

# Towards global elimination of Trachoma: An evaluation of Trachoma surveillance system, Wa East District, Ghana

Ernest Akyereko<sup>1,2</sup>, Donne Kofi Ameme<sup>1</sup>, Edwin Andrew Afari<sup>1</sup>, Kofi Mensah Nyarko<sup>1</sup>, Samuel Sackey<sup>1</sup>, Delia Akosua Benewah Bandoh<sup>1</sup>, Ernest Kenu<sup>1,&</sup>

<sup>1</sup>Ghana Field Epidemiology and Laboratory Training Program, Department of Epidemiology and Disease Control, School of Public Health, University of Ghana, Accra, <sup>2</sup>Disease Surveillance Department, Ghana Health Service, Accra

#### ABSTRACT

**Introduction:** Trachoma is leading cause of preventable blindness globally with the highest prevalence in Africa (85% of global cases). In Ghana, Upper West and Northern Regions are endemic for trachoma. Ghana has made significant strides toward the global elimination of trachoma (GET) 2020 target and reported to have reached the initial elimination thresholds of 5.0% for trachomatous inflammationfollicular (TF) among children 1 to 9-years old. We evaluated the Trachoma surveillance system in the Wa East district in Upper West region to determine its performance, usefulness and assess the system attributes. Methods: We used Center for Disease Control and Prevention (CDC) Updated Guidelines for surveillance system evaluation. We identified and interviewed key stakeholders using semi-structured questionnaire. We abstracted, analyzed 2010-2014 trachoma surveillance data and presented the results in tables and graph. **Results:** A total of 2,911 cases were recorded in Ghana with 232(8.1%) from Upper West region. Wa East district also recorded 3 cases in 2011 and 1 case in 2013 in the IDSR. Surveillance forms were easy to fill and the case definitions were well understood by participants. The system was sensitive to the detection of cases and was found to be useful as it was still detecting cases at all levels. All 18 health facilities reported to the surveillance system. Some discrepancies in data between the different datasets (OPD, IDSR and community screening) were identified. **Conclusion:** The trachoma surveillance system is simple, useful, sensitive, and partially meeting its objectives. However, data quality needs improvement.

**KEYWORDS:** Trachoma elimination, surveillance system, Wa East district, Upper West region

#### **\*CORRESPONDING AUTHOR**

Ernest Kenu, Ghana Field Epidemiology and Laboratory Training Program School of Public Health University of Ghana. ernest\_kenu@yahoo.com

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#### Introduction

Trachoma is the leading cause of preventable infectious blindness [1]. Globally it is endemic in 51 countries, causing 2.2 million visual impairment and irreversible blindness in 1.2 million people [2]. World Health Organization (WHO) proposed the implementation of the Surgery for advanced disease, Antibiotics to clear *C. trachomatis* infection, Facial cleanliness and Environmental improvement to reduce transmission (SAFE) strategies with the aim of eliminating trachoma by 2020 [3]. A responsive surveillance system is vital to the success of trachoma elimination programme [4].

Upper East and Northern are the two endemic regions in Ghana. To eliminate the infection, the Ghana National Trachoma Control Programme was initiated in June 2000 by Ghana Health Service (GHS) and partners like WHO, International Trachoma Initiative (ITI), Sight Savers, The Carter Center, CBM, and Swiss Red Cross [5]. Eligibility for elimination is tied to evidence of reaching a threshold of below 5.0% for trachomatous inflammation-follicular (TF) among children 1 to 9 years old, and<0.2% for trachomatous trichiasis (TT) among 15 years and above and maintain those achievements for at least two years for all endemic districts [6]. Ghana is reported to have reached the initial elimination thresholds after implementing the SAFE strategy and is one of the countries to have attained the pre-validation surveillance stage [5,7]. The assessment of the progress towards this goal rests on a good surveillance system to early detect, respond and also provide accurate data for elimination status [8-10].

The trachoma surveillance system is part of the integrated disease surveillance and response (IDSR) system by WHO. This is a coordinated method to data. analyse. collect interpret. use and dissemination of public health information to guide decision-making and public health action [9,11-12]. The objectives of the Trachoma surveillance system include detecting and treating cases of active trachoma and their contacts, estimating the prevalence of disease and monitoring, determining the need for, frequency and duration of community treatment, monitoring screening and treatment coverage rates, detecting cases of trichiasis and refer them for surgery and confirming the elimination of blinding trachoma.

We evaluated the surveillance system of trachoma in Wa East in Upper West Region to determine whether it is meeting its objectives, to determine its usefulness and assess its attributes.

# Methods

The evaluation covered all the levels of the surveillance chain from the national level to the community level. The evaluation was conducted in Wa East district of the Upper West Region of Ghana. Figure 1 shows the map of Upper West region and Wa East district. The Wa East District has a population of 76,261 projected from the 2010 population census with a growth rate of 1.9%. The district is located in the southeastern part of the Upper West region with Funsi as the capital. The location of the area is remote in relation to the rest of the district in the region and characterized by lowlevel of social and infrastructural development. Only 20% of the populace have access to potable water, which predisposes them to a lot of diseases. The average annual rainfall is about 1,200mm per year and they are torrential, erratic and stormy. The district has seven (7) Health Centre's and twelve (12) Community -Based Health Planning and Services (CHPS) zones but no hospital. The leading health problems which are the causes of morbidity and mortality are malaria, diarrhoea, pneumonia, snake bites, anaemia among children, eye infection, meningitis and intestinal worms. The terrain and inadequate transport also make access to health care facilities difficult. The district has an eye care centre located at Funsi which is responsible for eye service in the district.

#### Operation of the system

The surveillance system of trachoma operates at five level: national, regional, district, sub district and community level. The reporting timeliness for trachoma is monthly at all levels of the surveillance chain. The standard case definitions used to identify cases are:

Suspected case: Any patient with red sticky eyes who complains of pain and itchiness of the eyes [13].

*Confirmed case*: Any patient with red sticky eyes who complains of pain and itchiness of the eyes where examination of the eyes confirms one of the stages of

Trachoma infection according to the WHO Simplified Trachoma Grading System [13].

# **Evaluation design**

We used the Centers for Disease Control and Prevention (CDC) updated guidelines 2011 for surveillance system evaluation. We used both qualitative and quantitative methods of data This encompasses collection. stakeholders engagement, describing the trachoma surveillance system and gathering credible evidence concerning the performance of the system. The period under evaluation was January 2010 to December 2014. We interviewed health workers and community members serving as Community Based Surveillance Volunteers (CBSVs) who are participating in the trachoma surveillance system in Ghana as well as reviewing health records on trachoma within that period under evaluation.

# Data Collection Process and study participants

A semi-structured questionnaire on purpose and objective of the Trachoma system, components of the system, resource available to the system and the system attribute was administered to stakeholders drawn from national to the community level of the surveillance system.

A total of 12 officers who were directly involved in the operation of the trachoma surveillance system at the various levels from the national level to the community level were interviewed. At the regional level, the surveillance officer, trachoma focal person, and the eye specialist were interviewed. For the district level, the surveillance officer and trachoma focal person were interviewed whilst the health facility focal person, the physician assistant, the ophthalmic nurse and two community health nurses from CHPS compounds were interviewed. Two trachoma community-based volunteers were also interviewed. We reviewed and abstracted both electronic and hard copy of trachoma data from different dataset such as OPD morbidity report, IDSR monthly reports and screening reports.

# Data Analysis

We performed a content analysis of the qualitative data gathered from the interviews by generating themes. Closed-ended questions and abstracted data

# Assessing system attributes

Simplicity was assessed using the following metrics; time spent on surveillance activities and minimum skill and data required for operation. The system was said to be simple if it required little time, few variables or minimum data, and readily available resources and skills for operation. Respondents were asked about changes in the system's operation since implementation, and its response to the changes. We also described the surveillance information flow and generated a flow diagram for the existing system. The system was flexible if it responded to changes in surveillance procedure with little additional resources. Stability was assessed by the availability of resources needed for operation. The system was stable if all needed resources and skills were readily available. Sensitivity was assessed as the system's ability to detect cases.

Acceptability was assessed by the facility participation rate, which was defined as the proportion of health facilities reporting to the district level. The system was representative if it captured cases across all sub-districts. The system was stable if all needed resources and skills were readily available.

The data on reporting rate summary from the District Health Information Management System (DHIMS) on timeliness was used to assess data timeliness as the number of reports that were submitted on the DHIMS on the expected date of reporting. Reporting completeness was described as the proportion of all expected monthly IDSR summary reports on trachoma that were submitted on the DHIMS II. Data quality was evaluated by assessing the validity, completeness and consistency of variables by comparing hard copies with DHIMS data and also OPD morbidity data with IDSR.

# **Ethical Consideration**

We obtain approval for evaluation from Ghana Health Service Disease Surveillance Department. Permission was sort from the regional and district directors of Health Services to conduct the evaluation. Individual consent was obtained from interviewees during the study. The data obtained from the study was held on computers encrypted with a password and hard copies kept under lock and key.

# Results

Stakeholders identified by respondents included: WHO, CDC, International Trachoma Initiative (ITI), Red cross society, Sight savers, Ministry of Health, Ghana Health Service, National Health Insurance Authority (NHIA), Community Based Surveillance Volunteers (CBSV), Health Care Workers (HCW), traditional authorities and opinion leaders. The entire population of the district both males and females of all ages were under surveillance. CBS, DCOs and HIOs were responsible for collecting primary data on suspected trachoma. The data collected was on daily basis but the reporting on monthly basis. The district has an eye care centre specifically for trachoma and other eye conditions with an ophthalmic nurse trained to identify and grade cases. Any suspected case is referred to the eye care centre at the district for the ophthalmic nurse to assess the condition. Additionally, active case search is performed in a form of screening every year to identify cases. A functional data validation team was available at the district health directorate and facility level for monthly validation of report. This was done by cross reviewing all hard copies of reporting tools for correctness, completeness and consistency before it was entered into the District Health Information Management System II (DHIMS-II) database.

All Respondents demonstrated a clear knowledge and understanding of the purpose and objectives of the system. Respondents also had copies of trachoma technical guideline and the standard operating procedures for integrated disease surveillance with the appropriate case definition of trachoma.

Respondents understood the case definition of trachoma and had them at the district surveillance office. The flow diagram for grading of the trachoma case was also available at the eye care unit of the Funsi health centre.

#### Resources used in the operation of the system

The trachoma surveillance system is part of the Integrated Disease Surveillance and Response (IDSR) which is operated in the country and therefore has no separate budget for its operation. It utilizes resource available in the district for surveillance activities. It also received occasional support from partners such as Site savers, Red Cross society, United States Center for Disease Control and Prevention (CDC) for community screening programme. The district also hasan eye centre that was built with the support of Swiss Red Cross to support trachoma identification and management. At the district level, the district disease control officer, the district surveillance officers and the trachoma focal person are directly involved in the trachoma surveillance. At the facility level, the Ophthalmic nurse and the physician assistant were directly involved whilst CBSVs were involved at the community level.

Some constraints such as laptops for data entry, frequent breakdown of motorbikes, bad road network and bad communication network were identified to affect the surveillance system. Moreover volunteers mentioned that monetary assistance and support like supply of bicycles which they get to help them in their work were no longer coming.

# Usefulness of the system

The trachoma surveillance system in Wa East district was found to be useful as it was still detecting cases at all level. Data generated from the surveillance system were being used to identify priority areas and trend of trachoma at all level. The district trachoma programme coordinator indicated that they used the routine trachoma data to select three communities to organized free screening programmes over the period under study.

A total of 2,911 cases were recorded in Ghana from 2010-2014 with 232(8.1%) from Upper West region. The regional trachoma incidence in Upper west region was below 1 per 100,000 population except for 2013 <u>Table 1</u>. Wa East district recorded 3 cases in 2011 and 1 case in 2013 in the IDSR. Community screening identified 30 cases with 16 Trachoma follicles (TF) treated.

# Data Flow and communication

At all the levels, respondents were conversant with flow of information for the trachoma surveillance Figure 2. A general flowchart for all the diseases under surveillance in Ghana was available and trachoma as well. The trachoma surveillance system operated both passive and active surveillance system. Passive information flow started with the reports from the community level from trachoma CBSV from their monthly reporting to the CHPS level. The CHPS aggregated data collected by the trachoma CBSV in addition to their facility data are sent to the Sub-district level. The sub-district in turn combines the CHPS data together with the health centre facility data and forward it to the district level who then validates and enters it into the DHIMS. There was periodic active case search by regional eye care team and other NGOs such as the Red Cross Society. It was observed that some data, especially from community screening, did not go through the district health directorate but was rather reported directly to the partners. Feedback from the system followed a similar flow from the national to the community level.

# System Attributes Simplicity

The system was rated as fairly simple because surveillance forms on trachoma were easy to fill and the case definitions were well understood by participants. All stakeholders interviewed reported that trachoma forms were easy to complete. It took less than 10 minutes to collect data required to fill the new trachoma screening form. The diagnosis was done by the ophthalmic nurse at the district level and therefore it is required that all suspected case be referred to the district level. Also, the flow of information recommended by the Ghana Technical Guidelines for Integrated Disease Surveillance & Response Ghana was not always followed.

# Representativeness

The surveillance system of trachoma was representative. All the 18 health facilities in the district reported to the surveillance system reported monthly. Data reported covered all communities, gender, ages, ethnicities, occupations, religions and socioeconomic backgrounds. The data was collected throughout the year with active cases search at three different communities. The system was acceptable to stakeholders of the system. All health facilities within the district reported to the system. Moreover, all districts in the region reported monthly the trachoma data into the DHIMS II.

# Flexibility

The system was well integrated into the national reporting system, which is the IDSR form. Data collected from the trachoma screening form was enough to fill the trachoma portion of IDSR. Moreover, changes in its operations example, the introduction of the DHIMS II during the period of the study did not affect the system.

# Sensitivity

The system was sensitive to the detection of cases in the district. Cases of trachoma were reported by the system in 2011 and 2013 on the IDSR whereas on the OPD morbidity cases were recorded in all the years.

# Timeliness

Timeliness was assessed to be fairly good but poor in 2010. The highest percentage (97.3) was recorded in 2013 whilst in 2010 none of the trachoma data reported into the DHIMS II was on time. The reporting rate summaries show an increase in timeliness of reporting comparing 201 to 2014. Some reporting sites did not report for 2010(75.9%) and 2013(98.9%) Table 2.

# Stability

The trachoma surveillance system is part of the IDSR and therefore its operation and maintenance does not differ from the rest of the disease under surveillance in the district. During the period under evaluation, the country experienced frequent unscheduled power outages but did not affect the operation of the system. Some routine challenges with poor internet network, poor road network and poor transport system were observed during the evaluation.

# Data quality

The data quality of trachoma surveillance system was rated as fair. There were data consistency from the district health directorate to the national level. Yet discrepancies were seen comparing OPD morbidity forms and the IDSR forms as shown in **Figure 3**. The community screening data were not included in the IDSR reports and therefore not included in the district report. Of the 35 randomly selected hard copies of IDSR reporting forms for the district, 97.6% were completely filled. Indicators that were sometimes not filled included: the total number of a population under surveillance, the name of reporting facility, date, the names and signature of the reporting officer.

# Discussion

Despite financial, human resource and logistical constraints, the trachoma surveillance system was effective and meeting its objectives in detecting cases of active trachoma and their contacts. The surveillance system was sensitive, useful, stable, and well integrated into acceptable, other surveillance systems. The system was sensitive to trachoma cases over the period even though some years did not record any cases. This suggests that there are still cases of trachoma in the district even though the cases may be minimal. This agrees with survey done in Ghana which suggests that trachoma in Ghana is reducing as the year progresses [5]. An effective surveillance system ensures that low cases identified are attributable to the absence of disease rather than to low detection and reporting [10].

Ghana has reached the elimination threshold and it is at the pre-validation surveillance stage [7]. Therefore, surveillance is still relevant in addition to trachoma surveys for accurate monitoring of trends and confirmation the trachoma elimination [14]. WHO suggests that even after a country has achieved certification, surveillance should continue for at least 10 years [1]. The surveillance system is expected to monitor trend and to determine the need for, frequency and duration of community treatment. Ghana technical guideline for integrated disease surveillance and response expects data analysis at each level of the surveillance system [15]. The study found that data on trachoma were analyzed at each level of the surveillance chain and expressed in graphs, which were included in their annual reports and trachoma review. This informed decision-making at the district level and helped in the participation of stakeholders in the system. Moreover, it was used to identify priority areas for the community screening in 2011 and 2013 as it is required by WHO. Analysis done suggested that cases of trachoma were reducing with time, a situation similar to the estimation by WHO [12]. The surveillance system of trachoma was well integrated into the IDSR reporting system without any challenge. Staff, office equipment, means of transport and resources used by the system were not specific to trachoma. This flexibility attribute of the trachoma surveillance system enables it to benefit from the sharing of resources and ideas of other surveillance systems [15]. WHO suggests that countries trachoma surveillance system must be integrated into the IDSR to ensure sustainability [1]. A parallel surveillance system is documented to burden health care workers and reduce acceptability [1]. Moreover, the system was also able to adapt to the introduction of District Health Information Management System (DHIM I) which was later changed to DHIMS II in 2012 [9]. Data on trachoma are entered directly into the DHIMS as part of the IDSR reporting forms. This implies that it requires no additional resources like internet connectivity or computer to report. Also, the transition from the paper-based reporting an electronic to system(DHMIS) may have contributed to the low timelines observed between 2010 to 2012 although 2013 had timeliness above 90% [10].

The data quality was fair because there were inconsistencies with data reported from the district to the national level. Again, there were inconsistencies comparing different datasets (OPD morbidity forms and the IDSR forms). Since smaller facilities at the lowest level may not have health information officer, individuals are responsible for writing different reports. Thus, the likelihood of data errors. We, therefore, recommended that validation of data at the facility levels be carried out on a regular basis.

The system was found to be fairly simple. The trachoma surveillance system, like other surveillance system, follows the Ghana Health Service (GHS) flow of information [14]. Information and feedback flow from the community level to the national level [12]. In this study, we found that this was not always

followed at the health facility and district level. Occasionally, data and information from screening programmes move straight to the regional Red Cross office and other partners without passing through the district office. This could be due to the fact that some of the partners sponsor the exercise and there may be little involvement of the district. Therefore, the collaboration between the district health directorate and the health facility and other partners should be strengthened. Also, suspected cases of trachoma need to be confirmed by the ophthalmic nurse or a specialist. The district of study does not have a district hospital and therefore relies on the eye centre for this service. Therefore, suspected cases from other sub-district need to travel from their communities to centre for confirmation. This increases the cost of service which is known to negatively influence health seeking behaviour which may lead to underreporting. It is therefore important to organize training for staff at the periphery to be able to suspect cases that are very likely to be trachoma.

# **Evaluation limitation**

The evaluation required that participants recall past events with a span of past five years, this could have led a recall bias, however, some of these questions were routine activities and therefore the bias could be minimal.

# Conclusion

The trachoma surveillance system is achieving its objectives despite the financial and logistics constraints it faces. The system performance has been useful in estimating the magnitude of the infection and has informed critical decision making towards the major reduction of trachoma morbidity in the country. The system was found to be representative, sensitive, flexible, and acceptable. It fairly simple despite some gaps in was communication observed. The quality of data found was fair because data discrepancies were identified. However, timeliness of reporting into the DHMIS was currently good and was found to have improved over the years. Surveillance officers were trained and sensitized on the importance of quality data towards elimination efforts.

# What is known about this topic

- Trachoma is leading cause of preventable blindness globally.
- Africa has the highest prevalence of trachoma.
- Ghana has eliminated trachoma and was certified by WHO in 2018.

#### What this study adds

- The Trachoma surveillance system in Ghana is meeting its objectives.
- Data from the trachoma surveillance system in Ghana is used in decision-making at all levels and this help in the participation of stakeholder in the system.

# **Competing interests**

The Authors declare no competing interest.

#### Authors' contributions

EA, DKA, EAA, KMN, SS, DABB and EK. conceptualized the plan of the evaluation. EA and DKA. Collected and analysed data collection. EA, DKA, KMN and DABB. wrote the report. EA, DKA, EAA, SS, DABB and EK. drafted the manuscript. All authors read and approved of the final version of the manuscript.

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#### **Tables and figures**

Table 1: population	Trachorr from	na ii	ncidence 2010	per to	100,000 2015
<u>Table 2</u> :	Reporting	rate	summary	of	Wa East
trachoma	cases	fron	1 2010	t	o 2014

Figure 1: District map of Upper West regionshowingstudyarea

Figure 2:Flow diagram for the trachomasurveillancesystemofGhana

**Figure 3**: Wa East trachoma surveillance data from IDSR and OPD morbidity report compared

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<b>Table 1:</b> Trachoma incidence per 100,000 population from 2010 to 2015						
Region	2010 (/100,000)	2011 /100,000	2012 /100,000	2013 /100,000	2014 /100,000	
Ashanti	4.9	7.1	2.3	0.2	0.3	
Brong Ahafo	4.1	2.1	3.9	1.0	0.2	
Central	0.0	0.0	0.0	0.0	0.2	
Eastern	3.9	5.0	0.5	13.2	0.1	
Greater Accra	0.6	0.5	0.0	0.4	1.2	
Northern	0.8	0.4	1.6	2.4	0.0	
Upper East	0.0	0.0	0.0	0.0	0.0	
Upper West	0.1	0.5	0.3	7.3	0.5	
Volta	11.6	15.7	2.8	0.9	0.0	
Western	5.6	5.0	0.0	0.0	0.7	
Ghana	2.6	2.3	1.1	2.5	0.3	

<b>Table 2:</b> Reporting rate summary of Wa Easttrachoma cases from 2010 to2014						
Years	Expected reports	Actual reports	Actual reports on time			
2010	204	155(75.9)	0			
2011	228	228(100)	19(8.3)			
2012	264	264(100)	214(81.1)			
2013	264	261(98.9)	257(97.3)			
2014	264	264(100)	242(91.7)			



Figure 1: District map of Upper West region showing study area



Figure 2: Flow diagram for the trachoma surveillance system of Ghana



Figure 3: Wa East trachoma surveillance data from IDSR and OPD morbidity report compared