."*

"People are not aware of the govt system. Only when a govt staff like JHI/HI visited them they realized that there is such a staff in their

community….90% of the people didn't know where the nearby PHC was. The public is not aware about the Govt system" – Doctor working with National Health Mission.

Overall impression about the health system response

When asked about their overall impression about the health systems response, all the participants sated it to be a success. Most of them felt that it was managed in a timely manner, due to proper coordination and interdepartmental collaboration as mentioned earlier. Also, the previous experience during the Kozhikode outbreak and the Kerala floods were credited for the smooth functioning of the system.

"Everybody understood that this was a public health emergency and that everyone should work actively for this" – Community medicine specialist.

When asked to point out one major factor for the success of the health system response, all the participants unanimously stated that it was due to leadership and the political–administrative commitment of the State.

"One thing I noted was that the Health Minister herself took the centre stage – pro actively asking for specific accountabilities. What it shows is that when the leadership comes into forefront and demands accountability from various stakeholders – that increases the speed, efficacy and quality of the work being done" – Infectious disease consultant working in a private hospital.

Discussion

The study was able to highlight the effective response of the health system of Kerala in controlling the Nipah outbreak. The major enablers for its apt response were identified to be effective communication, good line of control, effective division of work, intersectorial coordination, strong leadership, political commitment, resilient public private partnership and support groups, past experiences in disaster management, quick procurement of medicines and availability of lab facilities. While the challenges identified were initial confusions, lack of standard operating procedures/guidelines for epidemic management, complacency, lack of effective zoonotic surveillance, media management and community participation.

The WHO's Emergency Response Framework highlights six critical functions that are required for a successful outbreak response. They are effective leadership/incident management, partner coordination, dissemination of information and planning, technical expertise, timely operations support and logistics, and apt finance and administration.[9] Our study was able to highlight how all these six functions came together for the timely outbreak response.

Often diagnosis for diseases like Nipah gets delayed due to its nonspecific symptoms. Studies have shown that delay by the health system in recognizing and responding to such disease outbreaks result in greater disease spread, leading to high morbidity and mortality.[10] However, the timely diagnosis made by the private institution coupled with the quick response of the health system resulted in the outbreak being controlled to a single case. Good public private partnerships enabled in doing so. Therefore, it is crucial that all governments should engage with their private sectors early and establish relationships before a crisis in order to have a faster or stronger response.[11]

Even though there existed a previous model for Nipah[12] outbreak investigation and control in the state, it lacked an official standard operative procedure guideline. Since Nipah outbreak had occurred just a year back, the Kozhikode team was brought in to guide the Ernakulam team, and as the memory was still recent, they were able to carry out the outbreak management effectively even without SOPs. However, the lessons learnt need to be translated into SOPs/guidelines for future use if the case arises.

Management of media even though was successful to an extent, it did seem to be a challenge. At the time of an outbreak, media management is crucial for dissemination of information to the public; however, it should not pave way for panic.[13] The general public needs to be informed and necessary behaviour change communication activities need to be in place for preventing further progression of the outbreak.[14]

Lack of effective zoonotic surveillance was also found to be major challenge especially in diseases such as Nipah. Therefore, it is crucial that health systems build upon their zoonotic surveillance and at the same time adopt 'one health' approach by considering human, animal and environmental health into the same context.[15] It is needed to detect, respond and prevent outbreaks of zoonosis. Epidemiological data and laboratory information need to be shared across different sectors at the local, national, regional and global levels for effective and sustainable health system responses against such health threats in the future.[16]

It should be noted that understanding these results will not only benefit the policy makers but also the primary care physicians as well. In the event of such an outbreak, it is usually the primary care physicians who are often the first responders. They are actively involved in the routine surveillance and control activities. Therefore, by implementing wider multisectoral interventions and through proactive communication, primary care can promote effective emergency response. This in turn will result in the development of a better prepared health system that will aid in quicker recovery from emergencies.[17]

Therefore to conclude, irrespective of these few shortcomings, the overall health system response was deemed to be a success. This study attributes the success of the outbreak response to the strong leadership and political commitment that guided the entire health system for the effective management of the Nipah outbreak. Therefore, in order to ensure the prevention of such outbreaks in the future, we need to build a resilient health

system through capacity building and further strengthening the surveillance system.

Declaration of consent

The authors certify that they have obtained all appropriate consent forms. In the form, the participants has/have given his/her/their consent relevant information to be reported in the journal. The participants understand that their names and initials will not be published and due efforts will be made to conceal their identity.

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Conflicts of interest

There are no conflicts of interest.

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