## ORIGINAL ARTICLE

# EPIDEMIC INVESTIGATION OF AN ACUTE GASTROENTERITIS OUTBREAK IN DASLANA VILLAGE OF AHMEDABAD, GUJARAT

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## ABSTRACT

**Background:** Diarrhoeal diseases affect millions of people around the world and have greatest impact on children, especially those in developing countries. Diarrhoeal disease outbreaks are cause of major public health emergencies in India. We investigated such an outbreak of acute gastroenteritis in Daslana Village of Ahmedabad district, Gujarat, to identify etiological agent, source of transmission and propose control measures.

**Methodology:** A cross sectional epidemiological study was carried out to find out the cases of acute gastroenteritis by house to house survey, and also inspected the sanitation and water supply.

**Results:** There were 38 cases of acute gastroenteritis among total 220 peoples who were residing near brick production sites, overall attack rate was 17.27%. Infants and children of 1 to 12 years of age were highly affected, (25%) and (20.56%) respectively.

**Conclusion:** The underlying cause for this outbreak of acute gastroenteritis was waterborne in nature and due to contamination of water with contributing factors of poor living condition.

**Keywords:** Acute gastroenteritis, epidemic investigation, outbreak.

## INTRODUCTION

Diarrhoeal diseases represent a major health problem in developing countries. Conservative estimates place the global death toll from diarrhoeal diseases at about two million deaths per year (1.7 - 2.5 million deaths), ranking third among all cases of infectious disease death worldwide. Most of these deaths occur in children under five years of age.[1] Diarrhoea continues to be an imported contributor to childhood deaths in India. About 10% of infants and 14% of 0-4 year children die every year due to diarrhoea in India. [2] Unfortunately, Indian data on morbidity and mortality from diarrhoeal diseases is deficient in many ways. The validity of this data is further lost by their fragmentation under sub-heads of cholera, gastroenteritis, dysentery, diarrhoea and parasitic diseases. The aetiology of diarrhoea is very varied, important aetiological enteropathogens are V. Cholera, E. coli, salmonella, shigella. Rotavirus has emerge as the leading cause of severe, dehydrating diarrhoea in children age less than 5 years.[3] Most of the pathogenic organisms that cause diarrhoea are transmitted primarily or exclusively by the faecal-oral route. Faecal-oral transmission may be water-borne; food-borne, or direct transmission which implies an array of other faecal-oral routes such as via fingers, or fomites, or dirt which may be ingested by young children.[4]

An outbreak or epidemic is defined as the unusual occurrence in a community or region of disease, specific health-related behaviour or other health related events clearly in excess of " expected occurance".[5] Increase in the total number of cases do not, however, necessarily indicate increase in the incidence of diseases. Variation in the number of reporting sites, completeness of reporting, geographical size of the catchment area and size of population are factors that must be taken into consideration while analysing reports. The prime purpose of an outbreak investigation is to control the outbreak, limit its spread to other areas and assess how preventive strategies could be further strengthened to reduce or eliminate the risk of such outbreak in future.[6]

***The outbreak:*** On 14th April 2010, an outbreak of gastroenteritis was reported from Daslana village of Ahmedabad district. A Rapid Response Team (RRT) was constituted from B. J. Medical College, Ahmedabad to investigate the reported outbreak. Daslana village had a population of 3000, come under subcenter Ukhlod of Manipur Primary Health Centre. First case was noted on 12th April 2010 by private practitioner from Ukhlod.

***Epidemiological Description of area:*** Site is brick production unit (Bhattha) situated away from Daslana village. All brick workers stay in periphery of production site with their families. Most of workers were seasonal and migratory who were come from Uttar Pradesh. It was totally an isolated community. They were living in a small kuttcha hut made up of immature brick and plastic roof. Size of hut is on average 8×8

foot with height of 5 foot. It has no sanitary facility for cooking, storing food, storing drinking water and washing facility. There was no provision of sanitary latrine in whole premises. Hygienic practices for day to day activities were also very poor in nature. Before this episode of diarrhea and vomiting no community lunch or gathering was observed. No change in population structure or surveillance method.

Only single bore well was a source of drinking water. Bore well water was stored in water tank and then tank water was utilized for various purposes (washing clothes, cleaning, drinking and cooking etc.) by residents of the surrounding dwelling. At Outlet of tank there was a plastic pipe without tap. There was no drainage facility, because of that agent host transmission of infection becomes easier. [Figure1].

**Figure 1: Water tank and area surrounding water tank**

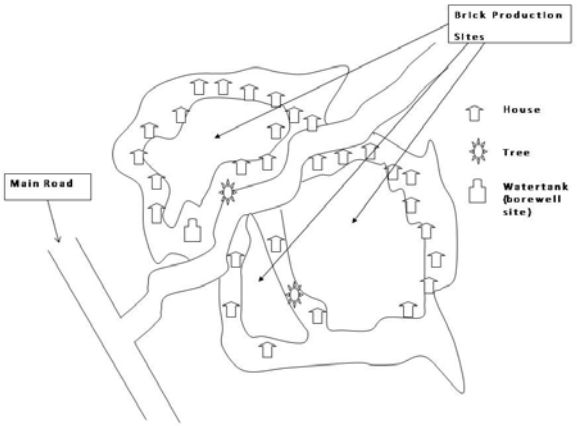


**Figure 2: Map of brick production sites**

### Investigation

After arrival at epidemic site rapid response team contacted Epidemic Medical Officer and Medical Officer of PHC Manipur. All the details of surveillance activities were checked. An area map of all the brick production sites was drawn [Figure 2]. RRT has carried out door to door survey and examined affected individuals clinically. Physician of RRT has thoroughly examined cases clinically and opined diagnosis of Acute Gastroenteritis. Microbiologist had also visited all active mild cases in field to get stool sample, but during that door to door visit, no active case was observed and all cases were already given antibiotic treatment.

## RESULTS

Out of total 220 peoples who were residing in area near brick production site, there were total 38 cases of acute gastroenteritis; overall attack rate was 17.27%.Infants and children among the age group of 1 to 12 years were highly affected with attack rate of 25% and 20.56% respectively [Table 1]. Sex wise distribution of cases shows that females (21.34%) were more affected than males (14.50%), but this difference is not statistically significant (P>0.05) [Table 2]. Index case was reported on 12th April 2010, but after investigation it was uncovered that cases of gastroenteritis were also occurred before 12th April 2010 [Figure 3].

**Table 1: Age wise distribution of cases**

| Age Group | Population (%) | Cases (%) | Attack Rate |
|---|---|---|---|
| Infant | 16 (7.27) | 4 (10.53) | 25.00 |
| 1 to 12 yrs | 107 (48.64) | 22 (57.89) | 20.56 |
| 13 to 60 yrs | 95 (43.18) | 10 (26.32) | 10.53 |
| Above 60 yrs | 2 (0.91) | 2 (5.26) | 100.00 |
| Total | 220 (100) | 38 (100) | 17.27 |

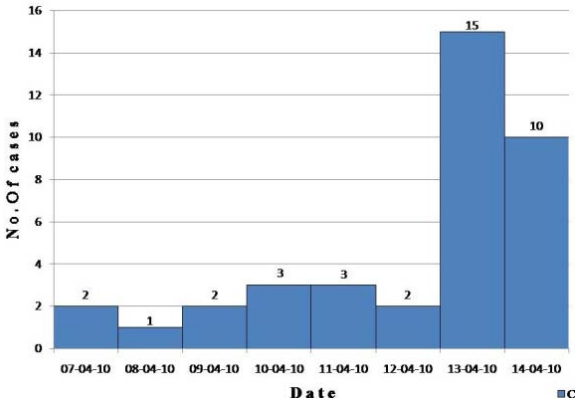


**Figure 3: Date wise distribution of cases of acute gastroenteritis**

**Table 2: Sex wise distribution of cases**

| Sex | Gastroenteritis | | Total |
|---|---|---|---|
| | Yes | No | |
| Female | 19 (21.34%) | 70 (78.65%) | 89 (100%) |
| Male | 19 (14.50%) | 112 (85.49%) | 131(100%) |
| Total | 38 (17.27%) | 182 (82.72%) | 220 (100%) |

($X^2$=1.74, P>0.05)

## DISCUSSION

We investigated the outbreak of acute gastroenteritis by conducting door to door survey. Out of total 220 peoples who where residing near brick production site,

there were total 38 cases of acute gastroenteritis, overall attack rate was 17.27%.Goud et al also observed attack rate of 22% in their investigation of gastroenteritis outbreak in Kurugod village, Karnataka.[7] In this investigation we found that infants and children among the age group of 1 to 12 years were highly affected, because they are most vulnerable age groups, similar observation were made by Singh et al in their study.[8]

Index case was reported on 12th April 2010, but after investigation it was uncovered that cases of gastroenteritis were also occurred before 12th April 2010. Different distributions of incubation periods in differently susceptible individuals, the bacterial dose or better reporting of cases because of improvement in the surveillance system after initial phase of outbreak can be the reasons for this kind of an epidemic curve.

## CONCLUSION

Availability of safe and potable drinking water at the brick production sites has always been a major problem because of the temporary settlements. Open air defecation and disposal of sullage in an open space, though hazardous, are commonly practiced at such temporary settlements. As these labourers are illiterates/less educated and from lower socioeconomic strata, they also have poor awareness regarding personal hygiene. So, agent, host and environmental factors already coexist. Thus, platform for an outbreak is always set at such sites.

Only single bore well was a source of drinking water. Bore well water was stored in water tank and then tank water was utilized for multiple purposes (washing clothes, cleaning, drinking and cooking etc.) by residents of the surrounding dwelling. Outlet of tank is plastic pipe without tap which always put back into collection of dirty water. There was no drainage facility, and because of that chance of transmission of infection becomes easier.

This outbreak of Acute Gastroenteritis was waterborne in nature and was due to contamination of water and poor living condition.

This outbreak is eye opener as a point of view of occupational hazards. With unplanned haphazard rapid development has just gives birth to many new occupational sites, which attract peoples for their livelihood, but employer does not take care to provide basic health and sanitation facilities. By compulsion employee were stayed at worksite, because they do not have any option, just make them vulnerable to such epidemics by living in nonliving conditions.

### Control measures taken

Control measures are most effective when selective interventions are applied early to provide maximum impact with minimum diversion of scarce resources. Chlorination of water source was done. Rapid survey regarding identification and treatment of affected individual. Individual affected with gastroenteritis were referred to nearby CHC at Kadi, Detroj or Viramgam and Mild cases were treated on site by health team of PHC.

## RECOMMENDATIONS

**Short term measure:** Outbreak was water borne in nature. Regular chlorination of water at mass level in water tank as well as household level chlorine tablet should be distributed regularly.[9] Health education regarding hygienic practice like hand washing before eating or drinking and after defecation. Shelter should be provided according to basic housing condition Outbreak area is isolated in nature and no surveillance or health service was provided. Before starting production work, employer should ensure healthy housing with supply of potable drinking water and sanitary living condition.

**Long term measure:** Regular surveillance regarding epidemic prone disease in unstable (migratory) and seasonal worker's community. Employer of such industries should be sensitized regarding provision of basic living condition to worker.

**Limitation:** Laboratory confirmed diagnosis was not possible, as all cases with active illness were referred.

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