SHORT ARTICLE

Acute diarrhoeal disease outbreak in an urban residential complex of Ghaziabad, UP May 2024: Felt needs of community participation

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CITATION
Verma R, Dhoundiyal A, Bassi S, Choudhary S, Aggarwal V. Acute diarrhoeal disease outbreak in an urban residential complex of Ghaziabad, UP May 2024: Felt needs of community participation. Journal of the Epidemiology Foundation of India. 2025;3(4):331-334.
DOI: https://doi.org/10.56450/JEFI.2025.v3i04.007
ARTICLE CYCLE
Received: 09/12/2025; Accepted: 26/12/2025; Published: 31/12/2025

Abstract

Introduction: An outbreak of acute diarrheal disease in a gated residential complex at Ghaziabad, UP, was reported by the district surveillance team, and study was done to identify exposures of the outbreak. **Methods**: A Google form circulated among the case for exposure and behavioural details. The water supply and drainage system, purification methods, and cleanliness of tanks were observed. **Results**: The drinking water source was the society water supply in 198 (98%) cases. The pipeline supplying water to society had a joint, a nearby dirty drain, and maintenance work done a few days back. No chlorine dozer installed, and no records regarding maintenance and chlorination of the water system. **Conclusion**: There is a need for proactive participation among residents of the complex for ensuring safe drinking water.

Keywords

Case Search; Outbreak; Water Contamination

Introduction

Acute diarrheal disease (ADD) is an occurrence of three or more loose stools within 24 hours. It is a waterborne or food borne disease caused by lack of water sanitation and hygiene (WASH) practices. Globally there are 1.7 billion cases of childhood diarrheal disease every year and is the third leading cause of death in under-five children (1). In India incidence of diarrhoea has been reported as 9.2% (2). Uttar Pradesh has second highest prevalence of diarrhoea cases in country (3).

Diarrhoeal deaths as a result of inadequate WASH were reduced by half during the Millennium Development Goal (MDG) period (1990–2015), with improving service levels towards safely managed drinking-water or sanitation practices (4). Although the incidence of diarrhoea is high in rural area and poor socio-economic group but considerable incidence is also in urban area and richer

group(3). Integrated health information platform (IHIP) is a national level online surveillance portal which collects the data of 33 communicable diseases and conditions including diarrhoea. According to IHIP data of 2023, about 700 cases of diarrhoea was reported in Ghaziabad district of UP which is extensively urban area. An event alert was generated on 3rd of May 2024 at IHIP, about 80-100 cases of ADD were reported at a gated residential complex in Ghaziabad and was confirmed as an outbreak. The study was conducted to identify the risk factors for the outbreak.

Material & Methods

Outbreak Investigation of ADD was done at residential complex "X" in Ghaziabad between 3rd May to 15th May 2024. **Case** was defined as Any resident at urban residential complex "X", Ghaziabad presenting with loose stools or pain abdomen or vomiting since 14th April to 18th May 2024. Google form was created to obtain details regarding demographic, travel, clinical-investigation and treatment, fooding and WASH habits. Google form was circulated among cases as google link and QR code through WhatsApp. We also interviewed the maintenance team and reviewed the records for details of maintenance process, its frequency and monitoring. We observed the water supply and drainage system, purification methods and cleanliness of tanks. Categorial data was analysed as frequency and proportion while qualitative data was enlisted. Confidentiality of interviewers was maintained and all standard protocols followed during study. Outbreak investigation was caried out with the purpose to identify the source of contamination for immediate control of the outbreak and to prevent deaths as part of public health response by the State Health Department. Ethical approval is therefore exempted and not applicable as part of public health response. The field response does not involve any human laboratory sample collection for research purposes, and there are no invasive investigations or medical interventions /experiments carried out. All ethical principles and guidelines by the government of India were adopted during the outbreak response.

Results

A total of 970 cases (attack rate 21.6%) in the outbreak and we obtained google form responses from 202 cases.

Exposure history: Source of drinking water in 198(98%) of cases was water supplied by the society and, 199(98.5%) used RO for purification of water. About 58(29%) of cases used direct society supply water for cooking food, and 32(15.8%) cases carried water at work place from home itself. Cases who consumed food from outside was only 21(10.4%) and only 5(2.4%) had travel history. (Table 1)

Table 1: Exposure history of cases (n=202)

Exposure	n	%
Source of water at home		
Society water supply	198	(98)
Packaged bottle	4	(2)
Purification of water (RO)	199	(98.5)
Source of water for cooking		
Society supply water	58	(29)
RO water	144	(70)
Source of water at work		
From home	32	(15.8)
RO/Packed water	144	(71.2)
Outside food (within 3 days)	21	(10.4)
Food delivery	10	(5)
Restaurants	11	(5.4)
Travel History	5	(2.4)

Environmental Observation results:

Description of water supply system in the building: The main source of water in complex is Ganga Jal supply water through pipeline running at proximity to complex, by Ghaziabad development authority which is supplied for 2 hours daily in morning and evening. And two borewell pumps installed by the builder. Water from these sources is collected at main domestic tank situated at basement of building complex. Now from this main domestic tank water is supplied to all 8 domestic overhead tanks installed at top of each tower of building. And from these overhead domestic tanks water supplied to individual flats through robust pipeline system.

There are also 3 other tanks at the basement of building. Fire tank 1 and 2 which is supplied by same ganga Jal water supply and two borewell, and flush tank supplied only by borewells. The water from fire tanks is supplied to fire system installed in the building and water from flush tank is supplied to overhead flush tanks at top of each tower from where water is supplied to flush of each flat of the tower.

At times when there is water crisis or tanks get empty, water from fire tank 1 is drawn to domestic tank after use of filter unit. And also, sometimes water is drawn from one overhead fire tank to overhead domestic tank of tower via hosepipe.

Other observations and interview finding: The area from where pipeline carrying Ganga Jal water supply to society is entering the building was moist, had one joint in pipe, nearby drain was full with dirty water, and some construction work done few days back. The gates to access the domestic tank was found opened. There was no chlorine dozer installed and water directly supplied to domestic tank was not treated. Some overhead domestic tank and flush tank were open. No records of last one year could be presented for chlorination of water, cleaning of water tanks and maintenance of installed filter. No mass gathering or event was reported in building a week prior to reporting of the cases. No resident welfare association was formed for monitoring and managing the common affairs related to residents of the complex.

DISCUSSION

In the majority of cases, purified drinking water was used; however, one-third of the residents used the direct water supply for cooking. Although purification methods were used at the user end (in each flat), purification was not ensured at the source of the water supply within the residential complex.

Despite the use of household purification, there was poor maintenance of the water supply chain at the source. A study by Waddington H. S. et al. (6) suggests that interventions at the Point of Use (POU) regarding water supply and quality are more effective in reducing diarrhoea cases than source-side interventions. This suggests that the purification methods used by these residents might not have been completely effective. Furthermore, water used for cooking was taken directly from the tap, which may have been contaminated; this is consistent with findings by Joshi R. et al., which state that approximately 38% of diarrhoea cases are due to unhygienic food practices (7). Leakages in the water supply pipeline were also noted, consistent with studies confirming that outbreaks in urban settings are often due to defects in piped drinking water (8–10). In response, a medical camp was set up at the complex to treat cases. The complex's water supply was shut down, and water tanks from the Jal Board were provided to residents. All reservoirs and tanks were cleaned, and a chlorine dozer was installed in the water supply chain. According to the Global Water Supply and Sanitation Assessment 2000 Report, failures in the distribution system—such as the loss of adequate disinfectant residuals, low water pressure, intermittent service, and ageing infrastructure—can result in the declining quality of the water supply (11).

CONCLUSION

The ADD outbreak in this gated residential complex likely occurred due to a contaminated water supply, primarily resulting from a lack of maintenance of the water supply system. The

study highlights the urgent need for proactive participation among the residents of the complex to ensure safe drinking water.

Recommendation

There should be monitoring of water supply chain maintenance by the residents (via a Resident Welfare Association). Water testing should be ensured at both the supply and user ends, and awareness should be raised among residents regarding prompt consultation at health facilities and safe water, sanitation, and hygiene (WASH) practices.

Limitation of the Study

The study was limited by low response rate, reliance on self-reported exposure data collected through digital platform and potential selection and recall bias.

Authors Contribution

All authors contributed equally

Financial Support and Sponsorship

Nil

Conflict of Interest

There are no conflicts of interest.

Declaration Of Generative AI And AI Assisted Technologies In The Writing Process

The authors haven't used any generative AI/AI assisted technologies in the writing process.

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