SHORT COMMUNICATION

# INVESTIGATING DIPHTHERIA OUTBREAK: A QUALITATIVE STUDY IN RURAL AREA

**Narendra Patil[1], Nilesh Gawade[1], Abhay Gaidhane[2], Zahiruddin Quazi Syed[2]**
[1] Tata Institute of Social Sciences, Mumbai, Maharashtra, India
[2] Department of Community Medicine, JN Medical College, Datta Meghe Institute of Medical Sciences, Wardha, Maharashtra, India

**Correspondence to: Zahiruddin Quazi Syed (zahirquazi@rediffmail.com)**

**DOI: 10.5455/ijmsph.2014.260120141** **Received Date: 26.11.2013** **Accepted Date: 26.03.2014**

**ABSTRACT**

**Background:** Even after three decades of implementation of the Universal Immunization Programme in India, cases of diphtheria continue to occur. It is pertinent to study the social and epidemiological determinants of diphtheria.

**Aims & Objective:** The present study was undertaken to investigate epidemiological and social determinants of Diphtheria outbreak in a district in Central India and to understand response of health care system to this outbreak.

**Materials and Methods:** Explanatory case study method, a qualitative method was employed involving interviews with stakeholders including family members of the affected children, specialists from tertiary care teaching hospital who treated these cases, health workers, public health functionaries at primary care and district level.

**Results:** Both cases belonged to migratory community and non-immunization was identified as the chief proximal reason. Both, knowledge and utilisation of immunisation was poor in these communities and was limited to pulse polio immunization. Epidemiologically, the two cases were possibly linked. Vaccination drive to immunize all unimmunized children was conducted in the district where the cases were identified but not in the district where possibly the cases have originated.

**Conclusion:** Social determinants including poverty, migration, poor access to health care all contributed in creating epidemiological situation where transmission of disease agent was easy, resulting in an outbreak. Migration creates vulnerability and our health systems should gear up themselves to address this vulnerability; appropriate strategies and micro-planning should be in place to cater to the needs of this underprivileged community. Strong surveillance system with adequate public health response addressing outbreaks is necessary.

**Key Words:** Diphtheria; Outbreak; Qualitative Study

## Introduction

Diphtheria is a highly contagious and potentially life threatening bacterial disease.[1] In 2010, India accounted for 3123 (74.59%) of the 4187 diphtheria cases reported globally.[2] There have been reported epidemics in Karnataka, Andhra Pradesh, Maharashtra and Assam.[3-5] The disease, which was common among under-five children in the past, is now affecting older children (5–19 years) and adults. A study from urban north India concluded that poor immunisation coverage, population migrations, and overcrowded urban slums may be contributory factors.[6] The study attempts to study the underlying social factors in a case of outbreak of diphtheria in central India. Two male children (aged five and six years) presented with clinical features of diphtheria in August 2011 at a tertiary care teaching hospital of Central India. Neither child was immunized against diphtheria. The first case was confirmed as diphtheria through laboratory investigations. The second case was not confirmed as a case of diphtheria due to absence of positive result on culture which could have been due to antibiotic treatment received after the onset of symptoms. Underlying social and health system factors were investigated and also whether these 2 cases where epidemiologically related to each other.

## Materials and Methods

The present study was undertaken to investigate epidemiological and social determinants of Diphtheria outbreak in a district in Central India and to understand response of health care system to this outbreak. This study was conducted using Explanatory type of Case study, a Qualitative design.[7] Data was collected with the use of an in-depth unstructured interview by using interview schedule as a tool for data collection. It was relevant to select only those stakeholders who were associated with the outbreak. Hence, stakeholder-mapping technique was followed for selection of study respondents. The stakeholders were classified into three groups. First group was family which included, parents and other family members; second was local health care system, which included, auxiliary nurse midwife, medical officers and treating paediatricians. The third group included sub-district and district level health functionaries of all the districts concerned. Medical records were also examined to look into proximate causes of death and definitive diagnosis. Institutional Ethical Committee of Datta Meghe Institute of Medical Sciences gave approval for the study.

## Results

**Case 1**: On 10th of August, 2011 at 11 pm one male child of 5 years of age was brought to the casualty ward to the tertiary care teaching hospital. Clinical history reveals that the child was suffering from a low-grade fever and also had severe swelling around his neck, which was also causing dysphagia. The child was suffering from severe breathlessness at the time he was admitted in the hospital. Since he had dysphagia, he was on a liquid diet. During clinical examinations, bilateral swelling in neck near submandibular region is seen which was tender in palpation and also 4.5 cm in size. Throat examination showed whitish membrane, which was encroaching over his tonsils whereas the rest oral cavity were normal. Complications such as pneumonia and Laryngotrachial bronchitis were present. This patient was immediately admitted to the Paediatric Intensive Care Unit (PICU) of the hospital. Swab culture of the patient confirmed diagnosis as *diphtheria*. The patient had a severe septic shock due to *diphtheria* toxaemia, which eventually led to his death within 17 hours of admission on 11th August, 2011.

**Case 2:** A five year old male child was admitted in to the tertiary care teaching hospital with the symptoms of intermittent fever since 20 days with difficulty in swallowing and breathlessness. Patient was admitted in PICU of the hospital. Although a swab culture for Diphtheria turned out negative, clinical symptoms suggest that it was a probable case of diphtheria. After two weeks of admission, the patient died due to the complication of diphtheria such as Myocarditis, and septic shock due to diphtheria toxaemia. Since the laboratory investigation did not reveal diphtheria, this case remained "suspect" in nature. In the opinion of the treating paediatricians, the failure of confirmation of diagnosis could have been due to late admission (after 20 days of onset) leading to vanishing of membrane and the pathological sample was reported negative.

We explored reasons for failure to vaccinate these children. Both the children had received BCG and OPV but no immunization thereafter (such as DPT). Both the families did not have adequate knowledge about immunization schedule. They believed that Polio is the only vaccine that needs to be given to a child. Second family stated that had they known importance of immunization against diphtheria, they would have immunized the deceased child. After the event, all the un-vaccinated children in first family did receive immunization. The siblings of second case were between five to ten years of age and were eligible to receive tetanus toxoid. However, these children did not receive tetanus immunization even after the event.

There were issues on demand as well as supply with respect to immunization. The Health officers and workers expressed difficulties in catering to the communities to which these children belonged. First child belonged to *'Paradhi'* community, a community is known for their migratory lifestyle. The people belongs to this community does not own any agricultural land or any livestock and migrate from place to place for livelihood. They generally stay in '*Bedhas*' (gypsy colonies) which are situated in the outskirts of villages in makeshift houses. Normally the population of these *Bedhas* range from 20 to 30 people. The main occupation of *Paradhis* is to sell home brewed alcohol to the local villagers and take up seasonal jobs in agriculture and factories or construction sites where they work as labourers on a daily wage basis. The second child belongs from *'Bharadi'* community. It is also known as a migratory community and lives in the same circumstances as the first family. His family stay in a Bedha of a one village in a district for six months and they spend rest six months at another village of Neighbouring district.

"We have to go from one to another place to look for a job, we don't have any permanent work or our own fields or any business where we can go and do some works, if we are getting work then we will stay there, otherwise we have to move to other place. Since we are poor, we have to do these things. Where ever is our Bedha is situated we go there till we have work" **-** Mother of Case 1

Both the communities are disadvantaged and recognised as backward. However, people of these communities often do not get benefits of government schemes whether it is caste certificate or income certificate?

Due to their constant mobility, their access to health services remains poor. Consequently, their utilization of existing health services like antenatal registration, institutional delivery, anganwadi services, etc. is poor. According to the health workers, these communities have poor knowledge regarding immunization, which leads to poor utilization. They are aware only about polio immunization and avail the same since it is provided at doorstep. One of the medical officers felt that outreach programmes in the community led to a tendency in the community to wait until the health care providers approach them and provide vaccination

'Why should we go to hospital if they are coming to our house to give vaccines?' – mother of Case 1

The perception of relatives of this case was quite different from what had been stated earlier by health care provider above. As mentioned earlier the family perceived that only polio vaccination is possible. According to them if someone had explained to them about usefulness and the consequences of not having their child immunized, they would have had the child immunized. Even though Second case had history of institutional delivery but he was unimmunized probably due to their lack of knowledge regarding benefits of vaccination. Since these families were not educated and not aware about vaccination, then expecting them to oblige is also not fair.

In the opinion of health care providers, the community believed that disease would occur irrespective of immunization and they need not immunize children, as it would give pain to the children of the community. The medical officer added that in case mild local reaction like swelling or fever is enough to evoke unfavourable response from the entire community resulting in non-participation in the whole campaign. Many times this community become very aggressive if health care providers tried to convince them of the value to the health to their children.

Since this community lives in makeshift houses, they are not part of routine visits of health workers. Since they have to migrate from one place to another, health workers find it very difficult to trace them and avail the same of health services that they need. The health department also runs immunization campaigns but that probably has benefitted only the unimmunized children in the stationary population.

"We always tried our best to avail them there benefits but when we go there to vaccinate them or to provide some other health facilities then this people will not be there. They won't tell anyone where they have gone or when they'll come back and the rest of the people residing in those Bedhas also don't show any concern with government health systems. They won't respond properly or won`t support us in our campaigns" – district level health manager

**Health seeking behaviour:** For health care, the community prefers private practitioners including non-qualified ones. This is partly because they do not trust government facilities. "For us both (public and private) hospitals are same, it is just money matter. Although government facility provides free consultation, medicines are not available and have to be bought from outside. For us, both facilities cost equal. We prefer private if it is serious case" - mother of Case 1. The family of case 1 preferred to go to private facility for the current episode in district, which is far away from their village even when government facilities were available close to them. They did not wish to talk more about reasons for not availing treatment from public sector. Second family also approached private facility instead of public sector. In both the cases, treatment was not available at the first private facility, which they approached. They did consult at other private providers and ultimately were hospitalized at a tertiary private healthcare provider. Regular source of medical care for the community is private sector but the private sector to a large extent is not partner in immunization programme with exception of polio.

**Response of health care system:** According to the sub - district health functionaries of all three districts, the immunization coverage of these districts was around 85-90%. Local district health authorities visited the hospital after receipt of information regarding the confirmed diphtheria case. The authorities surveyed one village to find unimmunized children. The team identified and immunized 18 children including both siblings of the first case. Weak health care delivery system in the past was cited as probable reason for not immunizing these children by the authorities. The team educated people in that village about immunization so that there will not be any unimmunized child in near future.[8]

**Epidemiological link between these two cases:** Since diphtheria is a contagious disease these two cases must have contracted infection from a source and they would have possibly transmitted to some other individuals. Tracing the recent travel history of both the cases it was found out that these two cases were in contact with each other. Case 1 stayed in a village in central India in the beginning of the year and migrated to another village in neighbouring district in April and stayed there for about 3 to 4 months. Then they migrated to third village where they resided for 2 months. The family returned to the second village where the child became symptomatic. Second family also was not staying at a permanent location. They generally used to stay for six months each, in two different locations in central India. One of these locations was same as the third village where case 1 stayed. The two cases were in contact with each other in bedha at this village for two weeks ending around 6th August 2011. Onset of symptoms was estimated to be on 8th august for first and 14th august for second case. Given the incubation period of two to ten days, possibility of transmission of infection cannot be ruled out. Since the second case was also 'suspect' case of diphtheria, the

possibility of these two cases being part of single outbreak of diphtheria cannot be ruled out.

## Discussion

Diphtheria, a vaccine preventable disease persists as a public health concern due to poor immunisation coverage in India.[3] Immunisation coverage rates are typically lower among migrants as seen in studies.[9,10] In this study, migration was an integral part of these families. It is driven both by their tradition as well as livelihood issues. Providing secured livelihood is an important intervention which can reduce their vulnerability if not migration. Both the families were not much aware about the vaccine preventable diseases and this lack of knowledge is an important social determinant of their behaviour. Investing in education and specifically health education would be important means of countering the ignorance. It has been shown that personalised service provision by health care system increases chances of a child receiving full immunisation.[9] There is need to develop health care services specifically for migrant communities. If ignored, then it would lead to high risk susceptible areas in rural India where children will be susceptible and in close proximity with each other. In such epidemiological situation, disease agent will continue to transmit and result in periodic outbreaks. Families, in the study, preferred private practitioners rather than government system even though the former is not affordable for them. Therefore, health care delivery structure for migrants should include private practitioners. Since migrants will be highly mobile population, it is important to have micro-plans to reach out to them. Along with these measures to prevent, a case of diphtheria from occurring, need is to develop systems that would mount sufficient public health response. District health authorities vaccinated all unimmunized children in one village. Since the two cases described, had been travelling from one village to other; there was need of a coordinated effort of all authorities in both the districts. This calls for need of a strong surveillance system which would not only trigger disease control activities but also plan, implement and evaluate programmes.

## Conclusion

Social determinants including poverty, migration, poor access to health care all contributed in creating epidemiological situation where transmission of disease agent was easy, resulting in an outbreak. Migration creates vulnerability and our health systems should gear up themselves to address this vulnerability; appropriate strategies and micro-planning should be in place to cater to the needs of this underprivileged community. Strong surveillance system with adequate public health response addressing outbreaks is necessary.

## References


1. Park JE. Epidemiology of communicable diseases: Respiratory infections: Diphtheria. In: Park JE (edi). Preventive and Social Medicine. 20th Edition. Jabalpur: Banarasidas Bhanot. 2009. 149.
2. WHO vaccine-preventable diseases: monitoring system 2011 global summary [online]. [updated 2011 September 23; cited 2012 March 10] Available from: URL:http://www.who.int/immunization_monitoring/en/globalsummary/timeseries/tsincidencedip.htm.
3. Bitragunta S, Murhekar MV, Hutin YJ, Penumur PP, Gupte MD. Persistence of Diphtheria, Hyderabad, India, 2003-2006. Emerg Infect Dis 2008;14(7):1144–6.
4. Dravid MN, Joshi SA. Resurgence of diphtheria in Malegaon & Dhule regions of north Maharashtra. Indian J Med Res2008;127(6):616–7.
5. Nath B, Mahanta TG. Investigation of an outbreak of diphtheria in Borborooah block of Dibrugarh district, Assam. Indian J Community Med 2010;35(3):436–8.
6. Lodha R, Dash NR, Kapil A, Kabra S. Diphtheria in urban slums in north India. Lancet 2000;355(9199):204.
7. Tellis W. Application of a Case Study Methodology. The Qualitative Report [online]. 1997; 3(3). [cited 2011 October 13]. Available from: URL:http://www.nova.edu/ssss/QR/QR3-3/tellis2.html.
8. Disease alerts/outbreaks reported and responded to by states/UTs through integrated disease surveillance project (IDSP). 2011. [cited 2012 January 24] Available from: URL: http://idsp.nic.in/idsp/IDSP/resource_idsp.jsp#
9. Kusuma YS, Kumari R, Pandav CS, Gupta SK. Migration and immunization: determinants of childhood immunization uptake among socioeconomically disadvantaged migrants in Delhi, India. Trop Med Int Health 2010;15(11):1326-32.
10. Mathew JL, Babbar H, Yadav S. Reasons for non-immunization of children in an urban, low income group in North India. Trop Doct 2002;32(3):135-8.


**Cite this article as:** Patil N, Gawade N, Gaidhane A, Syed ZQ. Investigating diphtheria outbreak: A qualitative study in rural area. Int J Med Sci Public Health 2014;3:513-516.
**Source of Support: Nil**
**Conflict of interest: None declared**