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*Full Length Research Paper*

# Improving surveillance for non-communicable diseases in the Eastern Region of Ghana - 2011

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**The incidence of Non Communicable Diseases (NCDs) is on the rise worldwide and Ghana continues to show an increasing trend especially for hypertension and diabetes. The NCDs surveillance system in Ghana was established through the District Health Information Management System in 2008 to detect and monitor morbidity, mortality and risk-factor trend for evidence-based public health decision making. However, it is not known if the NCDs surveillance system is effective in achieving its set objectives. We evaluated the performance and usefulness of the Eastern Regional NCDs surveillance system to identify and utilize opportunities for system improvement. We used the Centers for Disease Control and Prevention guidelines for surveillance system evaluation. We interviewed stakeholders, reviewed records and data collection tools, observed processes and analyzed data on hypertension, diabetes, sickle cell and bronchial asthma from 2006 to 2010 using Epi info version 3.5.1. Between 2006 and 2010, the proportion of morbidity and mortality of the selected NCDs ranged from 6.9 to 9.9% (median = 9.5%) and 9.7 to 23.3 (median = 12.9%), respectively. The NCDs surveillance system has no case definition for bronchial-asthma and sickle–cell-disease. Completeness of data is 60%. The health facilities infrequently analysed data provided no feedback to health workers and rarely advocated for public health interventions. The NCDs surveillance system in the Eastern Region inadequately meets its set objectives. Data completeness, provision of feedback and advocacy for public health intervention needs strengthening. Feedback meeting on current NCDs data has been organized for health system managers and data validation is ongoing.**

**Key words:** Non communicable diseases, evaluation, disease surveillance, system performance, Eastern region, Ghana.

## INTRODUCTION

Non-communicable diseases (NCD) are non-infectious, long duration and generally slow progression diseases. NCDs, primarily cardiovascular diseases, cancers, chronic respiratory diseases and diabetes are responsible for 63% of all deaths worldwide with 80% occurring in low and middle income countries where they contribute up to 45% of the disability adjusted life years (Alwan, 2010; Ama de-grafts, 2007). Of the 57 million deaths that occurred globally in 2008, nearly two-thirds were due to NCDs. WHO projections show that the NCD burden will increase by 15% during the next decade (2010 to 2020) accounting for 44 million deaths. The greatest increases will be in the WHO regions of Africa, South-East Asia and the Eastern Mediterranean (Beaglehole, 2008). Some community studies conducted in the African region have shown that the prevalence of the major NCDs such as diabetes mellitus and hypertension is as high as 16 and 48%, respectively (CDC, 2000). Over the last fifty years, there has been an increase in prevalence of chronic diseases especially hypertension and diabetes in Ghana (Connor et al., 2007). Non-communicable diseases (NCDs)

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represent a major public health threat in the Eastern Region of Ghana. Of the reported public health facilities in the Eastern region of Ghana, proportional morbidity of hypertension increased from 5.1% in 2006 to 8.5% in 2010 (ERHD, 2010). Cerebro-vascular accidents (CVAs) as a complication of hypertension had case fatality rates of 8.2 and 9.3% in 2008 and 2009, respectively (Dalal, 2011).

Most NCDs can be prevented through cost-effective measures such as behavioural change that address the common and modifiable risk factors (Eastern Regional Health Directorate Report, 2008). Up to 80% of heart disease, stroke and type 2 diabetes and over a third of cancers could be prevented by eliminating shared risk factors mainly tobacco use, unhealthy diet, physical inactivity and the harmful use of alcohol (Ama de-grafts, 2007). Actions such as health education and promotion coupled with the enforcement of synergistic legislation are also known to have a great impact on reducing the prevalence of NCDs (Ezzati et al., 2005). The NCDs surveillance system in the Eastern Region was established through the District Health Information Management System (DHIMS) in 2008 to detect and monitor all non communicable diseases in the region for evidence-based public health decision making. However, we do not know if the NCDs surveillance system is effective in achieving its set objectives.

We evaluated the NCDs surveillance system to:

1) Determine the performance of the NCDs surveillance system in the Eastern Region of Ghana with regards to its set objectives.
2) Determine the usefulness of the NCDs surveillance system in the Eastern Region of Ghana.
3) Develop recommendations based on the evaluation findings and disseminate to key stakeholders at regional and district levels.

Evaluation of the NCDs surveillance system validates the quality of reported data among other attributes and identifies opportunities for improvement that would strengthen the system. It would provide stakeholders evidence-based information to improve the NCDs surveillance system, enhance the strategies for reducing NCDs prevalence and improve their outcomes in the region.

## MATERIALS AND METHODS

### Study design

We employed a descriptive design using secondary data analysis and key stakeholders interview. CDC Updated Guidelines for Evaluating Public Health Surveillance Systems 2001 was the tool used to assess the surveillance system of selected NCDs (hypertension, diabetes, bronchial asthma and sickle cell disease). The period for the evaluation expanded from 2006 to 2010.

### Study area

Located in the eastern part of Ghana (Figure 1), Eastern Region(ER) has an estimated population of 2,354,538 with 19,323 $km^2$ land area and the percentage urban: rural population of about 60:40. It has a growth rate of 1.4% and sex ratio of 96.8 males to 100 females. It has 21 districts, 31 hospitals, 57 health centres and 309 community–based health planning and services (CHPS). Access to health care is about 80%. Hypertension and diabetes continue to be among the common cause of out-patient attendance with stroke as major cause of mortality. Interventions on NCDs have been centered on promotion of health-walks in the communities and health education. The NCDs surveillance system is integrated within the general frame work of the Integrated Disease Surveillance and Response (IDSR) system and it operates within the decentralized system at all levels of the health care delivery in the region. Data on NCDs are primarily collected with morbidity and mortality formats by health records officers on monthly basis at the CHPs compounds, health centres and district hospitals. The data is then summarized and forwarded to the Regional Health Directorate for onward submission to the National level.

Periodically, feedbacks on NCDs from the Regional Health Directorate are sent to the district levels (Figure 2).

### Study population

Patients diagnosed with any non-communicable disease at the health facilities in the Eastern Region from January 2006 to December, 2010 and key stakeholders.

### Data types

Data variable-groups collected included socio-demographic data (age, sex, occupation, place of residence), morbidity and mortality data on NCDs at health facility and district levels. **Sources of data**

### Sources of data

Principal sources of our data were from the Regional Health Information Units and In-depth interviews with stakeholders at the District and Regional Health Directorates.

### Data collection procedures

The Regional Director of Health Services, the Deputy Director Public Health, the Regional Clinical Care Coordinator, the Regional Public Health Nurse, Regional Statistician, selected District Directors of Health services and Health Facility Officers were interviewed with an in-depth interview guide to know their views on the NCDs surveillance system in the region. A voice recorder was used to assist in data capture. A checklist was used to gather the relevant information from the data review. Data from 2006 to 2010 was entered, cleaned and analyzed. The surveillance system was then reviewed in terms of its performance and usefulness. This was then checked against direct observations. The performance of the system was then assessed through its ability to detection and monitor cases. Usefulness of the system was described through interviews focusing on data analysis, describing the public health actions taken or decisions made as a result of analysis and interpretation of the data.

### Ethical issues

This project was conducted as part of health system process

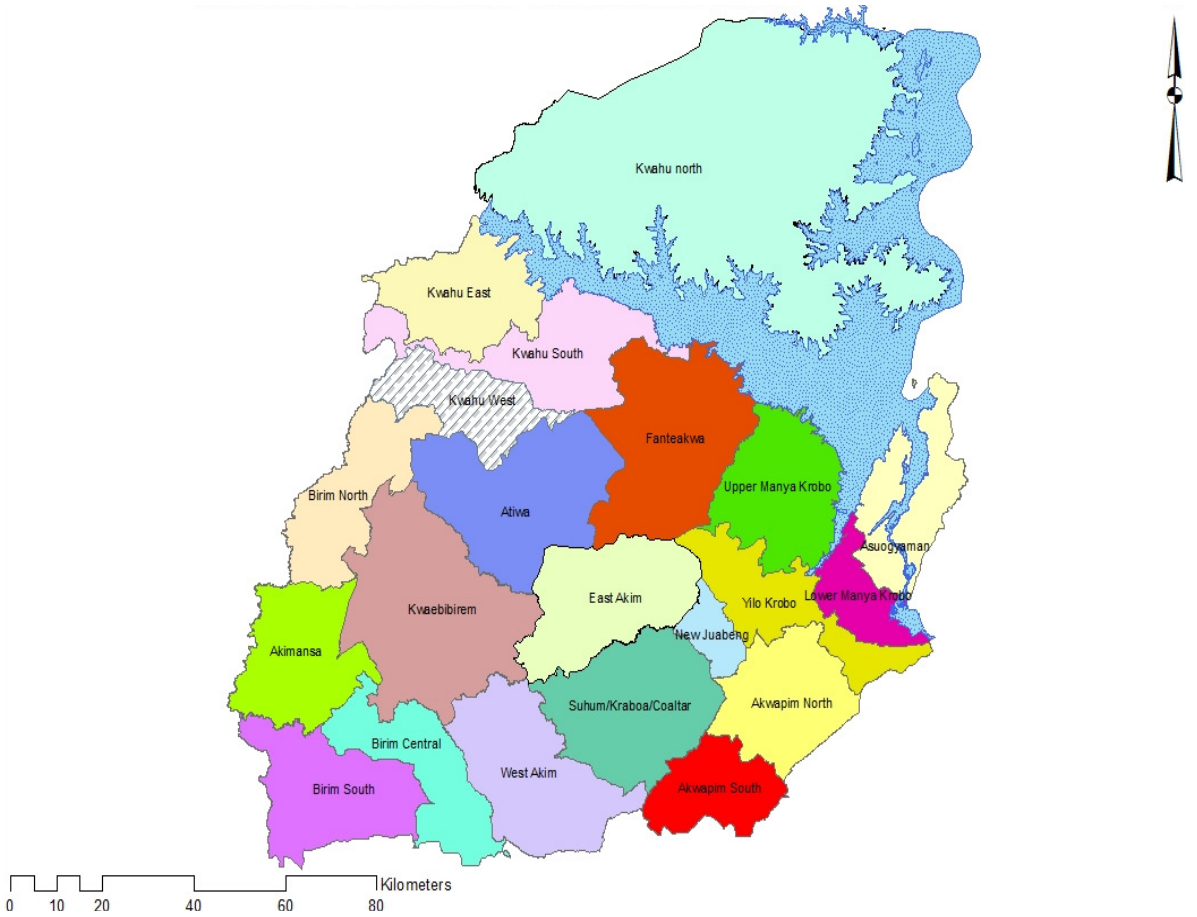


**Figure 1.** Eastern Regional Map showing districts.

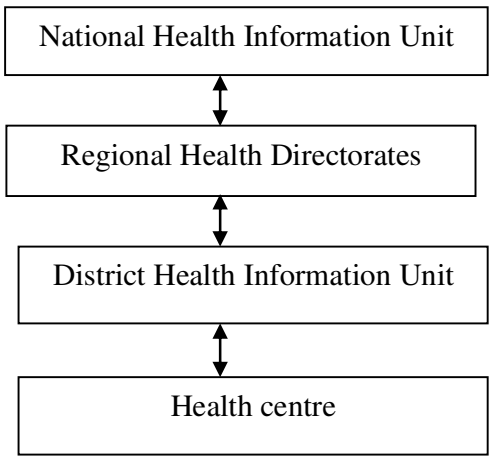


**Figure 2.** Flow diagram of NCDs notification.

improvement and service-based learning in the Eastern Region. Official consent was obtained from the Regional Director of Health Services, the Regional Biostatistician and the other Deputy Directors at the Regional Health Directorate. The Health Information officers at the Regional Health Directorate collaborated in the study. We protected the confidentiality of the case-patients through the use of de-identified and coded data.

### Data quality procedures

The principal investigator and the data collectors were trained to review and collect data a day before the exercise to enable them give the same interpretation to the questions on the check-list and interview guide to avoid other interviews bias. The check-list and the in-depth interview guide were pretested in a neighboring region. About 10% of the completed check-list was randomly selected by the Principal Investigator to check for completeness. Samples of the stakeholders were re-interviewed to ensure consistencies in the information given earlier.

### Analysis plan

Reported district data on NCDs were reviewed, validated and used to update the electronic database at the Regional Health Information Unit. The MS excel data base was imported into SPSS version 16 and analyzed. Data was described using frequencies and proportions and summarized in tables and figures. Qualitative data was coded and analyzed thematically.

## RESULTS

### Performance of the NCDs surveillance system

Case Definitions of a person with diabetes; a suspected new case of a patient with diabetes is any person

**Table 1.** Morbidity of selected Non communicable Diseases, Eastern Region and 2006-2010.

| NCDs and other diseases | 2006 | 2007 | 2008 | 2009 | 2010 |
|---|---|---|---|---|---|
| Hypertension | 35855 | 106070 | 97698 | 126078 | 138040 |
| Diabetes | 8646 | 23277 | 28070 | 32846 | 36412 |
| Bronchial asthma | 2520 | 6914 | 7518 | 11957 | 12748 |
| Sickle cell disease | 1372 | 3000 | 3478 | 3808 | 6487 |
| All other diseases | 651314 | 1801802 | 1233010 | 1663486 | 1826163 |
| Total reported diseases | 699707 | 1941063 | 1369774 | 1838175 | 2019850 |

**Table 2.** Proportion of selected Non communicable Diseases among other diseases, Eastern Region and 2006-2010.

| Disease | 2006 | 2007 | 2008 | 2009 | 2010 |
|---|---|---|---|---|---|
| Total selected NCDS (%) | 48393 (6.9%) | 139261 (7.2%) | 136764 (9.9%) | 174689 (9.5%) | 193689 (9.6%) |
| Total all other diseases | 651314 (93.1%) | 1801802 (92.8%) | 1233010 (90.1%) | 1663486 (90.5%) | 1826163 (90.4%) |
| Total reported diseases | 699707 | 1941063 | 1369774 | 1838175 | 2019850 |

**Table 3.** Mortality of selected Non communicable Diseases, Eastern Region and 2006-2010.

| Selected NCDs | 2006 | 2007 | 2008 | 2009 | 2010 |
|---|---|---|---|---|---|
| Hypertension | 107 | 112 | 173 | 317 | 437 |
| Diabetes | 32 | 42 | 38 | 69 | 74 |
| Bronchial Asthma | - | - | 17 | 41 | 39 |
| Sickle cell disease | - | - | 4 | 11 | 12 |
| Total all other deaths | 1241 | 1434 | 1566 | 1596 | 1850 |
| Total deaths | 1380 | 1588 | 1798 | 2034 | 2412 |

**Table 4.** Proportion of deaths due to selected non communicable diseases among other diseases, Eastern Region and 2006-2010.

| Deaths | 2006 | 2007 | 2008 | 2009 | 2010 |
|---|---|---|---|---|---|
| Total selected NCDs deaths (%) | 139 (10%) | 154 (9.7%) | 232 (12.9%) | 438 (21.5%) | 562 (23.3%) |
| Total all other deaths | 1241(90%) | 1434 (90.3%) | 1566 (87.1%) | 1596 (78.5%) | 1850 (76.7%) |
| Total deaths | 1380 | 1588 | 1798 | 2034 | 2412 |

presenting with the following symptoms: increased thirst, increased hunger and frequent urination. A confirmed new case is any person with a fasting venous plasma glucose measurement of ≥ 7 mmol/L (126 mg/dl) or capillary glucose ≥ 6.1 mmol/L (110 mg/dl): or any person with a non-fasting venous plasma glucose measurement of ≥ 11.1 mmol/L (200 mg/dl) or capillary glucose ≥ 11.1 nnik>k (200 mg/dl).

### Case definitions of a person with hypertension

A case of a patient with hypertension is any individual presenting on at least two occasions with a resting blood pressure measurement (based on the average of 3 readings) at or above 140 mm Hg for systolic pressure, or greater than or equal to 90 mm Hg for diastolic pressure. Most of the other NCDs do not have well defined case definitions (bronchial asthma, sickle cell disease etc.) but protocols on them are available in the standard treatment guidelines of the Ghana Health Service. The selected NCDs namely; hypertension, diabetes, bronchial asthma and sickle cell disease have contributed significantly to the total morbidity and mortality in the Eastern region. Based on available data, the proportion of morbidity of the selected NCDs were of the ranges between 6.9 to 9.9% (median of 9.5%) (Tables 1 to 2). Similarly, the proportion of mortality by the selected NCDs were of the ranges between 9.7 to 23.3 (median of 12.9%), respectively (Tables 3 to 4); between 2006 to 2010, there was an observed increase in the trend of hypertension, bronchial asthma, sickle cell disease and

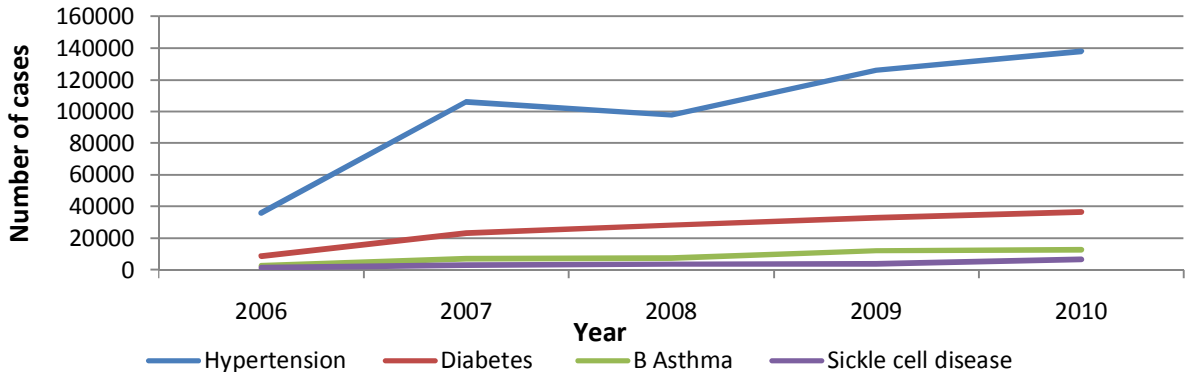


**Figure 3.** Trends of selected NCDs in the Easten Region Ghana, 2006-2010.

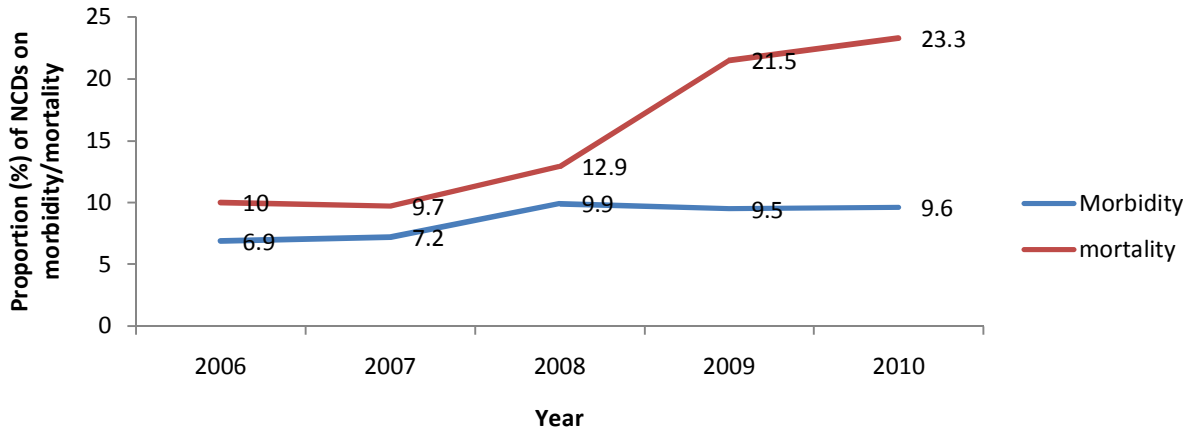


**Figure 4.** Contribution of NCDs on morbidity and mortality, Eastern Region, 2006-2010.

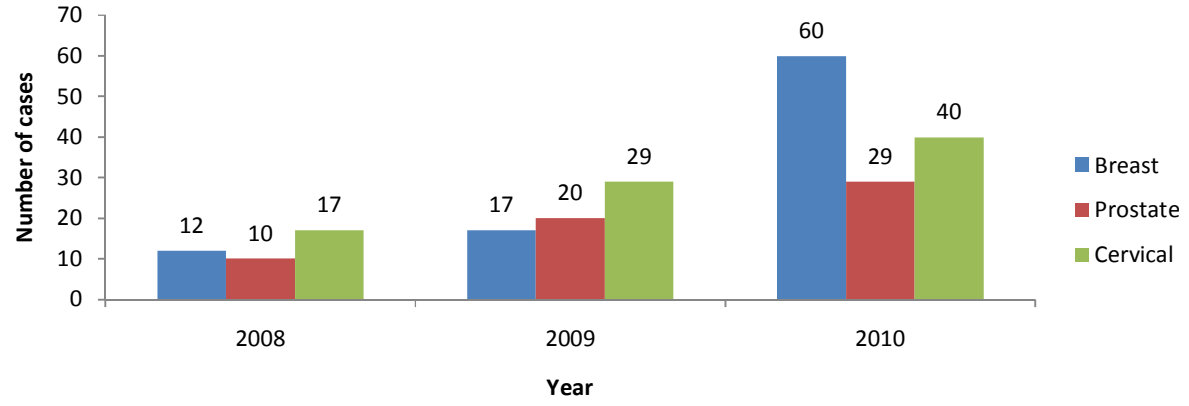


**Figure 5.** Distribution of cancers in the Eastern Region of Ghana, 2008-2010.

diabetes in the region based on institutional recorded data. Data on hypertension showed the most remarkable increase with a range between 2174 to 138040 and a median of 101884 (Figure 3). There has been a recent upsurge of deaths due to NCDs in the region. Morbidity, however has plataued (Figure 4).

Available data on cancers indicate that breast cancers have shown a significant increase since 2008 followed by cervical cancers (Figure 5). There were virtually no cases of hypertension recorded between 0 to 20 years of age, however, there is a gradual increase of cases from 20 years with the majority of them among females (Figure 6). Sickle cell diseases were found in all age-groups with a decline in the late adult age-group (Figure 7).

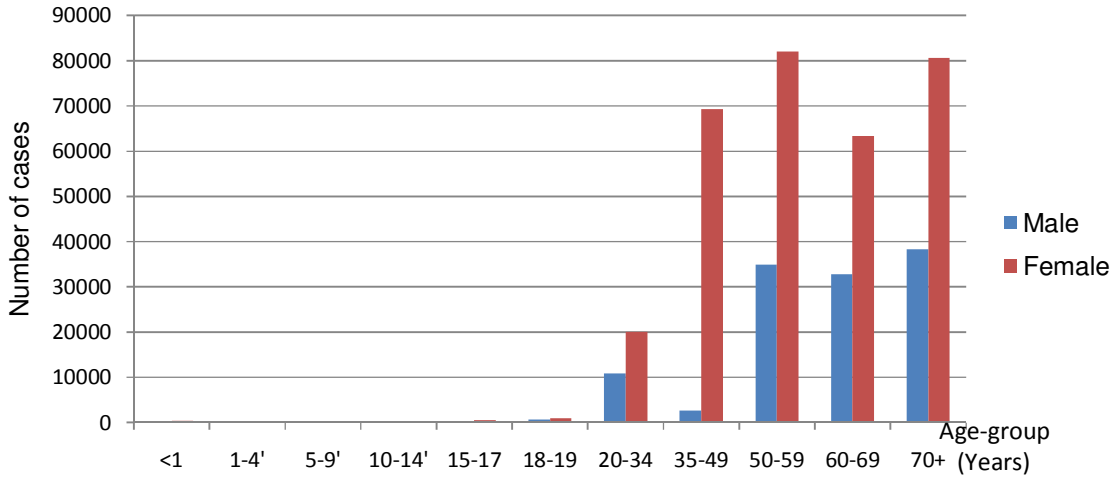


**Figure 6.** Distribution of hypertension by sex and age, Eastern Region, 2006-2010.

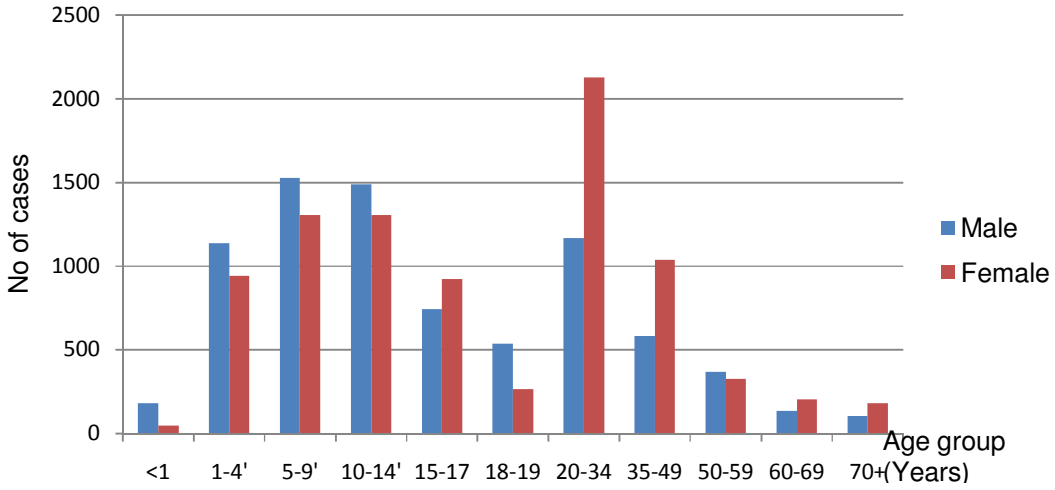


**Figure 7.** Distribution of sickle cell disease by sex and age, Eastern Region, 2006-2010.

## Usefulness of the NCDs surveillance system

According to the information gathered from the Regional Director of Health Services, and other stakeholders, NCDs significantly contribute to the total morbidity and mortality in the Eastern Region of Ghana. Data on NCDs are generated at all health facilities in the district and forwarded to the Regional Health Directorate and national level. The data is inadequately analysed at all levels of the health delivery system. Feedback on NCDs is normally presented at review meetings by Health Facility Officers and Directors of Health Services. This feedback is irregular and not detailed. However, there are usually no significant public health actions taken as a result of the interpretation of the data. Although, the system is able to detect the trend of disease occurrence by providing estimates of morbidity and mortality, it has not stimulated any meaningful epidemiological research yet in the region. Estimates of risk factors of the NCDs in the region are not available.

## Attributes of the NCDs surveillance system

The available system of surveillance on NCDs in the region is simple as it is being used by all the 21 districts with a smooth flow of data at the various levels. Each district reports through the Health Information Unit by the 10th day of the ensuing month. It has some case definitions but there is none for bronchial asthma, sickle cell disease and a few others. Data is collected with a check list which is easy to complete. There are a few computers to manage data at the sub district level. Data is normally analysed by simple frequencies without much details by person, place and time. Record officers at the sub-district level are not frequently given in-service

trainings on NCDs data management. The system is flexible as it is able to adapt and report on new diseases and changes in reporting formats. It has a standardized data collection tools at the various levels. Data quality is poor as completeness of available data was 60%. At the Community and District levels, NCDS data are inadequately analysed to describe the burden of the disease, assesses program, disease impacts and determine needs for additional services or regulation. At the regional level, the surveillance data are equally poorly analysed and no significant actions are taken on findings. The system is acceptable as every health facility reports on NCDs to the Regional Health Information Unit on schedule. However completeness on the required data is low. Regular feedback on data is poor.

The NCDs surveillance system is sensitive as it is able to detect cases. Likewise, it is representative enough as the system describes the occurrence of all health events (NCDs) by person, place and time in the region.

## DISCUSSIONS

Our study showed that some of the non communicable diseases for example sickle cell disease and bronchial asthma had no case definition. This was also observed in the evaluation of the Ugandan surveillance system two years after establishment where the system was found to lack standard case definitions, the capacity to confirm priority diseases, and neither health facilities nor district health offices received regular performance reviews (Geoffrey et al., 2001). Reasons for this observation could be the inadequately developed nature of the Eastern Regional Surveillance System and lack of regular facilitative supervision on the field. Lack of definition may lead to under reporting and lack of comparism of data. Effective disease surveillance systems provide information for action and it is the basis for public health decision-making worldwide. Lack of the relevant information to assist in the identification of a disease may affect the data capture on the disease burden in the community. The need to strengthen non communicable diseases surveillance and response systems are recognized globally. Available data from the study indicate that there has been a gradual increase of NCDs notably hypertension, diabetes, bronchial asthma and sickle diseases in the Eastern Region (Table 1). Similar findings have also been documented in data analysis in several countries in Africa (Mensah, 2008; Miranda, 2008; Parkin et al., 2008).

The possible drivers of these epidemics are urbanization and changes in lifestyle associated with economic development. These include changes in (i) diet, (ii) physical activity, (iii) smoking, (iv) adiposity and (v) alcohol use (Steyn et al., 2005; Vorster, 2002; WHO, 2008). Furthermore, the increasing trend of NCDs could be as a result of a relative increase in awareness of these diseases and since routine data cannot capture all cases, a community survey is recommended in the near future. There is an urgent need for health decision makers to develop efficient preventive strategies to halt the growing trend of NCDs through the control of risk factors. However, although most of developed countries have reacted by pragmatic measures, the trend remain globally passive mainly because developing countries have been, so far satisfied with adopting national conventions and adhering to international recommendations instead of pragmatic decisions such as prohibiting smoking in public areas, controlling alcohol abusers, encouraging physical activity, promoting healthy diet and improving primary health care for screening and early detection of chronic diseases.

Our data revealed that females in the late adult year groups are mostly affected with NCDs. This was also observed in Hlabisa NCDs clinic, South Africa (Geoffrey et al., 2001). Both observations are contrary to the published document by the WHO (2002), 10 facts on non-communicable diseases, that NCDs affect both sexes equally (WHO, 2008). This observation in our data could be due to a relative inadequate data capture on NCDs or the poor health seeking behavior among most men in the region. Nearly everywhere in the world, women live longer than men. But a longer life is not necessarily a healthier life.

The study observed that currently, the NCDs surveillance system in the region is not case-based that is, individual cases are not thoroughly investigated as what pertains in the surveillance of infectious diseases. Only hospital-based information is available and record keeping needs improvement. Although, the flow of data from the district level to the region and national level makes the NCDs surveillance system simple and flexible as other data on NCDs could be added on, it is also representative and sensitive enough to capture all the relevant data in the region. A similar observation has been documented by WHO in the South-East Asia Regional Network for Non communicable Disease Surveillance (WHO, 2002). As According to Miranda et al. (2008), NCDs are no longer diseases of the affluent (WHO, 2002), there is an urgent need to advocate for the establishment of a comprehensive NCDs surveillance system in the region that can capture the relevant representative data for an effective public health intervention.

### Conclusion

This study presents evidence on the increasing burden of NCDs notably hypertension, diabetes, bronchial asthma and sickle cell disease in the Eastern Region of Ghana. The system is simple, flexible, acceptable, sensitive and representative. However, data is inadequately analysed at all level for an evidence based decision making. Feed back on data is equally poor from the national level to the

health facilities. We recommended that The National Surveillance Department should assist the Eastern Region in developing/strengthening systems for NCDs surveillance through development of the other cases definitions on NCDs, offer refresher trainings on NCDs data management for Regional Health Information Officers and play an advocacy role for public health intervention on NCDs. The Regional Health Directorate should assist to improve the process of collection, analysis, and utilization of critical data on NCDs in the region through regular in-service training programmes. In-service training on DHMIS (district health management information system) should be extended to the Health Record Officers at the health centres and CHPs (community–based health planning and services) compounds.

## PUBLIC HEALTH ACTIONS

A dissemination meeting has been organized on NCDs and each health facility has been mandated to organize regular health walk for staff and community members in their respective localities. There has been an on-going exercise on NCDs data validation.

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