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Food Poisoning in a Senior High School in Kumasi an Unmatched Case Control Study

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Abstract: Food poisoning, is when a person or a group of persons consume food that may be contaminated with microbes, their toxins, or chemicals. Most cases are accidental and may arise from contamination of ingredients, overdose of additives, or contamination of utensils. Globally, 600 million cases and 420,000 deaths are reported annually. In Ghana, 1914 cases were reported between 2013 and 2021, with 36 deaths. We investigated a case of food poisoning among students of a Girls SHS in the Kumasi Metropolis to estimate the burden, identify the cause and implement control measures. An unmatched case-control study (119 cases, 347 controls) was conducted after descriptive epidemiology, to test for association between the suspected exposure and the outcome. Medical records were reviewed. Active case search was conducted in classes. Our outbreak Case Definition was 'Any person who developed diarrhoea and or abdominal pains from March 5-8, 2022 within the school'. Confidentiality was ensured by excluding the name of the school. A total of 119 boarders, out of 982 (attack rate 12.1%) were affected, but 18 hospitalised. The mean age was 17.4 (range 15-20, SD±0.92). Onset of index case was March 5, 2022. Symptoms included abdominal pains (84/119), diarrhoea (95/119) without mortality. A total 109 (91.6%) cases ate rice and stew, 6 (5%) ate tea and bread, 7 (5.8%) ate banku and groundnut soup, 4 (3.3%) ate rice balls and 1 (0.8%) ate porridge prior to incident. Odds ratio was 9.9 for consumption of rice-and-stew. A point source outbreak was concluded. The odds ratio indicated very strong association between consumption of the rice-and-stew and the outbreak. We recommended screening for food-vendors and education on food hygiene.

Keywords: Food poisoning, Senior High School, unmatched case-control, Kumasi

1. INTRODUCTION

Global burden of food related diseases contribute hugely to global morbidity and mortality (Adley & Ryan, 2016). Food poisoning, is a situation where a person or a group of persons consume food that may be contaminated with pathogenic substances: microbes or their toxins, or chemicals. (Ghana Health Service, 2020). About 31 foodborne microbes (250 hazards) have been identified, including *Salmonella*, *Campylobacter*, *E-coli*, and *Vibrio Cholerae*.

Whiles few cases may be criminal related, most food poisoning cases may be accidental (Kevin J Kulik, 2023) and may arise from contamination of the food ingredients, overdose of certain ingredients or contamination of utensils (Williams, 2012). Food borne diseases may be mild with fast recovery or severe resulting in hospitalization and or death (Adley & Ryan, 2016). Globally, an estimated 600 million persons suffer from food poisoning with about 420,000 mortalities (WHO, 2022). An estimated 110 billion dollars, is lost annually

through loss of productivity and expenses in medical care in lower income countries (WHO, 2022). In Ghana, 1914 cases were reported between 2013 and 2021, with 36 deaths (Larbie, 2022).

We investigated a case of suspected food poisoning among students of a Girls SHS in the Manhyia Submetro of the Kumasi Metropolis, following a report of same from the Manhyia Hospital Surveillance Unit. This was to estimate the burden of the outbreak, identify the cause and implement control measures (Food and Drugs Authority, 2016).

2. MATERIALS AND METHODS

Setting: A government Girls School is situated at Dichemso that lies within longitude -1.609 and Latitude 6.709. It has a total population of 1452, with 982 being boarders. A total of 602 were third year students with rest being second year students. Food is served in the dining Hall but other food vendors also sell food on the compound.

Records review was conducted in the Manhyia Hospital and the school infirmary. Active case search was also conducted in the various classes. Cases were interviewed to collect data on food history, signs and symptoms and other socio-demographic information. Controls were also interviewed for their food consumption history and pattern.

An outbreak Case Definition was developed as follows: “Any person (Student or Staff) who developed diarrhoea and or abdominal pains from March 5, to March 8, 2022 within the campus of the Girls SHS”.

Controls Definition: “Any student in same school who did not show signs of the outbreak”.

An unmatched case control study was done after the descriptive epidemiology, to test the association of the suspected exposure to the outcome.

Data Analysis

Data was entered into Microsoft Excel 2016 and cleaned. Excel pivot tables was used for analysis. Results were presented in frequencies, proportions and a graph. Epi info version 7 was used to arrive at the odds ratio

Ethical Consideration

This was an acute outbreak and the investigations were done with the mandate of the Kumasi Metropolitan Health Directorate to promptly respond. To this end, no ethical clearance was required. However, the name of the school was excluded from this report and the identity of students involved were not revealed. Permission was sought from school authority.

3. RESULTS

A total of 119 boarding students out of 982 (attack rate 12.1%) were affected, but 18 of them reported to the Manhyia District hospital for treatment. Fourteen (14) of them were treated and discharged on same day while 4 were admitted and discharged after spending one night at the ward. No mortality was recorded. The mean age of the case was 17.4 (range 15-20 years $SD \pm 0.92$).

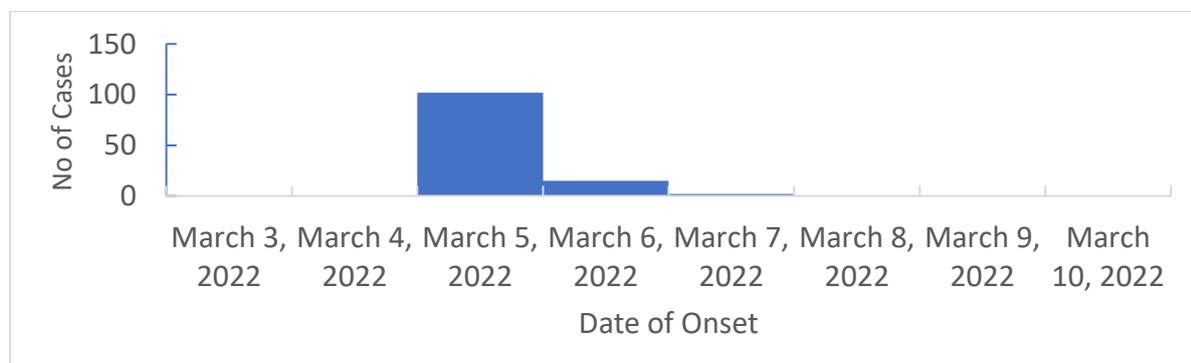


Figure 1: Date of onset of symptoms, suspected food poisoning at a girls SHS, Kumasi March 2022

The first case reported signs and symptoms on Saturday March 5, 2022. The last case reported onset on March 7, 2022. No new case has been reported since then (Fig. 1).

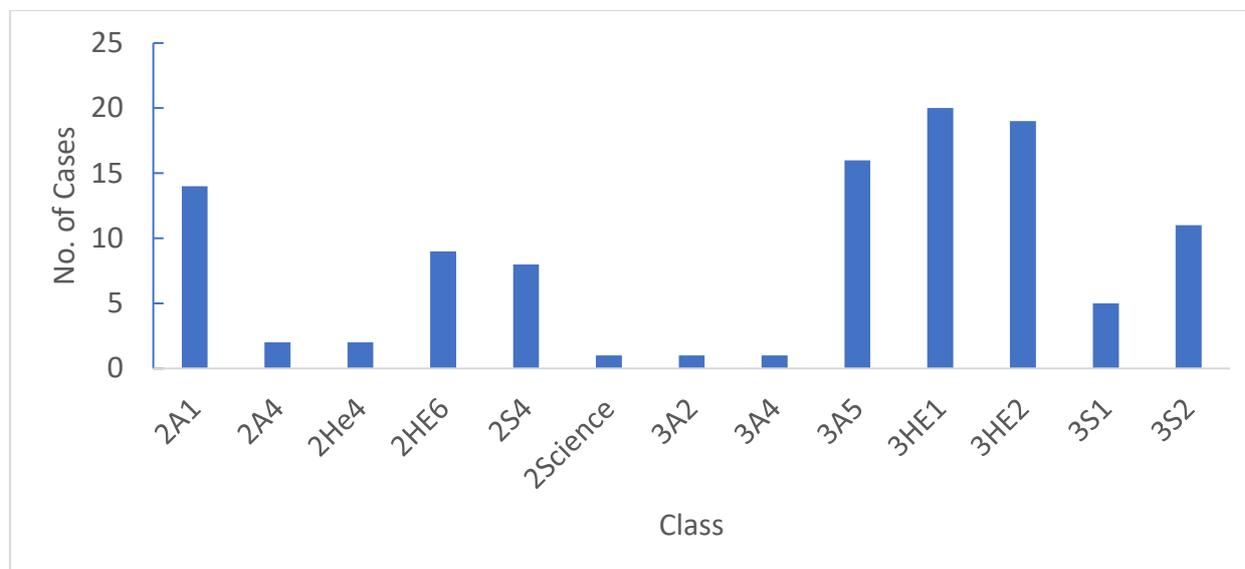


Figure 2: Number of Cases per class, suspected food poisoning in a Girls SHS in Kumasi, Ghana, March, 2022

The cases came from a wide range of classes, but majority of them were from third year class. No first year student was affected (Fig. 2).

Table 1: Signs and symptoms exhibited by cases in a suspected food poisoning, a Girls SHS in Kumasi, Ghana, March 2022.

Sign/Symptoms	Cases	Percentage
Abdominal Pains	54	45.4
Diarrhoea	95	80.0
Nausea /Vomiting	2	1.7
Dizziness	1	0.84

Majority of the cases showed abdominal symptoms as indicated in Table 1.

Table 2: Food Consumption history of cases of food poisoning in a girls SHS Kumasi, Ghana. March2022

Food Eaten	Yes (N=119)	Percentage
Ate Rice and Stew	109	91.60
Tea and Bread	6	5.04
Banku and Groundnut soup	7	5.88
Rice Ball	4	3.36
Porridge	1	0.84

Majority (91.6%) of the cases ate rice and stew bought from a private vendor on campus (Table 2).

Table 3: Cases and Controls against exposure to Rice and Stew, Food poisoning outbreak in a Girls SHS, Kumasi 2022

Exposure	Cases	Control	Total
Ate Rice and Stew	109	181	290
Did not Eat Rice and Stew	10	166	176
Total	119	347	466

About 91.6% of the cases actually consumed that food (Rice and Stew), sold by a private vendor on the school premises. Only students and people staying on the school premises usually buy from the vendor.

Odds of exposure (Odds Ratio) to the rice and stew was thus computed to be: 9.9

4. DISCUSSION

The attack rate of 12.1% in this outbreak was lower than what was reported in Boamang Kyerekrom D/A primary School in the Afigya Kwabre North District of Ghana where an attack rate of 30.8 was reported (Laryea & Gyimah, 2021). Like that study, there were no mortalities reported. No first year student was on campus during the incident, hence none was affected.

From the results, it was realised that only borders were affected. Also, the onset of first symptom was on a weekend. The incidence most likely occurred on a weekend, when it was suspected that many students ate from outside the school dining hall.

Like the study in Ga East district of the Greater Accra region of Ghana (Malm et al., 2015), the most common sign or symptom reported was diarrhoeal (and vomiting). In this study, cases showed multiple symptoms. In the study at Afigya Kwabre North District in Ghana, the commonest symptoms were abdominal pain, fever, nausea and bloody diarrhoea (Laryea & Gyimah, 2021). In this outbreak however, no bloody diarrhoea nor fever was reported.

This outbreak lasted for 3 days compared to 5 days in the case of Ga East (Malm et al., 2015). Food sample was not available for laboratory testing. The acute nature of foodborne diseases could be a reason why samples are usually not picked for testing. Also, until further descriptive studies to narrow down on the suspected exposure, it becomes too vague deciding on which food sample to pick since consumption patterns may be very wide.

Although, the rice and stew was the culprit from the odds ratio of 9.9, the exact cause of contamination could not be established. This was unfortunate. It is similar to the Ghana FDA findings in the investigations of food contamination in a private restaurant in Accra where the root cause was never established (Frimpong, 2022). However, victims were successfully treated by clinicians of Manhyia District Hospital, Kumasi

Findings from this study suggest that boarding should pay particular attention to food vendors who sell on their campuses. The need to collaborate with state agencies like Food and Drugs Authority, Environmental Health and the Ghana Health Service to ensure they (vendors) comply with basic safety procedures in order to protect their students. The findings also show that early reporting of such cases for prompt medical care saves lives.

In order to establish the specific cause(s) of such outbreaks in the future, school authorities must collaborate with health authorities to be able to collect samples from suspected foods for laboratory analysis.

5. CONCLUSION

This outbreak was a point source outbreak possibly caused by consumption of the rice and stew. An odds ratio of 9.9 indicated a very strong association between consumption of the rice and stew and getting the condition. Since only boarding students were affected, the suspected contamination occurred in the food sold on Saturday March 5, 2022. Symptomatic management was successful as all cases survived.

We were unable to determine the specific cause of the incident due to our inability to pick appropriate sample for testing. Again we could not gather data on exact time of onset to determine interval between exposure and onset of symptoms. It is imperative that the food vendor and her staff must be screened by the environmental Health Unit. Also health education on food hygiene must be intensified among the food vendors and students in all SHS in Ghana to prevent microbial contamination of food.

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