# Evaluation of the Response Efforts to Foodborne Disease Outbreak in a College of Education in Ghana

# Abstract

**Aim:** This study aimed to evaluate the emergency response measures implemented by the Presbyterian College of Education, Akropong, following a foodborne disease outbreak in September 2023 that affected 51 students.

**Study Design:** A mixed-methods evaluation design was employed, guided by the United Nations High Commissioner for Refugees (UNHCR) Emergency Handbook and the OECD Development Assistance Committee (DAC) evaluation criteria updated in 2019.

**Methodology:** Data were collected from both primary and secondary sources. Primary data comprised key informant interviews and focus group discussions involving 22 stakeholders, including students, college administrators, health staff, and emergency coordinators. Secondary data were drawn from the college’s After-Action Report (AAR) and medical records compiled by college nurses. A directed content analysis approach was used to interpret the findings based on the OECD-DAC evaluation framework.

**Results:** Five key response strategies were implemented: community health education, emergency planning, clinical investigations and referrals, prevention/mitigation strategies, and the stockpiling of first aid supplies and personal protective equipment (PPEs). These efforts were deemed relevant, coherent, effective, efficient, impactful, and largely sustainable. The outbreak was controlled within four days, with no fatalities or recurrence. However, stockpiling was found to be resource-intensive, and prolonged emergency meetings emerged as a notable operational constraint.

**Conclusion:** The College’s response to the outbreak was timely, well-coordinated, and aligned with national health policies. Effective communication, multi-stakeholder collaboration, and prompt clinical interventions contributed to the successful containment of the emergency. Future interventions should aim to streamline emergency planning processes and improve logistical readiness to enhance responsiveness and sustainability.

**Keywords:** Foodborne disease, outbreak, response efforts, evaluation, College of Education

## 1. Introduction

After an outbreak of a foodborne disease that creates an emergency, it is important to evaluate the response efforts to reflect and identify gaps, best practices, and lessons learned emerging from the emergency, as well as to suggest measures and actions to improve ongoing response or be better prepared for future emergencies (Rural Health Information Hub, 2022). Failure to act on problems identified from past emergency experiences can leave health systems and communities susceptible to the same problems during future events (World Bank, 2009; Savioa et al., 2012). Evaluating a department's response can offer insights into what supports or hinders the successful delivery of health services during an emergency (Adini and Peleg, 2013). Emergency evaluations are conducted for learning and accountability purposes; as a result, timelines for these reports are of great essence (UNCHR, 2024). An evaluation of level 3 emergency operations is to be conducted within 15 months or earlier of response, while evaluation of level 2 and level 1 emergencies may be commissioned at the request of the Senior Executive Team at any time for a real-time review (UNCHR, 2024).

Foodborne diseases are an important cause of morbidity and mortality and a significant impediment to socioeconomic development worldwide (World Health Organization, 2015). Globally, foodborne diseases kill an estimated 2.2 million people annually, with children under five years of age being the most at risk (Ameme et al., 2016; World Health Organization, 2015). These diseases are acquired by the consumption of food contaminated with toxins, viruses, bacteria, or parasites (Ameme et al., 2016; Morris & Vugia, 2021). The symptoms of foodborne diseases range from mild and self-limiting situations, such as nausea, vomiting, and diarrhea, to debilitating and life-threatening situations such as kidney and liver failure, brain and neural disorders, paralysis, and cancers, leading to long periods of absenteeism and premature death (World Health Organization, 2015).

There are many causative agents responsible for foodborne diseases, but the most common include Clostridium perfringens and Salmonella species (Clostridium perfringens - Food Safety, 2015).

Clostridium perfringens often presents with mild symptoms and with a short duration as compared with Salmonella species, which is characterized by serious intestinal complications (Clostridium perfringens - Food Safety, 2015).

From 15th September to 18th September 2023, a total of 51 students from the Presbyterian College of Education - Akropong were rushed to the Emergency Department of Tetteh Quarshie Memorial Hospital in Ghana with complaints of abdominal pain, vomiting, diarrhea, and general body weakness. The students started complaining at around 9:00 pm, and at about midnight, 32 of them had been sent to the hospital for treatment. Between midnight and 6:00 am, an additional 9 students were also sent to the hospital for emergency care. The number of reported cases went down drastically until it ended on the 4th day. None of the students were detained beyond a day at the hospital. All the students were treated and discharged within 3 to 6 hours of their visit to the hospital, and there were no fatalities.

All the students had eaten from the college’s dining hall. They ate cooked, rich, and groundnut soup with chicken for dinner. The hospital authorities suspected a foodborne disease outbreak and notified the Regional Health Directorate through the District Health Management Team (DHMT) and the Regional Food and Drugs Authority to investigate the outbreak and to offer precautionary as well as preventive measures. One year after the outbreak of the foodborne disease, the college is evaluating its response efforts for learning and accountability purposes.

## 2. Methods

### 2.1 Outbreak Setting and a Brief History

The outbreak evaluation was carried out at the Presbyterian College of Education in Akropong. The college is situated in the capital of the Akuapem North Municipality in Ghana's Eastern Region. It has a total of 1,876 students and 125 staff members. Ghana's government policy provides feeding grants to colleges of education nationwide. Accordingly, Presbyterian College of Education, like its sister colleges, offers meals to all students. These meals are prepared in the college's kitchen under the supervision of three domestic bursars, each holding at least a bachelor's degree in hospitality management and at least three years of post-qualification experience in large-scale cooking. In addition to the three supervisors, twelve junior staff assist with kitchen duties. All kitchen personnel are certified by the Ministry of Health to prepare food for public consumption. The kitchen includes three storerooms: one for tubers, another for cereals, and a cold room for storing fresh fish, meat, and other perishable items.

The college depends on two water sources for students' domestic needs: the Ghana Water Company Limited and a mechanized borehole. The primary drinking water for students is bottled water they buy from local vendors. The college has a ten-bed clinic managed by two nurses and other health professionals from the Tetteh Quarshie Memorial Hospital.

### 2.2 Study participants

The study participants consist of staff and students whose duties are directly or indirectly related to maintaining health and safety in the institution. They include the head of the institution (1), the College Nurses (2), the Dean of Student Affairs (1), the Hall Warden (1), the Hall Masters/Mistresses (8), the Quality Assurance Officer (1), the Domestic Bursar (1), and the SRC (7). These respondents made up the key participants for the study, totaling twenty-two (22).

**2.3 Data collection.**

The study adopted the mixed-method approach that relies on a variety of primary and secondary sources as recommended by the UNHCR Emergency Handbook. The primary sources included key informant interviews and focus group discussions. In the case of the secondary sources, the "After Action Report" (AAR) generated by the college management, as well as the report from the college nurses, was used.

The Organization for Economic Co-operation and Development (OECD) Development Assistance Committee (DAC) evaluation criteria, as updated in 2019, were used as a guide in developing the interview guide for the primary sources of data, as well as the search for the secondary data. The six criteria are effectiveness, relevance, efficiency, impact, sustainability, and coherence. These were guided by the corresponding indicative evaluation questions:

1. How responsive was the college strategy to the external environment, including the role of government (Ministry of Education, Ministry of Health, and GTEC) and local actors?
2. To what extent was the college’s response meeting the needs of students?
3. To what extent did the college achieve its envisaged outcomes?
4. How efficient and timely were the response efforts?
5. To what extent were the successes and failures in the response efforts attributed to system-related factors?
6. What more should be done?
7. What can the college learn from its preparedness efforts?

In the case of the primary sources of data, a total of four (4) key informants in the person of the head of an institution, the senior college nurse, the senior hall warden, and the dean of student affairs were interviewed on the above indicative evaluation questions. The section for each participant lasted for about 35 minutes.

In addition to the key informants’ interviews, focused group discussions were conducted for the SRC and the house masters/mistresses, with each group being seven (7) and eight (8), respectively. With the consent of the respondents, the interview sections were recorded and transcribed verbatim using the content analytic approach.

The researcher used secondary sources of data in the form of the After-Action Report (AAR) on the outbreak from the college management and the College Nurse Monthly Report to complement as well as fill in the gap with data supplied by the focus group discussions and the key informants.

## 3. Analysis

The directed content analytic approach was used to analyze data. The analysis starts with a theory or relevant research findings as guidance for initial codes. This approach has the power to interpret meaning from the content of text data and, hence, adheres to the naturalistic paradigm Hsieh & Shannon, 2005). The OECD-DAC evaluation criteria, as updated in 2019, were used as a guide in developing the interview guide for the primary sources of data, as well as the secondary sources.

## 4. Results of the study

The results were organized around six criteria for evaluation, which are relevance, coherence, effectiveness, efficiency, impact, and sustainability. The result starts with making a case for the occurrence of the outbreak. All the secondary sources of data for the study solicited from AAR and the college nurse report confirmed the occurrence of the outbreak of foodborne diseases in the Presbyterian College of Education from the 15th to the 18th of September, 2023, with 51 students rushed to the Tetteh Quarshie Memorial Hospital, with almost all the victims’ showing signs of abdominal pains, vomiting, and general body weakness. It was also observed that all the victims were treated and discharged between 3 to 6 hours after their referral to the hospital, and there was no fatality recorded.

The first criterion considered was relevance, and the corresponding indicative question was, to what extent is the college's response strategy meeting the needs of students? Relevance in emergency response was defined by OECD (2021). The extent to which intervention's objectives and design respond to beneficiaries' needs and priorities, as well as alignment with national and institutional policies. The study found that the college used community health education, emergency planning, and risk assessment and mitigation strategies as emergency response efforts in the college. Refer to Table 1 for the matrix on emergency response efforts in the college.

**Table 1. Matrix on Emergency Response Efforts in the College**

| **Response Efforts** | **Actions** |
| --- | --- |
| **Community Health Education** | - Awareness creation on the outbreak by college nurses- Early detection signs and preventive practices by college nurses and DHMT- Promotion of food safety and hygienic practices by the DHMT |
| **Emergency Planning** | - Engagement of key stakeholders in their roles in emergency management |
| **Clinical Investigation and Referral** | - Examination of each case by college nurses- Administration of appropriate first-aid- Referral of severe cases to the District Hospital |
| **Prevention/Mitigation Strategies** | - Enforcement of strict food safety and hygiene standards at the kitchen, food vending points, and students’ residences |
| **Stockpile of Needed Inputs** | - Procurement of additional First Aid supplies and PPEs |

The question as to whether the college response efforts were relevant in meeting the needs of the students was explored. To respond to this issue, Table 1 presents the general summary of the findings. The interpretation found in Table 1 indicates that most students became calm, and their anxiety about the effects of the outbreak was reduced when the students realized that the situation was under control and stakeholders knew what to do in their response efforts. For instance, an SRC member spoke of how relevant the emergency response efforts of the college management were:

*”We are grateful to the Management of the college for the various interventions put in place to address the health concerns on campus. The education on food safety, hygienic practices, and early detection of symptoms saved a great deal. The swift manner in which the key officers such as the college nurses, hall masters/mistresses, and the college responded to emergency calls was worth commending as it reduced the fears students had about the outbreak. We were happy to note that, for one’s unauthorized food vendors were barred from selling to students on campus.” (FGD1- SRC.P1).*

A Hall Staff also had this to say on the relevance of a Specific emergency response effort:

*The emergency planning meeting involving the hall staff ( hall masters/mistresses), the Dean of Students Affairs, the college nurses, the domestic bursars, the transport officer, the Estate Officer, SRC, and management was very important and timely in helping all key stakeholders to be responsive to expected roles as duty bearers in such an emergency. ( FGD2-Hall Staff.P4).*

A common complaint from some students that negatively impacted the response efforts of the college was the frequency and length of emergency planning meetings, which often kept some activities delayed.

*Some students were very sick, they were rushed to the hospital and no management member followed up to check on the situation of the affected students because management members were having emergency meetings (FGD1-SRC.P5).*

*We were not very happy as students when at a point the duty of transporting victims to the clinic as well as to the hospital fell on students due to the frequent meetings the responsible officers were engaged in. (FGD1-SRC. P7)*

The management of the college and the college nurses were content that the response efforts of the college paid off as the college was able to contain as well as eradicate the outbreak within four days of its emergence. These emergency response efforts were indeed relevant in restoring health and safety that was jeopardized by the outbreak of foodborne disease on campus back to normalcy.

*I really went through a lot as a college nurse, for the four days the college was hit by foodborne disease. Calming students down, attending to emergencies, making referrals, attending emergency planning meetings, and engaging students in health and safety education were all difficult moments but it paid off in the end as the outbreak was eradicated. (Int. P.3)*

Coherence was the second evaluation criterion used. This criterion examined the extent to which other interventions supported or undermined the college emergency efforts and vice versa. The indicative evaluation question, which served as a guide, was how responsive was the college strategy to the external environment, including the role of government (Ministry of Education, Ministry of Health, and GTEC) and local actors?

The study found that the response efforts of the college were in sync with the Ministry of Health's protocol for emergency management, which emphasizes clinical investigations and referral, first aid, evacuation, and triage. Again, the college response efforts were found to be in sync with the Health Policy of Ghana, which aims to provide equitable, affordable, and responsive health services to improve the quality of life for all citizens, including students. Finally, the college's response efforts were in sync with Ghana's School Health Policy, which focuses on providing a supportive environment for students' health and well-being. The principal of the college spoke about the complementary nature of the college's response efforts and the fact that it was in harmony with other health policies:

*We consulted widely before coming up with the college’s emergency response efforts. Experts assured the college that when the response efforts are followed through, the outbreak would be eradicated. I am aware that the college response efforts were in line with the Ghana Ministry of Health protocol in emergency management, Ghana Health Policy, and Ghana's School Health Policy and would add value to the emergency management in the college. (Int. P1)*

A college nurse also spoke about the coherence nature of the response efforts of the college:

 *I cannot do things fortuitously especially during this emergency as my superiors are watching every emergency step I take. There are laid down protocols for emergency management, and as a professional, I must keep to them and be able to write a report that is consistent with the template of emergency management. (Int. P6)*

The effectiveness of the response efforts was considered. Broadly, this criteria looks at the extent to which the intervention achieved or is expected to achieve its objectives while taking into account the relative importance of the objectives.12 The indicative evaluation question was how effective was the targeting strategy? Almost all the SRC members and the Hall staff who spoke on community health education also talked about the fact that it was effective in creating awareness of the outbreak in the college community and in educating the college community on the danger signs of the foodborne outbreak as well as emphasizing good food safety and personal hygiene practices. This was what one SRC member had to say:

*The Disease Control Officer’s seminar held during the outbreak indicated that whenever someone has any of the following symptoms, bloody stool, prolonged vomiting, diarrhea and a fever higher than 1020 F the affected person should be rushed to the clinic for attention since it can have dire consequences. There should be strict observance of personal hygiene, avoid eating food that is cold, and avoid cross-contamination. This information was very helpful in reducing the impact of the disease outbreak. (FGD1-SRC. P4)*

The case of how effective the emergency planning activities contributed to mitigating the effects of the outbreak was explored as indicated in Table 1, found that most discussants applauded the management of the college for inviting all key stakeholders in emergency management, such as the Dean of Student Affairs, college nurses, hall warden, hall masters/mistresses, transport officer, and SRC for an emergency planning meeting. This planning meeting offered the opportunity for the key stakeholders to reflect on their duties and execute them without delay. It also offered the opportunity for the management of the college to take stock of all needed inputs that would be required during the outbreak period and provide them immediately. Inputs from a hall staff and an SRC, respectively, on this discussion were profound:

*I was very happy with the urgency with which the management of the college called for an emergency planning meeting involving all stakeholders in health and safety issues to discuss what to do during this crisis period, and how to do it. I think this planning phase was effective in energizing us to work. (FGD2-Hall staff. P8).*

*This is the first time the SRC is experiencing a foodborne disease outbreak, and without this emergency planning meeting we at our level will not know how to calm our students down and what to do in this emergency. (FGD1-SRC P2)*

From Table 1, the effectiveness of another college response effort, which is clinical investigation and referral was assessed. Almost every interviewee indicated that the college nurses did very well in attending to each case promptly by investigating if it was a foodborne disease. All foodborne diseases were referred immediately to the nearest hospital. Comments from the Principal and the Dean of Student Affairs:

 *I had no cause to worry about the management of the emergency crises on campus since the two nurses were seen discharging their duties without delay. Those who needed first aid and, or referrals were given promptly. (Int. P1).*

*I spent most of the time during the outbreak period at the college clinic observing the turn of events and supporting where necessary. I found the nurses very apt at their work. I have yet to receive any adverse comments on the role played by the college nurses in this emergency crisis (Int.P2*).

While many of the discussants found the mitigating strategy of adhering strictly to food safety and hygiene practices effective, a few saw it as not an effective intervention. They were of the view that the outbreak had already occurred and what need was there to keep to the strict standard of washing hands under running water? This is what some of the students' representatives had to say:

*We have already been hit by the outbreak, so why do we have to worry ourselves to frequently wash our hands under running water*? (FGDI-SRC. P3)

*Tightening the food safety practices at the college kitchen is a good thing to do, but to spend money to purchase Veronica buckets for hand washing, I am not sure I am in support. (FGD1-SRC. P7).*

The effectiveness of the last college response effort was explored, and many interviewees agreed to the fact that the stockpile of first aid inputs and PPEs during the period of the outbreak, though expensive, was a good intervention. The college nurses commented that they felt at ease working once the inputs needed to work during the outbreak period were provided:

*Equipping the clinic with first aid inputs and PPEs was enough motivation to work since I felt empowered and secure. (Int. P4)*

*One of the most impactful interventions was the stockpiling of the clinic with emergency items such as first aid inputs and PPEs. We did not have to delay in attending to cases because all inputs needed were available. (Int. P5).*

The efficiency of the college response efforts was the next evaluation criterion explored. OECD defined efficiency in emergency response as the extent to which the intervention delivers, or is likely to deliver results in an economical and timely way. 11 The indicative evaluation question was how efficient and timely were the responses of community health communication, emergency planning, clinical investigations, referral, mitigating strategies, and a stockpile of needed inputs? The study found that almost all the interviewees were happy that the response efforts of the college were able to curtail the outbreak within four days. A college nurse gave this positive comment on the college's response efforts.

*The professional advice the college sought from the DHMT on how to manage the outbreak is commendable. All the response efforts were very effective in eradicating the foodborne disease within the shortest time. (Int. P4)*

The Principal of the college also believed that the commitment of the college nurses as well as the efficient way by which the nurses supervised all the response efforts, were contributory factors to the early eradication of the outbreak on campus.

*The presence of the hardworking and committed nurses as well as their meticulous supervision of the various response efforts, cannot be taken for granted in the eradication efforts. (Int. P1)*

The impact of the response efforts was another criterion that was explored. Impact, as defined by OECD, looks at the extent to which the intervention has generated or is expected to generate significant positive or negative, intended or unintended, high-level effects. 11 The study found that the response efforts of the college were able to restore the well-being and safety of students after an outbreak of foodborne disease had shattered the lives of many. For instance, the college nurses spoke about the impact the response efforts had on the students:

*I am not surprised at all that our response efforts paid off and were very successful in restoring the well-being and safety of students because our activities were monitored and supervised by the DHMT. (Int. P5)*

*The most significant impact of the response efforts of the college was that no lives were lost during the outbreak and the well-being and safety of students were restored. (Int. P4)*

The final evaluation criterion, sustainability is the extent to which the net benefit of the intervention continues or is likely to continue. Many discussants were of the view that apart from stockpiling first aid inputs and PPEs which are not sustainable, the rest including ensuring strict health and safety standards, community health education, clinical investigation, and referral were sustainable in promoting a safe environment for students:

*I am not sure the college will have problems with organizing activities such as community health education, keeping to strict health and safety standards, and clinical investigations and referrals as these are part of the routine health activities the college must embark on (FGD1-SRC. P6).*

*The college takes its supplies from the hospital, and it is not the norm for the hospital to stockpile clinics with deliverables; therefore, this current stockpiling is not sustainable. (FGD2-Hall Staff. P3).*

## 5. Discussion

The outbreak of foodborne disease in educational institutions is not a rare event (Opare et al., 2013). And is often underreported among developing countries where systematic foodborne disease surveillance and epidemiological studies are uncommon (Kaferstein, 2003; Ameme et al., 2016). This study has shown that at the core of managing an outbreak of foodborne disease is time-sensitive care involving multiple caregivers who are both professional healthcare providers, such as college nurses and physicians, and nonhealth professionals, such as deans of students, hall masters/mistresses, and transport officers. Even though each caregiver’s role cannot be ranked above others, the college nurse plays a critical role as, in most cases, he/she is the only professional health worker in the college, and he/she is expected to identify potential health problems in the college environment, coordinate first aid and CPR training for staff, evaluate first aid and emergency training and exercise, and develop emergency plans for students with known health problems (National Association of School Nurses, 2019; Cagginello et al., 2011). A delay in the delivery of care from each of the caregivers could lead to avoidable deaths or a worsened ill-health situation with an increased cost. The timely delivery of the response efforts of the various gatekeepers in the college reflects how efficient these healthcare players were. It was not surprising to note that through the timely delivery of response efforts the outbreak was curtailed within four days without any fatality. This finding concurs with 7 that an outbreak of foodborne gastroenteritis may lead to fatalities if medical care is delayed. Besides causing deaths among the affected population, delayed emergency care may also lead to disability or a reduction in the effectiveness of treatment (Chang et al., 2016).

It is worth noting that the timely delivery of response efforts of the multiple caregivers was made possible by the initial emergency planning meetings held, which spelled out the expected roles and responsibilities of each caregiver. This was followed by the high level of coordination of care received from the college nurses and the head of the institution (principal). These two key officer roles were to ensure that there was no fragmentation in emergency care. For instance, at the scene of the emergency, which happened to be in the college, every suspected case was immediately reported to the housemaster/mistress, who intended to report the case without delay to the college nurses for clinical investigations for first aid or referral to the hospital. This approach to the coordination of emergency care is in line with Jin et al. (2023). Studies emphasize the coordination of care in improving outcomes of emergency medical services, and that an effective emergency care system cannot be achieved without effective coordination of care. This approach to coordination of emergency response efforts was also in line with the Emergency Care System Framework developed by the World Health Organization (World Health Organization, 2018). This indicates that emergency care systems span multiple sectors, including the scene of the emergency, the transport of patients, and the care system.

The issue of the relevance of the college's response efforts such as undertaken of health education, emergency planning, clinical investigations and referral, prevention/mitigation practices, and a stockpile of first aid inputs and PPEs cannot be taunted since it followed WHO protocols for community emergency care, which indicated that primary care and public health workers are likely to be the first point of contact for those seeking emergency care. As first-line responders, primary care workers are responsible for dealing with health emergency case management. This may involve disease-specific case identification, supportive management, appropriate infection control procedures, or safe onward referral (Rural Health Information Hub, 2022; Clostridium perfringens - Food Safety, 2015), and also supervised by the health professional from the Akuapem North District Health Management Team (DHMT). Credence can also be given to the response efforts of the college since they were in sync with major health blueprints in Ghana, such as the Ministry of Health's protocol for emergency management which emphasizes clinical investigations and referral, first aid, evacuation and triage (Ministry of Health, 2016); the Health Policy of Ghana, which aims to provide equitable, affordable, and responsive health service to improve the quality of life for all citizens, including students (Ministry of Health, 2020); and Ghana’s School Health Policy, which focuses on providing a supportive environment for students’ health and well-being (Ghana Education Service, 2024).

Again, the fact that the college’s response efforts were impactful such that they were able to prevent fatalities and restore the well-being and safety of students within four days after the outbreak had shattered the lives of many students cannot be underestimated. What needs to be worked on is rather the implementation challenges, such as frequency and long time spent for emergency planning meetings, delays in procuring PPE and first aid, and inadequate communication between the various stakeholders. These should be reviewed to improve operations in emergency care, as has been proposed (Zanello et al, 2015). A major limitation of this study was a recall bias among all the caregivers in the college. The study was designed such that the evaluation of emergency response efforts was carried out after one year of the outbreak. The possibility of the respondents not recalling the actual experiences related to their interventions, rather than giving general information on interventions, cannot be ruled out. Being mindful of this weakness, the researcher incorporated personal landmarks and life events as prompts to aid recall. Related to addressing the problem of recall was the unavailability of the outbreak report from the Regional Food and Drugs Authority (FDA) as well as that of the DHMT. It is believed that if these reports were available for reading, the respondents could have refreshed their memory on the facts from such reports and minimized recall biases. Unfortunately, after one year of a reported foodborne outbreak, reports on the outbreak from DHMT and FDA were yet to be received. The only available source of secondary data for reference was the AfterAction Report (AAR) from the college nurses. The use of the AAR alone without other external reports weakens the design of the study. These notwithstanding, the study provides useful lessons on response to efforts in foodborne outbreaks.

## 6. Conclusion and Recommendation

A foodborne disease outbreak occurred at Presbyterian College of Education-Akropong from 15th to 18th September 2023, affecting 51 students. After one year of the occurrence, an evaluation of the emergency response efforts was carried out and found that five main emergency response efforts were used to control the outbreak, namely, community health education, emergency planning, clinical investigations and referral, prevention/mitigating strategies, and stockpiling of first aid and PPEs.

The response efforts used by the college were found to be relevant, coherent, effective, efficient, impactful, and sustainable in controlling the outbreak within four days and without any fatalities or recurrence. The timely response of multiple caregivers, effective communication, and collaboration were seen as major promoters for successful emergency care in the college, while long hours used for emergency planning and frequency of emergency meetings were seen as setbacks and must be worked on in other emergency interventions.

## 7. Abbreviations

**AAR**, After Action Report; **DAC**, Development Assistant Committee; **DHMT**, District Management Team; FDA, Food and Drugs Authority; **GTEC,** Ghana Tertiary Education Commission; **MOE**, Ministry of Education; **OECD**, Organization of Economic Co-operation and Development; **SRC,** Students Representative Council; **UNHCR,** United Nations High Commissioner for Refugees; **WHO**, World Health Organization;

**9. Competing interests**

The author declares that he has no competing interests.

## 10. Ethical approval and consent to participate

Approval for the evaluation of the response efforts was given by the Akuapem North DHMT. This evaluation was considered a response to a public health emergency from a tertiary institution in the municipality and therefore did not receive a formal review from the Ethical Review Committee. All respondents provided consent and were assured of confidentiality.

COMPETING INTERESTS DISCLAIMER:

Authors have declared that they have no known competing financial interests OR non-financial interests OR personal relationships that could have appeared to influence the work reported in this paper.

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