

## Foodborne Outbreak Investigation in a Festival at Panchkhal Municipality of Kavrepalanchok District in Central Nepal

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### ABSTRACT

**Background:** On September 2018, cluster of gastrointestinal cases following feast of *Teej Festival* was reported in Panchkhal Municipality of Kavrepalanchok, Nepal. The outbreak was investigated to identify the possible source of infection, causative agent and guide local control measures for prevention and control of the outbreak.

**Methods:** Demographic and clinical details were collected from the cases, and the outbreak was described by time, place and person. Fourteen key informant interviews were conducted to assess the probable cause of infection, practice of food handling and preparation, source of drinking water. Semi-structured questionnaires were used to collect data from the cases. Blood examination, stool examination and culture and hepatitis serological test were done. Samples from wells and ponds were collected and microbiological tests were done in National Public Health Laboratory.

**Results:** A total of 452 cases were identified with gastrointestinal illness and no reported deaths. All the affected population had taken food from the same place during the festival where children being more affected. Two stool samples detected *Entamoeba Histolytica* and some showed pus cells with no cyst or ova of organisms. Stool culture was negative. No definitive source of infection detected but was suspected to be due to improper food handling.

**Conclusion:** This investigations confirmed the food borne outbreak in Panchkhal Municipality. The definitive causative agent of the foodborne outbreak was not identified. Proper and timely response to the outbreak is of utmost important, and can reduce the severity of the illness and halt further spread of the epidemics.

Keywords: Food, mass gathering, outbreak, Panchkhal, Food Poisoning

Access this article Online	Article Info.
Quick Response (QR) Code	<b>How to cite this article in Vancouver Style?</b>
	Adhikari SK, Thapaliya R, Lal BK, Shrestha G, Gautam D, Bhattachan M. Foodborne Outbreak Investigation in a Festival at Panchkhal Municipality of Kavrepalanchok District in Central Nepal. Journal of Karnali Academy of Health Sciences. 2020; 3(3)
	<b>Received:</b> 1 September 2020 <b>Accepted:</b> 19 November 2020 <b>Published:</b> 1 December 2020
	<b>Source of Support:</b> Self <b>Conflict of Interest:</b> None
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## INTRODUCTION

Illness related to any food ingestion can cause major public health emergency.<sup>1,2</sup> Vomiting, diarrhea, abdominal pain and fever are the most common clinical manifestations of foodborne illness.<sup>3</sup> Microorganisms and their toxins can be causes.<sup>4,5</sup> Festivals or major events where food borne outbreak can occur.<sup>6-8</sup>

An outbreak was reported from the Panchkhal Municipality on 7<sup>th</sup> September 2018 with initial information of 50 people suffering from vomiting and diarrhea. After confirming the situation, mobilization of Rapid Response Team(RRT) from the Epidemiology and Disease Control Division(EDCD) along with the respective RRT to the field was done immediately to investigate. This incident was presented in line with the mass gathering for a *Teej festival* on 6<sup>th</sup> September 2018. This study aims to assess the magnitude of the outbreak and identify the source of infection, the causative agent and use of local measures for control and prevention of further recurrences for food-related outbreak in Nepal.

## MATERIALS AND METHODS

An outbreak investigation was carried out among the affected population of food related illness in Panchkhal Municipality. Panchkhal Municipality is situated in Kavrepalanchok district (nearly 60 kilometer east from Kathmandu) of Bagmati Province with an estimated population of 40,000. On 7<sup>th</sup> September 2018, a cluster of cases was reported suffering from nausea, vomiting, diarrhea and abdominal pain. Confirmation of the outbreak triggered the mobilization of RRT and epidemiological investigation of the outbreak. A case was defined as any person who presented with one or more of the

following: nausea, vomiting, or abdominal pain, diarrhea, fever after 7<sup>th</sup> September, 2018. A semi-structured questionnaire was used to collect data regarding demographic, food consumption within 24 hours, and clinical details of the cases. A detailed clinical examination and laboratory tests were carried out to evaluate the severity of the illness. Stool examination and culture, complete blood count, Hepatitis serological test were carried out. Although Samples from the remaining food particles were planned to be tested, samples could only be collected from the disposed plates in the bins.

Water samples used for drinking and cooking purpose were collected from well and pond and taps. Data was collected from the camp organized in the locality, and nearby health care facilities; Dhulikhel Hospital, Panchkhal PHC, Baluwa Health Center - Outreach Clinic of Dhulikhel Hospital, Sheer Memorial Hospital and Banepa Hospital. Fourteen indepth interviews (IDI) were undertaken with the organizers (1), chefs (1), patients (8), service providers (2) and local people (2). The outbreak was described by time, place and person. All data were entered and analyzed in Microsoft Excel 2007 software. Data was summarized in frequency distribution table according to age and gender. Ethical approval was taken from Nepal Health Research Council.

## RESULTS

As soon as the food-related outbreak was confirmed in the Panchkhal, rapid response team (RRT) consisting of Chief of Quality Standard and Regulation Division, Chief of Health Emergency Disaster Management Unit, *Epidemiology and Disease Control Division*, National Public Health Laboratory,

Department of Food Technology and Quality Control, World Health Organization, along with District RRT were mobilized in the affected area for the field investigation and to provide health services and necessary coordination. A total of 452 cases were identified from 8<sup>th</sup> to 12<sup>th</sup> September, 2018. The peak of the outbreak occurred on 8<sup>th</sup> September. This investigation found that majority of the cases were from Hindu religion. Everyone were found to have lunched in an event organized to celebrate Teej on 7<sup>th</sup> September 2018. Teej is a major festival celebrated by Hindu women.<sup>9</sup>

Gramin Swabalamban Sahakari Sanstha named co-operative finance limited had organized this event. The venue for the event was in Thulichaur-12 of Panchakhal Municipality as an outdoor picnic. During this event the participants were provided with a buffet lunch. The organizer estimated around 600 participants in the event. However, the exact number of participants could not be calculated. It was a sunny day with a temperature more than 30<sup>0</sup> C. Food were prepared by local chefs, stored outdoor and

served after 4 hours of cooking. Majority of the cases reported feeling uncomfortable at around 11:30 PM on the same night with symptoms of nausea, vomiting, and frequent loose stools. A health camp was organized in the locality ward 12 to assess and treat the cases after increased number of cases were reported to the health coordinator in the municipality. Triage was done during the camp and serious cases were referred to Panchakhal Primary Health Center and subsequently to Dhulikhel Hospital, Sheer Memorial Hospital, Tribhuvan University Teaching Hospital and Kanti Hospital.

On trace back of food items, everyone had ingested Pulao, Paneer curry, Pea curry and mixed pickle (cucumber, carrot). The geographic distribution revealed a concentration of cases in the ward number 9, 11 and 12 of Panchakhal Municipality. All the patients complained of abdominal discomfort from mid night and early morning onwards (8<sup>th</sup> September, 2018) with complains of multiple episodes of diarrhea, nausea, vomiting and fever. Symptoms occurred within 6 to 16 hours of ingestion of feast food.

**Table 1: Age and gender distribution of cases**

Age in years	Male	Female	n(%)
Up to 10	57	45	102 (22.6)
11-20	37	44	81 (17.9)
21- 30	10	61	71 (15.7)
31-40	12	72	84 (18.6)
41-50	5	53	58 (12.8)
51-60	9	32	41 (9.1)
>60	2	13	15 (3.3)
Total	132 (29.2%)	320 (70.8%)	452 (100.0)

The age of patients admitted at health facility ranged from 2 to 90 years old. Majority of the cases were female (71%). The most common age group affected was less than 10 years (Table 1). The youngest was a two years old female child, who was admitted in Paediatric ICU at Scheer Memorial Hospital with diagnosis of febrile seizure secondary to Acute Gastroenteritis (AGE). Her condition improved and was discharged on the third day. Two cases were admitted in ICU, a 28 and 45 years old female at Sheer Memorial Hospital due to multiple episodes of loose stools. A 60 year female was also admitted at ICU in Dhulikhel Hospital with AGE with moderate dehydration with low Blood Pressure. There was no reported cases of mortality.

The inspection of the food for contamination was done using Gas Chromatography/ Mass Spectrometry. Reports from the National Forensic Science Laboratory proved no detection of insecticide poisons of Organophosphorus, Organochlorine, Carbamate and Pyrethroid group in all the 10 samples collected. Around 50 people were involved in cooking whose health status is not known. However, IDI with the chefs did not provide any clue to it. The temperature attained in the food products was not controlled due to lack of refrigerator. We assumed the temperature was high enough to multiply the microorganisms. The preparation of food had begun early morning and ended at 12:00 PM with people devouring by 3:30PM. These prepared food was exposed to the sun indirectly for long period as was prepared in the open field. 200 ml of water samples used for washing dishes were collected from 1) well and 2) pond and sent to National Public Health Laboratory which showed that the presence of Fecal E. coli of more than 180 CFU and another

sample showed presence of Fecal E. coli of more than 40 CFU. However, the drinking water was from Jar water. IDI with local people around the feast area did not provide any evidence of contamination of the water sources.

Stool examinations from two patients admitted at Dhulikhel Hospital detected Entamoeba Histolytica. Some stool RME of patients admitted at Sheer Memorial Hospital detected pus cells with no cyst or ova of organisms. However, the stool cultures in six patients were negative for cholera, salmonella and other organisms.

## DISCUSSION

The outbreak in Panchkhal is the largest foodborne outbreak that has been reported in 2018 in Nepal related to mass gathering. An outbreak investigation or epidemiologic study is of utmost important part in this kind of event. This Panchkhal scenario involved an acute and highly local outbreak, with a high attack rate. The outbreak was immediately apparent to those who ate in the feast. This promptly involved medical and public health authorities to investigate. Although large number of cases were reported, prompt action from local and public health authorities handled the epidemic very successfully owing to control of the severity of the disease. As the feast was a one-day event and all the food produced were disposed of, the sources of infection was controlled. Even though the outbreak was controlled, there were some limitations in the investigations. Epidemic Curve for incubation period could not be generated as most of patients visited the hospital on the same day and were discharged early after recovery from emergency department of various hospitals. The attack

rate was difficult to assess, since it assumed that a person ate all the food items provided during the feast and almost everyone got sick after food consumption. Also, the patients admitted in hospitals were identified but those who did not get ill eating the same food could not be identified. We could gather only the food sample on the next day from the disposed plates, which could have further contaminated as it was left in the open field.

This shows the important of time in an outbreak investigation particularly food borne. Early the conduction of investigation, the more evidences can be gathered and hence helps in strengthening the reason for the outbreak. A case-control study could not be conducted as controls could be identified. Vomitus examination was not done, which would have further strengthened this investigation finding the pathogens involved. Investigation should also be done regarding the potential contamination sources during production and processing of the food, washing, wash water, handling, hand washing and hygiene of the food handlers.<sup>10,11</sup> This investigation also suspected a food-handling error in the open

kitchen in the field that occurs shortly before consumption.

This scenario is the result of low-level contamination of a widely distributed food products. In such outbreaks, investigation can require coordinated efforts of a large interdisciplinary team to clarify the extent of the outbreak, implicate a specific food, and determine the source of contamination.<sup>10</sup> Nevertheless, this investigation taught us what went wrong and helped devise strategies to prevent future similar events from occurring. The trace back and a careful evaluation of the chain of food production is very important part in foodborne investigation.<sup>2,10</sup>

## CONCLUSION

The Panchkhal foodborne outbreak is the largest outbreak due to mass gathering in a festival. This paper highlights the need of timely epidemiological investigation in case of any outbreak. It is very important to develop strategies regarding deployment of RRT team, preventive measures through collaboration of regulatory agencies, food handlers and food producers against food contamination and microbial growth.

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