

# Description of Reported Foodborne Diseases in Selected Communities within the Greater Accra Region-Ghana: Epidemiological Review of Surveillance Data

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**Abstract**—Background: Acute gastroenteritis is one of the frequently reported Out-Patient Department (OPD) cases. However, the causative pathogens of these cases are rarely identified at the OPD due to delay in laboratory results or failure to obtain specimens before antibiotics is administered. Method: A retrospective review of surveillance data from the Adentan Municipality, Accra, Ghana that were recorded in the National foodborne disease surveillance system of Ghana, was conducted with the main aim of describing the epidemiology and food practice of cases reported from the Adentan Municipality. The study involved a retrospective review of surveillance data kept on patients who visited health facilities that are involved in foodborne disease surveillance in Ghana, from January 2015 to December 2016. Results: A total of 375 cases were reviewed and these were classified as viral hepatitis (hepatitis A and E), cholera (*Vibrio cholerae*), dysentery (*Shigella* sp.), typhoid fever (*Salmonella* sp.) or gastroenteritis. Cases recorded were all suspected case and the average cases recorded per week was 3. Typhoid fever and dysentery were the two main clinically diagnosed foodborne illnesses. The highest number of cases were observed during the late dry season (Feb to April), which marks the end of the dry season and the beginning of the rainy season. Relatively high number of cases was also observed during the late wet seasons (Jul to Oct) when the rainfall is the heaviest. Home-made food and street vended food were the major sources of suspected etiological food, recording 49.01% and 34.87% of the cases respectively. Conclusion: Majority of cases recorded were classified as gastroenteritis due to the absence of laboratory confirmation. Few cases were classified as typhoid fever and dysentery based on clinical symptoms presented. Patients reporting with foodborne diseases were found to consume home meal and street vended foods as their predominant source of food.

**Keywords**—Accra, etiologic food, food poisoning, gastroenteritis, illness, surveillance.

## I. INTRODUCTION

ACUTE gastroenteritis is one of the commonly reported OPD case with viruses being the leading causative organism [1], [2]. Most of time the causative pathogens are seldom identified at the OPD due to delay in laboratory results or failure to obtain specimens before starting treatment [3]. Studies have shown that 71% of gastroenteritis cases at the OPD are foodborne related [4]-[7] with presentation such as diarrhea and/or vomiting, which is marked by the presence of

fever, abdominal pain, fecal leukocytes, and hemocult. Most cases of acute gastroenteritis, like foodborne diseases are self-limiting [3], [8], hence are rarely reported in health facilities.

In Ghana four main clinically diagnosed food borne diseases were reported during the period 2009 to 2013. These were: Cholera (59.8%), typhoid fever (16.5%), dysentery [shigellosis] (2.6%), and viral hepatitis (1.6%). Out of these reported cases, only 8.0% (127/1,591) were confirmed through laboratory analysis [9]. Hence National Foodborne disease surveillance system was implemented in 2015 for these diseases. One of the objectives of the surveillance system is to trace back the etiologic agents of the disease to the various sectors along the food chain. This will provide the scientific justification for implementing public health interventions along these sectors of the food chain. However, no known study has been conducted to systematically review the surveillance data and identify sectors of the food chain requiring public health interventions. The purpose of this study is therefore to describe the epidemiology and the food practice of cases reported from the Adentan Municipality and recorded in the National foodborne disease surveillance system.

## II. METHOD

### A. Study Population and Design

The study involved a retrospective review of surveillance data obtained from the National Foodborne Disease Surveillance System in Ghana. A total of seven facilities in the Adentan Municipality were involved in foodborne disease surveillance in Ghana and these were both private and government health facilities. The data collected on all patients who visited these facilities, during the period January 2015 to December 2016 and diagnosed to be having foodborne disease of interest or gastroenteritis, were used in the study. All cases reported were suspected cases as laboratory confirmation was not conducted. The data of such patients, captured in the National Foodborne Disease Surveillance system, were obtained from the Food and Drugs Authority. This official data were stored, with restricted access, in the Foodborne Disease Surveillance Unit of the Food and Drugs Authority.

### B. The Surveillance System

The Surveillance System was based on the syndromic type

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of surveillance. Suspected Case of the following diseases: Viral Hepatitis (Hepatitis A and E), Cholera (*Vibrio cholerae*), Dysentery (*Shigella* sp.), Typhoid fever (*Salmonella* sp.) and other foodborne illness were the diseases of interest. Case definitions for these diseases were based on the case definitions stipulated in the "Summary Guidelines for details of Specific Priority Diseases and Conditions" of the Ghana Health Service [10]. The data from patients were collected at the health facilities by trained focal persons using the Foodborne illness reporting form (FDA/FSMD/FM-FBD/2012/01). These forms were collated and submitted weekly to the Foodborne Disease Surveillance Unit of FDA where they were entered electronically using Epi Info 7 software.

#### Data Collection, Processing & Analysis

Electronic copy of the data on patients who reported between January 2015 and December 2016 was obtained from the database of the National Foodborne Disease Surveillance. All information that will be used to identify patients was deleted and each record was given a unique number for tracing purposes. After checking for consistency and completeness of data, the records were analysed statistically using both Epi Info 7 software and Microsoft Excel 2016. Simple descriptive methods such as frequency distribution were used to explore the baseline characteristics of the population (records with complete data on patients treated). Reported cases of FBDs were compared among the different localities (place of residence), sex, age groups and food sources during the same period and over time. In comparing the various prevalence, a chi square test for trend was used to find significant differences ( $p \leq 0.05$ ) among the different groups.

### III. RESULTS

#### Background Characteristics of Study Participants

In all, records of 375 cases were reviewed for this study. Out of this number, 261 (69.6%) had complete data of interest. (Date of Reporting, Sex, Age, Occupation, Regions, District, Community, Suspected Food, Source of suspected food, Symptoms, Did you sought medical attention elsewhere, Food Source (72hr), Consumed at Place of Purchase, Suspected Etiological Agent, Classification of agent under case definition of surveillance) and therefore used in this analysis. There was a decrease in reporting for 2016 (2015: 175 and 2016: 86). The average number of recorded cases per week for the period was 3. The participants were made up of 150 (57.47%) females and 111 (42.53%) males, aged 0-84 years (mean = 27.47 years; SD  $\pm 17.47$ ) and mainly resident within the Adentan Municipality (Table I). Majority of the cases were from the Ashaley Botwe community (2015 = 45.14%; 2016 = 59.30%).

#### Trend and Seasonality of Reported Cases: 2015-2016

Clinical diagnoses of two main foodborne diseases were reported over the period 2015-2016. These were Dysentery (*Shigella* sp.) and Typhoid fever (*Salmonella* sp.) which recorded 11.1% and 1.1% respectively of cases over the period (Table II). Majority of the gastroenteritis cases (87.7%) could

not be classified due to the absence of laboratory confirmation.

TABLE I  
DISTRIBUTION OF REPORTED FOODBORNE DISEASE IN THE ADENTAN MUNICIPALITY BY THE DEMOGRAPHIC CHARACTERISTICS OF STUDY POPULATION

Characteristic of patients	2015 (N=175)		2016 (N=86)	
	n	(%)	n	(%)
<b>Sex</b>	<b>Chi = 0.0234</b>		<b>p = 0.8783</b>	
Female	100	(57.14)	50	(58.14)
Male	75	(42.86)	36	(41.86)
<b>Age (years)</b>	<b>Chi = 7.3983</b>		<b>p = 0.1927</b>	
<5	26	(14.86)	6	(6.98)
10 -14	18	(10.29)	9	(10.47)
15 - 24	31	(17.71)	24	(27.91)
25 - 34	57	(32.57)	22	(25.58)
35 - 44	18	(10.29)	12	(13.95)
>45	25	(14.29)	13	(15.12)
<b>COMMUNITY</b>	<b>Chi = 24.6</b>		<b>P = 0.1041</b>	
Abokobi	2	(1.14)	0	(0.00)
Accra New Town	1	(0.57)	0	(0.00)
Adenta	13	(7.43)	3	(3.49)
Adjiringanor	15	(8.57)	2	(2.33)
Amanfrom	9	(5.14)	3	(3.49)
Amarahia	9	(5.14)	3	(3.49)
Ashaley-Botwe	72	(45.14)	50	(59.30)
Ashieyie	9	(5.14)	2	(2.33)
Dansoman	1	(0.57)	1	(1.16)
Dodowa	3	(1.71)	0	(0.00)
Haasto	2	(1.14)	2	(2.33)
Japan Motors	5	(2.86)	11	(12.79)
Madina	3	(1.71)	1	(1.16)
Mandjor	8	(4.57)	3	(3.49)
Mataheko	2	(1.14)	0	(0.00)
Oyarifa	8	(4.57)	2	(2.33)
Sakora	5	(2.86)	2	(2.33)
Taifa	1	(0.57)	0	(0.00)

TABLE II  
REPORTED FOODBORNE DISEASE IN THE ADENTAN MUNICIPALITY: 2015-2016

Classification of cases based on case definitions of surveillance	2015		2016		TOTAL	
	n	(%)	n	(%)	n	(%)
Dysentery ( <i>Shigella</i> sp.)	16	(9.1)	13	(15.1)	29	(11.1)
Typhoid fever ( <i>Salmonella</i> sp.)	2	(1.1)	1	(1.2)	3	(1.1)
Gastroenteritis	157	(89.7)	72	(83.7)	229	(87.7)
<b>TOTAL</b>	<b>175</b>	<b>100</b>	<b>86</b>	<b>100</b>	<b>261</b>	<b>100</b>

The percentage of reported cases every week was steady over the period, mainly below 5%, except for weeks 9 (6.3%) and 7 (9.3%) in 2015 and 2016 respectively (Fig. 1). The number of reported cases observed in week 7 in 2016 was highest over the period.

The surveillance records indicated that the reported foodborne diseases in the Adentan Municipality are seasonal with the highest peak during the late dry season (Feb to April), which marks the end of the dry season and the beginning of the rainy season (Fig. 2). Relatively high peaks were also

observed during the late wet seasons (Jul to Oct) when the rain fall is the heaviest.

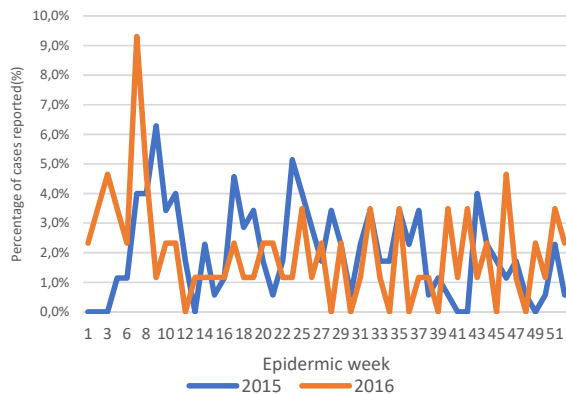


Fig. 1 Percentage distribution of reported foodborne diseases in the Adentan Municipality per epidemic week: 2015 – 2016

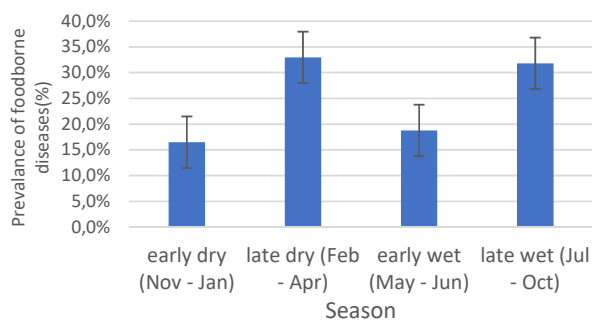


Fig. 2 Seasonal Prevalence of reported foodborne diseases in the Adentan Municipality: 2015-2016

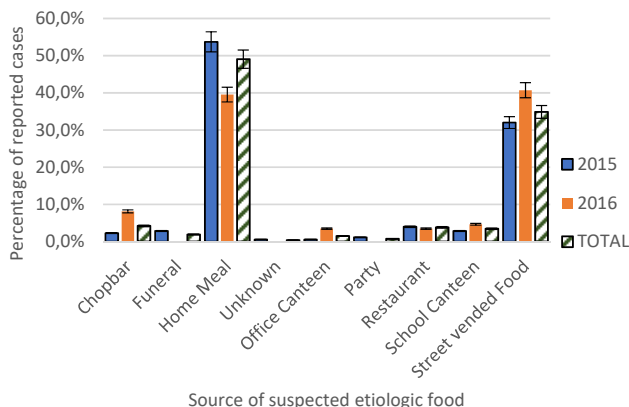


Fig. 3 Percentage distribution of cases by predominant source of food: 2015 – 2016

#### Predominant Source and Distribution of Food Consumed by Patients

Chopbars, Funerals, Home meals, Office Canteens, Parties, Restaurants, Street vended Foods and School Canteens were identified as the predominant source of foods that were

consumed by patients reporting with foodborne diseases. All these sources had below 10% of the recorded cases except Home meals and Street vended foods (Fig. 3). Home cooked meals (49.04%) was the major source of food, followed by Street vended foods (34.87%) for the entire period (2015-2016). However, the yearly distribution of the food sources indicated that Home cooked meals (53.70%) was the highest source of food for 2015 and Street vended foods (40.70%) was the highest source of food in 2016 (Fig. 3).

The percentage of people reporting from the different age groups was similar for cases who had “Home Meals” as the source of food. However, 62.70% of the people who had “Street Vended Foods” as the source of food were in the age group of 15-34 years.

#### IV. DISCUSSIONS

The current study was undertaken to describe the epidemiology and the food practice of cases reported from the Adentan Municipality and recorded in the National foodborne disease surveillance system. The analysis showed that the commonly reported foodborne disease at the health facilities within the Adentan Municipality was Dysentery (*Shigella* sp.). The number of cases reported were relatively high during the late dry season (Feb to April), which marks the end of the dry season and the beginning of the rainy season, as well as the late wet seasons (Jul to Oct) when the rain fall is the heaviest.

Similar studies have revealed Typhoid fever, bacillary dysentery and cholera as the most commonly reported waterborne/foodborne diseases at the health facilities in Accra, Ghana and in Ibadan City, Nigeria [9], [11]. They observed marked seasonality in the prevalence of the cases. Unsafe water, inadequate sanitation and poor hygiene among the residents have been associated with the occurrence of foodborne diseases in cities and towns in Ghana. Outbreaks can now be predicted with the onset of rains, due to the contamination of unprotected water source with latrine overflow and sewage. Thus, drinking from such water source or when such water comes into contact with food or food contact surfaces could result in outbreaks [12], [13]. Adentan Municipality is plaque with potable water shortages, hence residence have resorted to digging bole holes or finding alternate water sources. These water sources are easily contaminated during flooding resulting from heavy rains in late wet season. Attempts to control foodborne/waterborne disease in such communities have been ineffective due to the lack of long term approaches, such as potable water supply, proper disposal of solid waste etc. [14].

The use of clinical symptoms alone for the diagnosis of foodborne diseases in the National Foodborne Surveillance System could not establish the specific pathogenic agents responsible for the illnesses. As a result, 87.7% of the cases were classified as gastroenteritis by the clinicians. In a study conducted in the Netherlands, 71% of the cases classified as gastroenteritis by general practitioners were attributed to foodborne pathogens [15]. Thus, most of the cases diagnosed as gastroenteritis in Foodborne Surveillance System could actually be due to foodborne pathogens.

The study showed that home cooked meals were the highest predominant source of food. This is a deviation in the normal trend where street vended foods and foods from restaurants have mostly been the source of food for people reporting with foodborne diseases in various studies [16]-[19]. However, the yearly analysis indicated a slight variation in 2016 where 'Street Vended Foods' was the highest source of food. This observation could be attributed to the improvement in the erratic power supply that hit the nation in 2015. The interruption in power supply in Ghana in 2015 could have resulted in poor storage conditions of food in many households. Thus, poor storage conditions in household (no power for fridges and freezers) resulted in deterioration of most foods that are cooked in bulk for storage. This and poor food hygiene practices in homes result in food being contaminated with foodborne pathogen [20], [21]

#### V. CONCLUSION

A cross-sectional descriptive study involving the review of surveillance data was undertaken with the aim of describe the epidemiology and the food practice of cases reported from the Adentan Municipality and recorded in the National foodborne disease surveillance system. The study revealed that the commonly reported foodborne disease was Dysentery. Patients reporting with foodborne diseases were found to mostly consume home meals and street vended foods.

#### VI. LIMITATIONS

The absence of laboratory confirmation for most of the diagnoses means that the diagnoses were based on the judgment of the clinician. This could lead to misclassification of diseases. Also, the number of reported foodborne diseases in the Surveillance System, which is a passive system, is only a fraction of the cases that actually occurred in the study area. This is because some cases may be reported to other health facilities in the municipality which are not involved in the surveillance system.

#### VII. AUTHORS' CONTRIBUTION

O.T.B. developed the research question, supervised the study design, analysis data, interpretation of the results and drafted the manuscript. K.H. compiled the data and revised the manuscript. Both authors read and approved the final manuscript

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