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An evaluation of integrated disease surveillance and response within the community and health facility in three regions of Ghana

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Boston University
BOSTON UNIVERSITY
SCHOOL OF PUBLIC HEALTH

Dissertation

AN EVALUATION OF
INTEGRATED DISEASE SURVEILLANCE AND RESPONSE
WITHIN THE COMMUNITY AND HEALTH FACILITY
IN THREE REGIONS OF GHANA

by

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AN EVALUATION OF
INTEGRATED DISEASE SURVEILLANCE AND RESPONSE
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(Order No. )

JOHN STEPHEN JANESKI
Boston University School of Public Health, 2013

Major Professor: Davidson Hamer, MD, Professor of International Health and Medicine

ABSTRACT

An evaluation was conducted in three regions of Ghana to determine if the strategy described within the Technical Guidelines for Integrated Disease Surveillance and Response in Ghana (2002) is achieving its intended objectives within the health facility and community and to provide recommendations to stakeholders. A comprehensive review of documents and interviews of key informants at each level of the strategy from the national surveillance team to the community-based surveillance (CBS) volunteer were conducted. The strategy can only be described as useful at the level of the health facility. Within all but one sub-district evaluated, the community level of the strategy cannot be described as useful due to its declining state.

System attributes of the facility (CDC surveillance evaluation indicators) were found to be sufficient. With few exceptions, the core functions were generally operating at a minimal level, however. Although technical determinants (i.e. guidelines, training materials and reporting forms) were found to be of high quality and appropriate, many
essential materials were lacking within the facilities sampled. Organization and workforce and workforce performance determinants were found to be lacking in a number of key areas.

A number of concrete recommendations resulted from this evaluation. The CBS volunteer component should be eliminated from the national strategy. Key community members, especially those involved in health-related activities, should be sensitized to identify and report. Clinicians should be provided with training within facilities with a focus on managing and sustaining the seven core functions. Districts and facilities should routinely monitor the availability of the IDSR guidelines, standard case definitions, and all essential documents. A national initiative holding all health facilities accountable for weekly and monthly reporting is warranted, as well as an increased expectation of health facility level management of the seven core functions. Several ingredients are needed to achieve an exemplary IDSR strategy, including: review of the technical materials created for Ghana during the implementation of IDSR in the three northern regions; strategic allocation of resources; an increased focus on the role of the clinician; consideration of demographic change, especially on the periphery of large cities; and strong political will.
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<table>
<thead>
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<th>Abbreviation</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>AFP</td>
<td>Acute flaccid paralysis</td>
</tr>
<tr>
<td>AFRO</td>
<td>WHO Regional Office for Africa</td>
</tr>
<tr>
<td>BCS</td>
<td>Behavior change support program</td>
</tr>
<tr>
<td>CBA</td>
<td>Community-based agent</td>
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<tr>
<td>CBS</td>
<td>Community-based surveillance</td>
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<tr>
<td>CDC</td>
<td>Centers for Disease Control and Prevention</td>
</tr>
<tr>
<td>CHO</td>
<td>Community health officer</td>
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<td>CHPS</td>
<td>Community-based Health Planning and Services</td>
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<td>DHMT</td>
<td>District health management team</td>
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<tr>
<td>GHS</td>
<td>Ghana Health Service</td>
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<tr>
<td>HF</td>
<td>Health facility</td>
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<td>IAA</td>
<td>Interagency agreement</td>
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<td>IDSR</td>
<td>Integrated Disease Surveillance and Response</td>
</tr>
<tr>
<td>IHR</td>
<td>International Health Regulations (2005)</td>
</tr>
<tr>
<td>IMR</td>
<td>Infant mortality rate</td>
</tr>
<tr>
<td>KI</td>
<td>Key informant</td>
</tr>
<tr>
<td>KII</td>
<td>Key informant interview</td>
</tr>
<tr>
<td>MOH</td>
<td>Ministry of Health</td>
</tr>
<tr>
<td>NGO</td>
<td>Non-governmental organization</td>
</tr>
<tr>
<td>NIDs</td>
<td>National Immunization Days</td>
</tr>
<tr>
<td>NSU</td>
<td>National Surveillance Unit</td>
</tr>
<tr>
<td>PHRPlus</td>
<td>Partners for Health Reformplus</td>
</tr>
<tr>
<td>PPP</td>
<td>Purchasing power parity</td>
</tr>
<tr>
<td>QHP</td>
<td>Quality Health Partners</td>
</tr>
<tr>
<td>SDHT</td>
<td>Sub-district health team</td>
</tr>
<tr>
<td>TBA</td>
<td>Traditional birth attendant</td>
</tr>
<tr>
<td>USAID</td>
<td>United States Agency for International Development</td>
</tr>
<tr>
<td>USD</td>
<td>United States dollars</td>
</tr>
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<td>WHO</td>
<td>World Health Organization</td>
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CHAPTER 1: Purpose

Relevance to Improving the Health of the Public

Demographic and health profile

Located along the Gulf of Guinea in West Africa, Ghana is situated between Côte d’Ivoire to the west, Burkina Faso to the north and Togo to the east (Figure 1). Included amongst the larger populations of Africa, Ghana’s estimated population of 24.8 million [1, 2] is expected to reach 35 million by 2025 [3]. Its economy, also one of the largest in Africa, estimated to be 38.24 billion USD (PPP), is growing at an annual rate of 6.2% [4].

Over the twenty-year period from 1988 to 2008, Ghana’s fertility rate steadily decreased from 6.4 to 4 children per woman. Large differences can be found across regions, however. In 2008, the women of the Greater Accra Region, for example, had an average of 2.5 children compared to 6.8 for those living in the Northern Region [5]. A similar decline can been found in the infant mortality rate (IMR). Measured at 77 per 1000 live births in 1988 [5], Ghana’s IMR of 47 per 1000 is at present lower than that of neighboring Burkina Faso and Togo (91 and 64 per 1000 respectively) [6]. Life expectancy, having increased over the fifty year period from 1954 through 2005 (40 years vs. 60 years respectively) [6, 7], shows a small advantage over neighboring countries as
well: Burkina Faso (52) and Togo (59) [6]. Indicative of the stability of the public health infrastructure and country as a whole, immunization coverage follows a similar pattern of comparison. Hib3 immunization among one-year olds, for example, has been reported as 94%, 81% and 89% in Ghana, Burkina Faso, and Togo respectively [6]. Political stability, economic growth, and an improved health infrastructure may be amongst the factors contributing to this modestly lower mortality compared to other countries in the region.

A UNAIDS trend analysis of several years’ data indicates that the HIV prevalence rate has been decreasing in nine out of ten of Ghana’s regions. The country’s 2.9% prevalence in 2009 is lower than that of many other countries in sub-Saharan Africa [8].

Despite the epidemiologic transition currently underway, communicable diseases continue to make the largest contribution to Ghana’s mortality (66%) [6]. Almost two million cases of malaria were reported by the health system in 2009 [6]. In addition to malaria, HIV/AIDS, lower respiratory infections, diarrheal diseases and tuberculosis rank amongst the most frequently reported causes of death [9]. Despite progress in recent decades toward the eradication of Guinea worm and control of other infectious diseases, Ghana continues to experience large infectious disease outbreaks, with meningitis and cholera being amongst the most noteworthy [10-12].

The country’s epidemiologic transition is characterized by an increase in both a burden of chronic disease and emerging health threats, such as injuries from automobile accidents. Non-communicable disease presently makes up 25% of life-years lost nationally [6]. Of these, circulatory disease was ranked by Agyei-Mensah, S. (2007) as
the country’s number one cause of mortality in 2001 of all diseases and health events including infectious disease [13, 14]. An analysis of data from the Morbidity and Burden of Disease Estimates for WHO Member States (2002) supports this assertion. It reveals that all types of cardiovascular disease combined accounted for more deaths than any single infectious disease or other non-communicable condition [9]. Diabetes, for example, is a major contributor to morbidity in Accra and other Ghanaian cities with similar demographics [15, 16].

**Three regions characteristic of Ghana’s diversity and transition**

The Public Health Department divides the country into three broad epidemiologic zones possessing unique demographic and geographic characteristics relevant to public health programming. The diverse epidemiologic characteristics of these three zones, reflecting Ghana’s growing population and demographic transition, create broad implications for the management of the IDSR strategy. For the purposes of this evaluation, the three zones will be referred to as the “North”, “Middle Belt” and “Coastal”.

The United States Agency for International Development’s (USAID) Partners for Health Reformplus (PHRPlus) supported the implementation of the strategy in three regions in the North from 2000 to 2005. The North is comprised of the three northern most regions: Upper East, Upper West, and Northern. Compared to the other zones it has a higher level of poverty and less access to services due to a lack of paved roads. Especially prone to infectious disease epidemics, it recently harbored the last of the country’s Guinea worm cases and experiences yearly transmission of meningococcal
meningitis in each of its three regions [10, 11]. The majority of the population, dependent upon farming for its livelihood, lives in smaller widely dispersed communities that have been referred to as both “settlements” and “villages” reportedly having a median of 200 people each [18]. The exposure of the North to the neighboring countries of Côte d’Ivoire, Burkina Faso, and Togo may have implications for international disease transmission due to regular movement across borders.

Situated on the opposite end of the length of the country along the Gulf of Guinea coastline [19], the Coastal zone stands out as the largest most developed economic region of the country. Having the highest population density, the Coastal zone is home to Ghana’s highest percentage of urban dwellers. The Ghana Health Service (GHS) estimates that 85% of the Greater Accra Region’s more than 3 million residents are urbanites. The Accra district, a major metropolis of over two million people, has numerous government hospitals and clinics and many private health care facilities. Along with economic prosperity, Accra leads the country’s epidemiologic transition characterized by an increased burden of chronic disease including cardiovascular disease, diabetes, hypertension, and other diseases [15, 16]. Infectious diseases, however, continue to make a major contribution to morbidity and mortality. Recent outbreaks of cholera [12] and a malaria prevalence of 12% [20] serve as examples of the threat of infectious diseases in the country’s capital. A high incidence of infectious disease coupled with an increase of non-communicable disease as a result of the epidemiologic transition has created a unique public health situation in Accra. Agyei-Mensah et al. (2010) describe a “protracted” double burden of chronic and infectious diseases in Accra.
responsible for the majority of the city’s morbidity and mortality. Whereas the wealthy are now experiencing a high burden of chronic disease as a result of the epidemiologic transition, the urban poor experience a double burden characterized by a higher risk of infectious disease coupled with chronic diseases [14].

The Middle Belt, including the Brong-Ahafo, Ashanti, Eastern and Volta regions, has been called a “transition” zone characterized as geographically, developmentally, and economically falling between the North and Coastal zones. Boasting provincial populations in the millions, including the country’s largest (Ashanti Region, 4.7 million [2]), the Middle Belt is distinguished by a predominantly rural population and a lower population density compared to the Coastal zone.

**Justification for an evaluation of IDSR at the sub-district level**

This evaluation aimed to measure the performance of the IDSR strategy at the conclusion of the decade during which the *Technical Guidelines for Integrated Disease Surveillance and Response in Ghana (2002)* [21] was utilized as the guiding document for implementation and management of the strategy. The findings are intended to accompany the updated strategy found within the second edition which was created in 2011 in response to the release of the *Technical Guidelines for Integrated Disease Surveillance and Response in the African Region, 2nd ed. (2010)*[22] by the WHO. The most significant changes that have been made to Ghana’s guidelines are the addition of public health “events”, such as injuries, an increase in the number of priority diseases under surveillance, and the incorporation for the first time of the International Health Regulations (2005) (IHR) [23]. The GHS has plans to introduce the updated *Technical
Guidelines at district health management teams (DHMT) training workshops.

A lack of understanding of the gaps that exist at the point of data collection or where the "frontline" workers are involved in the strategy has been cited by health officials in Ghana as a shortcoming of IDSR implementation in a country where the strategy is otherwise strong. Data quality issues and gaps at the sub-district level associated with, but not limited to, consistency, timeliness, communication, and supervision were described by authorities from the GHS during pre-study meetings in April 2011. Integral to the functioning of IDSR, the community and health facility levels have not frequently been the focus of IDSR evaluations performed in Ghana or beyond. Furthermore, few evaluations of community-based surveillance (CBS) have been made available within the public domain. This evaluation, possibly the first of its kind to systematically evaluate the seven core functions of IDSR within the community and health facility taking into consideration performance determinants, can provide valuable information to all of the forty-four countries in Africa that have an IDSR strategy.

IHR (2005) [23] and the WHO Technical Guidelines (2010) [22] make clear the need to strengthen international public health surveillance in response to the rapid changes being brought on by globalization. These guidelines specifically state the importance of surveillance and response at the community level and its role within global public health surveillance. One objective of the WHO Technical Guidelines states, for example, "Emphasize community participation in detection and response to public health problems including event based surveillance and response in line with IHR (2005)." [22] The demographic and health data of Ghana point to a complicated relationship between
non-communicable and infectious diseases that may be indicative of what will be seen at the local level across Africa as globalization takes hold. Large Ghanaian cities, along with numerous others across the African continent, may soon, if not already, begin to experience Accra’s double burden of disease. The needs and problems associated with IDSR implementation within a sub-metro located in a growing metropolis undergoing transition may be different from those of less populated sub-districts, which only have a rural health center or health post that is difficult for the population and authorities alike to reach. Having been an early implementer, Ghana is amongst a small group of countries that have shared lessons related to implementation with other Member States. As Ghana is likely to be one of the first countries to update its guidelines, the findings of this evaluation may be helpful to other countries as they take on this challenging task.

The evaluation focused on the strategy during the period of time in which the first edition of the Technical Guidelines was being utilized, any reference to the guidelines from this point forward refers to the first edition (2002) unless specified otherwise.

Background and Significance

The IDSR strategy of the WHO Regional Office for Africa

Integrated Disease Surveillance and Response or “IDSR” was adopted in 1998 by Member States of the WHO Regional Committee for Africa at the 48th session held in Zimbabwe as the regional strategy for early detection in order to allow for timely and efficacious responses to priority communicable diseases [33]. The IDSR strategy “aims to strengthen countries’ capacity to collect, analyze, interpret, and disseminate information
to decision makers through the establishment of multi-disease surveillance systems that build upon existing surveillance structures, resources, and personnel with a focus on the district level” [34]. The forty-four countries within the AFRO region receive guidance and recommendations for the implementation of IDSR from the WHO and the Centers for Disease Control and Prevention (CDC). The specific objectives of IDSR for the region (Appendix 1) provide an overview for understanding the core functions of the strategy as described within the Technical Guidelines for Integrated Disease Surveillance and Response in the African Region, 2nd ed. (2010) [22], the principal document created to assist countries to develop their respective IDSR strategies.

The WHO Regional Office for Africa has compiled a list of priority diseases, conditions and events (Appendix 2) that Member States can use as a guide during the development or updating of national guidelines. Each country’s IDSR strategy differs according to its local context, political situation, and level of financial support and technical assistance received from donor organizations and non-governmental organizations (NGO). Ultimately, countries create a unique list of priority diseases, conditions and events based on national priorities and local epidemiologic profile. The priority disease and response matrix provides a means for planning activities for each level of the strategy. The focus of this evaluation, the community and health facility, rests at the first and second levels of the matrix, respectively (Table 1 below).

International Health Regulations (2005)

IHR (2005) were developed “to prevent, protect against, control and provide a public health response to the international spread of disease in ways that are
commensurate with and restricted to public health risks, and which avoid unnecessary interference with international traffic and trade [23]." Following the decision of the AFRO region that Member States incorporate the IHR (2005) within their existing IDSR strategies, the regulations have made a major contribution to the changes found within the second edition of the technical guidelines for the African region [22, 23]. According to the guidelines, the IDSR strategy can provide the following to further the implementation of IHR (2005) within the African region [22]:

- Infrastructure and resources for surveillance, investigation, confirmation, reporting and response.

- Experienced human resources.

- Defined implementation process (sensitization, assessment, plan of action, implementation, monitoring and evaluation).

- Generic guides for assessment; plan of action development; technical guidelines; training materials; tools and Standard Operating Procedures that incorporate IHR components.
Table 1 Detect and respond to priority disease matrix

<table>
<thead>
<tr>
<th></th>
<th>1.0 Identify</th>
<th>2.0 Report</th>
<th>3.0 Analyze and Interpret</th>
<th>4.0 Investigate</th>
<th>5.0 Respond</th>
<th>6.0 Provide Feedback</th>
<th>7.0 Evaluate and Improve the System</th>
</tr>
</thead>
<tbody>
<tr>
<td>Community</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Health facility</td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>District, State, Province</td>
<td></td>
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<tr>
<td>National</td>
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<tr>
<td>National WHO Representative, WHO Regional Office</td>
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</tr>
</tbody>
</table>

1Adapted from *Detect and respond to priority disease matrix*, WHO Regional Office for Africa and Centers for Disease Control and Prevention (CDC), EPO – Division of International Health, NCID – Division of Bacterial and Mycotic Diseases, Atlanta, GA. Available from: http://www.cdc.gov/idsr/files/disease_matrix.pdf

The IDSR Strategy of Ghana

Background

Ghana was one of the earliest countries in the AFRO region to assess its capacity and plan for IDSR implementation [17]. Prior to the development of its IDSR guidelines, Ghana reviewed the strengths, weaknesses and opportunities of its existing surveillance system and developed the Plan of Action for IDSR [21]. Early progress in implementation and the continued success of IDSR in Ghana may be partially explained by the attention given to the implementation of the strategy by international
organizations, especially those supported by the U.S. Government. Of the 46 African countries in which the U.S. Government has supported the design and implementation of IDSR through AFRO, Ghana is one of eight that have received additional technical assistance from the CDC and USAID [35]. Furthermore, Ghana was one of four countries included in a three year interagency agreement (IAA) between USAID and CDC developed in 2002 to strengthen IDSR implementation in Ghana, Tanzania, Uganda and Zimbabwe [36]. USAID funded NGOs to provide technical support for the design and implementation of IDSR including Quality Health Partners (QHP), EngenderHealth, and Abt Associates. The QHP project serves as an example of how U.S. funded technical assistance supported implementation. After conducting a baseline analysis of surveillance including the availability of resources and completeness of reporting forms in seven southern regions and select health facilities [37], the QHP provided support for the implementation of IDSR in 200 health facilities in 30 districts in 2004 [38].

The implementation process in Ghana is well documented, possibly considerably more so than most other countries in the region. The implementation of USAID's five-year (2000-2005) PHRPlus IDSR project in Ghana and Tanzania, for example, is described in a comprehensive report produced by Abt Associates (2006) [17]. An evaluation of the IDSR strategy by Nsubuga et al. (2010) [39] in Ghana and the other three IAA countries mentioned above was published by the journal Global Public Health. Both the community and health facility levels as defined within the Technical Guidelines are implicated along with the sub-district health team (SDHT) wherever the "sub-district" is referred to within this document.
“Gaps” of the IDSR strategy at the sub-district level in Ghana

According to the Technical Guidelines health facilities provide supervision of community level surveillance that involves the participation of CBS volunteers, community leaders and key community members. Appendix 3 provides the case definitions of the priority diseases of the community level. A description of the skills and activities associated with each core function of IDSR for the community and health facility levels can be found in Tables 2 and 3, respectively.

Table 2. Detect and respond activities and skills matrix – community level

<table>
<thead>
<tr>
<th></th>
<th>1.0 Identify</th>
<th>2.0 Report</th>
<th>3.0 Analyze and Interpret</th>
</tr>
</thead>
<tbody>
<tr>
<td>Community</td>
<td>Use simple case definitions to identify priority diseases or conditions in the community</td>
<td>Know which health events to report to the local health facility and when to report them</td>
<td>Involve local leaders in observing and interpreting disease patterns and trends in the community</td>
</tr>
<tr>
<td>4.0 Investigate</td>
<td>5.0 Respond</td>
<td>6.0 Provide Feedback</td>
<td>7.0 Evaluate and Improve the System</td>
</tr>
<tr>
<td>Support case investigation activities such as informing the community of the problem case finding and collecting specimens</td>
<td>Assist health authorities in selecting response activities</td>
<td>Give feedback to community members about reported cases and prevention activities</td>
<td>Decide if public health action took place as planned</td>
</tr>
<tr>
<td></td>
<td>Participate in response activities</td>
<td></td>
<td>Evaluate the community response to the public health action</td>
</tr>
<tr>
<td></td>
<td>Mobilise community resources appropriate for response activity</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Carry out community health education</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

1Adapted from the surveillance activities to detect and respond the priority diseases at level of the health facility table, Technical Guidelines for Integrated Disease Surveillance and Response in Ghana, 2002
Table 3. Detect and respond activities and skills matrix – health facility level

<table>
<thead>
<tr>
<th>Health facility</th>
<th>1.0 Identify</th>
<th>2.0 Report</th>
<th>3.0 Analyze and Interpret</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>- Use standard case definitions to identify priority diseases or conditions that present in:</td>
<td>- Report case-based information for immediately notifiable diseases</td>
<td>- Prepare and periodically update graphs, tables and charts to describe time, person and place for reported diseases and conditions</td>
</tr>
<tr>
<td></td>
<td>1. Inpatient and outpatient services</td>
<td>2. Report data gathered from inpatient and outpatient services and from community and private sector sources</td>
<td>- Identify and inform district level immediately of any disease or condition that:</td>
</tr>
<tr>
<td></td>
<td>2. Community reports</td>
<td>3. Report summary data to district level</td>
<td>o Exceeds an epidemic threshold</td>
</tr>
<tr>
<td></td>
<td>3. Record information about suspected cases in clinic register and patient case notes</td>
<td>4. Report laboratory results from screening sentinel populations at target sites (for example, STI clinic, MCH service, blood bank)</td>
<td>o Occurs in locations where it was previously absent</td>
</tr>
<tr>
<td></td>
<td>4. Use local laboratory capacity to diagnose suspected cases</td>
<td>5. Interpret results. Discuss possible public health action with district</td>
<td>o Occurs more often in a population group than previously</td>
</tr>
<tr>
<td></td>
<td>5. Use standard protocols to process laboratory specimens</td>
<td>6. Collect and transport clinical specimens for laboratory investigation</td>
<td>o Presents unusual trends or patterns</td>
</tr>
<tr>
<td></td>
<td>6. Collect and transport clinical specimens for laboratory investigation</td>
<td>7. Interpret results. Discuss possible public health action with district</td>
<td>- Interpret results. Discuss possible public health action with district</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>4.0 Investigate</th>
<th>5.0 Respond</th>
<th>6.0 Provide Feedback</th>
<th>7.0 Evaluate and Improve the System</th>
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<td></td>
<td>- Take part in investigation of reported outbreaks</td>
<td>- Treat cases and contacts according to standard case management guidelines</td>
<td>- Monitor timeliness and completeness for reporting routine and case-based information to the district level</td>
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<td></td>
<td>- Collect, package, or store and transport specimens for laboratory testing</td>
<td>- Use appropriate infection control measures</td>
<td>- Evaluate routine detection and reporting of priority diseases and conditions</td>
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<td></td>
<td>- Use investigation and laboratory results to confirm the outbreak</td>
<td>- Carry out public health response with the district level</td>
<td>- Evaluate preparedness for and timeliness of response activities</td>
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<td>- Process and record laboratory results</td>
<td>- Mobilise community involvement in the response</td>
<td>- Evaluate appropriateness of case management</td>
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<td>- Provide the results to district health management committee, clinical staff and patient</td>
<td>- Advocate for resources</td>
<td>- Take action to improve reporting practices</td>
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<td>- Take action to improve readiness for timely response to outbreaks</td>
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<td>- Maintain contact with community to maintain preparedness and prevention activities</td>
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<td>- Monitor the interval between receipt of specimens and sending of results</td>
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<td>- Monitor quality of laboratory results</td>
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1 Adapted from the surveillance activities to detect and respond the priority diseases at level of the health facility table, Technical Guidelines for Integrated Disease Surveillance and Response in Ghana, 2002
SDHTs have responsibility for detecting and responding to twenty-three priority diseases (Appendix 4). Health facilities and sub-districts have one of two surveillance and response strategy realities. A number of sub-districts have a sub-district disease control officer, usually posted in a health center, who has responsibility for leading activities related to the seven core functions. All facilities, nonetheless, have clinicians with surveillance and response responsibilities regardless of the presence of a disease control officer in the sub-district.

IDSR strategy stakeholders from the WHO Country Office in Ghana, the Public Health Division of the GHS, the GA West district, and Pokuase sub-district revealed in preliminary interviews that while the strategy is generally strong at the national, regional, and district levels, data quality issues and gaps associated with, but not limited to, consistency, timeliness, communication, and supervision exist at the sub-district level. The following includes information related to the “gaps” provided by interviewees.

- Lack of community-based surveillance volunteers. Many, however, are available for national immunization days.
- Volunteers not reporting regularly.
- Volunteers not motivated to conduct surveillance responsibilities.
- Lack of monitoring and supervision of volunteers.
- Lack of transportation for volunteers and supervision activities.
- No incentives available to motivate volunteers.
- Lack of documents for volunteers, i.e. reporting register.
- Reorganization within the health system creating some organizational ambiguity.
not yet resolved in one district. Some facilities are reporting select data directly to the
district bypassing the newly appointed sub-district focal person. Three sub-district
surveillance officers were working from a district office.

- Lack of software.
- Lack of hardware.
  - Computers
  - Phones
  - Internet connection
  - Handheld devices
- Lack of transport at regional and district levels.
- Data quality/consistency issues from level to level. For example, each level has
different data from the same period because data that are missing from lower levels
are added after the deadline by the district but not updated at the regional level due to
software limitations.
- Lack of transport, fuel, and per diem for supervisory visits. Fuel, money and
  training and refresher training are needed for district officers. M&E is not being
  performed once a month as recommended.
- Inconsistencies known to exist at the level of the “front-line” where data is
collected not understood by higher levels.
- Poor data quality and management including data inconsistencies.
Questions and specific aims

1. Is Ghana’s Integrated Disease Surveillance and Response (IDSR) strategy achieving its intended objectives at the health facility (HF) and community levels?

2. How can the IDSR strategy of the sub-district be improved to better meet the needs of stakeholders?

   o To describe the IDSR strategy at the health facility and community levels and indicate its usefulness.

   o To measure the performance of Ghana’s IDSR strategy at the sub-district level by assessing simplicity, flexibility, data quality, acceptability, timeliness, and stability, the seven core functions, and three determinants of performance.

   o To make recommendations based on the findings of the evaluation with a focus on how the updated technical guidelines for Ghana can be best applied considering data quality issues and gaps that exist within the sub-district.

   o To make available lessons learned that can be utilized by all of the World Health Organization (WHO) Regional Office for Africa (AFRO) Member States as they embark on the process of updating and rolling-out national guidelines based on the Technical Guidelines for Integrated Disease Surveillance and Response in the African Region, 2nd ed. (2010).
CHAPTER 2: Literature review

The WHO recommends the periodic evaluation of countries' communicable
disease surveillance systems as a means of creating accountability and assuring that
systems meet the objectives for which they were developed [43]. The technical
guidelines for the African region provide a means for the periodic evaluation of the
district level using the IDSR core indicators. The guidelines describe evaluation as a
methodology which can be used "... to assess the effectiveness of the surveillance and
response system in terms of timeliness, quality of data, preparedness, case management,
overall performance and using the indicators to identify gaps or areas that could be
strengthened [22]."

Evaluations found within the scientific literature and technical reports are more
likely to be national or multi-country studies focusing on the performance of the IDSR
strategy at or above the district level (i.e. district, state, province, national) [17, 39]. A
number of these studies have evaluated aspects of IDSR outside the realm of the
traditional epidemiologic surveillance evaluation. A cost of implementation study
conducted by Somda et al. (2009) serves as an example [45]. The following review
includes only studies that can strictly be described as surveillance performance
evaluations.

A monitoring and evaluation study, conducted in 2003 by Rumisha et al. (2007)
five years after the beginning of implementation of IDSR in Tanzania, concluded that
IDSR had not been effectively rolled-out in most of the country. The twelve districts
sampled were not monitoring the performance of their surveillance systems, analysis was
not being performed at the facility and district levels, and timeliness of reporting was inadequate. The authors noted that much of the implementation strategy had not been carried out as planned, especially at the lower levels. The study concluded that barriers to full implementation had included overburdened health facility staff, poor communication, poor laboratory capacity, poor incentives, poor organizational capacity, and insufficient financial resources. The study recommended that the capacities of health workers at all levels be strengthened [46].

The WHO and partners conducted a documentation exercise in December of 2002 in six African countries (Burkina Faso, Ethiopia, Ghana, Mali, Uganda and Sudan) with the aim of collecting information related to lessons learned, successes, challenges and opportunities of IDSR implementation in order to inform the scale-up of IDSR implementation in Africa and other regions (WHO, 2003) [47]. The report concludes that although achievement had been made towards implementation at the national level within these countries, bringing the IDSR guidelines, including those of the laboratory system, to the peripheral levels (provincial, district, health facility and community) remained a challenge. The authors suggest stronger integration of activities related to IDSR by donors at the national level in an effort to strengthen implementation at lower levels. A higher level of technical coordination and integration by ministries of health within their respective countries was also recommended [47]. The report concludes that a need exists for capacity building at the peripheral levels through proven mechanisms of training, supervision and feedback. Recommendations for health authorities were aimed at strengthening activities at the peripheral levels by assuring that technical materials are
printed and widely distributed, on-site training is provided, and evaluations of the IDSR core indicators are performed. The importance of strengthening community level surveillance activities was emphasized [47].

Nslobuga et al. (2010) conducted an evaluation of four African countries experiences' of implementing IDSR during the period of 1998 – 2005 [39]. The evaluation was comprised of the collection of data related to the IDSR core indicators and qualitative data collected at the national and in some cases the regional level by means of interviews of key informants (KIs) in order to gain the perspective of actors and stakeholders. A reported limitation of the evaluation was the lack of data from the district level and below from which to draw conclusions. The authors conclude that further investigation at the lower levels is needed.

Rumisha et al. (2007) found that poor communication and other factors at the health facility level had impeded full implementation. The authors did not, however, delve deeply into factors leading to poor communication and other barriers. Similarly, the WHO report (2003) mentioned above stated a need for capacity building at the peripheral levels and recommended the strengthening of community level surveillance activities and the link between laboratories at different levels. The report called for capacity building at the lower levels by means of training, supervision and feedback but did not provide specific solutions to “gaps” that exist at the “periphery” (community and health facility).

The PHRPlus report written by Abt Associates, *Improving performance of IDSR at district and facility levels: Experiences in Tanzania and Ghana in making IDSR*
operational (2006), is likely the most complete documentation of the implementation process in Ghana available. The report describes the measures taken by the Partners for Health Reformplus project (2000-2005) to support implementation in the Northern, Upper East, and Upper West regions of Ghana and select regions of Tanzania [17].

This valuable report provides insight into the strengths and weaknesses of IDSR implementation, a methodology for assessing and improving IDSR, and recommendations that can be applied in Ghana, Tanzania and beyond. The report describes three essential components or determinants of performance: technical; organizational/workforce; and workforce performance (Figure 2). The importance of providing routine attention to the three determinants was expressed in the report as the following: “Implementers are reminded that they must look for and resolve obstacles to performance in all three areas. This can be done by ensuring that assessment and ongoing support activities are designed to address all three types of determinants.” As a foundational component of the IDSR strategy, it is assumed that the countries have most of the basic technical elements of the strategy in place (technical standards, information system design, data collection forms, technology, etc.). In the absence of strong organizational and workforce capacity, IDSR will not perform optimally, according to Abt Associates. Both of these determinants were found to be sub-optimal in Ghana and Tanzania at the time the report was written.

A study was conducted in the Northern Region of Ghana in the year 2000 to measure the effectiveness of transitioning the Guinea worm village volunteer into the role of CBS volunteer. The study included interviews of community members, volunteers,
Figure 2. Determinants of disease surveillance and response system performance

**Technical determinants:**
Technical standards, information system design, data collection forms, and technology

**Organizational/Workplace determinants:** Structure, leadership, processes/procedures, resources, incentives, clear roles and responsibilities

**Workforce performance:** Knowledge, skills, and motivation of individuals working in the system, and organizational culture

zonal coordinators and health system personnel. The community member/villager informant allowed for the inclusion of IDSR stakeholders at the level of data collection that have no official role within the IDSR infrastructure in an attempt to better understand the local perception of the program and knowledge of their contribution to protecting the health of the community. In addition to key informant interviews (KIIs), a documents review was conducted within health facilities and the volunteer register was examined [18]. The methodology of this study informed the development of the present evaluation.

No journal articles focusing on the evaluation of community level surveillance were identified by a Pubmed search using the terms evaluation and community-based surveillance. A number of reports, evaluations and conference abstracts, however, provide evidence supporting the use of CBS as a means to increase the sensitivity of surveillance in countries where gaps at the local level lead to incomplete reporting within health facilities. The results of an evaluation of a measles surveillance system in Cambodia presented at the 37th National Immunization Conference of the CDC in 2003, serves as an example of what is available within the public domain. The evaluation found that many of the measles outbreaks detected by communities had not been detected or reported by health facilities [48]. Although the concept of CBS is well supported and often recommended by researchers, little has been documented about the evaluation of performance, especially explanations of poor performance. Additionally, no studies are available in the public domain specifically related to the evaluation of community-based surveillance within the context of IDSR.
CHAPTER 3: Research Design and Methods

Data were collected in three regions/provinces (Greater Accra, Eastern, and Northern regions) located within one of each of the three major epidemiologic zones (Coastal, Middle Belt and North) (Figure 3). The number of study sites was limited to one sub-district within each region/province due to constraints related to logistics, time and budget. Regional and district surveillance offices responsible for the sampled sub-districts were visited prior to conducting interviews within facilities and communities. In order to gain insight into gaps in performance associated with supervision and distance from the next higher level of administration, sub-districts sampled did not include those in which the district administration pertains and the districts sampled did not include those in which the regional administration lies. A convenience sample of communities was taken with the assistance of representatives from the Public Health Division of the GHS located in each of the three regions. The choice of study sites located in urban, semi-urban and rural areas was intended to shed light on how characteristics associated with different levels of public health services and demographics may affect surveillance. The community sampled in the Northern Region
was a rural community of 200 people mainly subsiding on agricultural activities. In contrast, the community in the country’s capital city, Accra, is densely populated, more economically diverse, and lies in the proximity of many services. The two remaining communities, each with populations of over ten thousand, share some of the characteristics of the aforementioned communities as they are best described as transitional. They both lie on the periphery of a large metropolitan area and are comprised of many individuals who have migrated from rural areas. Probability sampling was not utilized due to the fact that public health services were not expected to vary greatly within a district or sub-district and the availability of resources for travel was limited. With the exception of one sub-district in which two facilities were visited, one health facility, the most central and/or the location of a disease control officer, was visited in each of the sub-districts.

**Data collection, analysis and interpretation**

KIIIs and a review of documents were conducted including IDSR stakeholders from the national through community levels. An interview methodology was employed that shares some of the attributes of those described within the studies conducted by Maes and Zimicki (2000) [18] and Nsubuga et al. (2010) [39]. KIIIs fall into three broad categories or groups corresponding broadly with roles, responsibilities, and location within the disease and respond matrix. The first group included representatives from the NSU and the surveillance units of the three regions and districts. The second group comprised SDHT members. The third group of KIIIs was made up of community members. A records review was conducted within the health facilities to obtain data to
measure core functions, support functions, and quality/outputs. The CBS volunteer
Community Register for Vital Health Events in Ghana (2006) was also reviewed.

Six questionnaires and one document review guide were utilized by the data
collector: a CBS supervisor questionnaire; a CBS volunteer questionnaire; a CBS
community member questionnaire; three sub-district and health facility surveillance
questionnaires each corresponding with a different set of IDSR core functions; a
questionnaire for the national, regional and district; and a guide to collecting documents
and materials from the health facility/SDHT.

**Evaluation measures**

The measures employed by the evaluation were derived from three unique sources
related to surveillance evaluation or more specifically to IDSR. CDC’s *Updated
Guidelines for Evaluating Public Health Surveillance Systems* [44] provided a
methodology for evaluation of a surveillance system which included a description,
assessment of usefulness, and measurement of system attributes. The *Technical
Guidelines* (2002) of Ghana provided the activities that should be carried out at the
community and health facility levels to achieve the seven core functions of IDSR. The
third methodology was derived from the *Determinants of Disease Surveillance and
Response System Performance* model found within the PHRPlus report (2006). The
specific measures utilized by this evaluation have been organized below under each of
these three methodological sources.

The CDC’s *Updated Guidelines for Evaluating Public Health Surveillance
Systems* provided a tool to describe IDSR and measure its needs and performance. The
CDC recommends that an evaluation provide a description of the strategy and an evaluation of usefulness. The guidelines include system attributes (simplicity, flexibility, data quality, acceptability, sensitivity, representativeness, timeliness and stability) which may be evaluated as means to measure the performance of a surveillance system. All but sensitivity and representativeness were measured by this evaluation due to the availability of data and objectives of the evaluation. Global definitions for usefulness and each of the attributes are given below followed by the corresponding measures created for this evaluation.

Usefulness provides an indication of how well a strategy is working to detect new epidemics, identify changes in patterns of disease or health conditions that warrant public health action, and support the advocacy for resources [44]. The following measures were utilized to evaluate usefulness: 1) Has the health facility detected a new epidemic through data analysis? Which examples can be provided?; 2) Does the health facility have documentation of analysis that has shown a disease or condition that has exceeded the epidemic threshold or that occurred in locations where it was previously absent or that occurred more often in a population group than previously or that presents unusual trends or patterns?; 3) Can the SDHT or health facility provide examples of when they had advocated higher levels for resources or other help needed to undertake public health action?; 4) Have diseases listed under community surveillance within Ghana’s Technical Guidelines been detected and reported by CBS volunteers?

The simplicity of the structure and operation of an information system refers to having as simple a system as possible that can achieve its intended objectives [44]. A
flow chart for the IDSR strategy was designed to demonstrate each of the levels and actors involved in data reporting. Acute flaccid paralysis (AFP) case investigation was used to describe the process required to collect and report data on a rare disease.

Flexibility refers to how adaptable a system is to changing information needs and operating conditions with few additional resources[44]. Consideration of flexibility is particularly important at this time as the second edition of Ghana’s Technical Guidelines has recently become available. Flexibility was assessed by asking health facility personnel to describe how difficult it would be to add additional diseases and health events to those the health facility was currently reporting taking into consideration the resources that will be needed. They were also asked to describe the steps that would have to be taken to add each additional disease or health event, how long it would take to add each one, and the obstacles that might be encountered. CBS supervisors were asked how difficult it would be to add additional diseases and health events to those now being reported by the volunteers and the steps that would have to be taken to add each additional disease or health event. Similarly, CBS volunteers were asked how difficult it would be for them to report on additional diseases or health events in addition to those listed in the CBS register.

Data quality reflects the accuracy and completeness of form completion [44]. The following were employed to assess data quality within the facility and community: 1) a review of registers to observe completeness of columns; 2) a review of completeness of responses on all weekly (CD1) and monthly (CD2) reporting forms for the previous three months; 3) a sample from the registers of all malaria cases 5 years of age and older.
compared with those reported on the monthly reporting form (CD2) for the same period; 4) a simple count of unanswered or incomplete entries within the CBS register; 5) and a comparison of a sample of the six diseases and conditions found within the CBS register for the last one year compared to that recorded by the supervisor or supervising health facility.

Acceptability refers to the willingness of actors within the surveillance system to participate in data collection and reporting [44]. Facility personnel were asked to rate the responsibility of identifying and reporting diseases and health events compared with their other duties (Likert scale). Completeness of reporting forms and registers, and timeliness of reporting were assessed as part of the records review. Completeness and timeliness of reporting by CBS volunteers were evaluated by questioning supervisors and reviewing CBS books. Volunteers were asked to speak on why they continue volunteering, how much longer volunteers think they will continue volunteering, and the different ways they benefit from being a volunteer. CBS supervisors were asked to describe how CBS has helped them to do their work and if they think that surveillance in general has been improved by its implementation. Community members (chemical sellers) were asked their opinions about the benefits of CBS and their participation.

Timeliness reflects the speed between steps in a public health surveillance system [44]. Since no data were available within the facilities themselves to measure timeliness, district disease control officers were asked to report the frequency that weekly and monthly reports were received by the reporting deadline from the sampled health facility or sub-district within their jurisdiction during the three-month period of October through
December 2011.

Stability refers to the availability and reliability of the system[44]. More specifically it can be understood in terms of the uninterrupted availability and reliability of minimal essential resources, personnel, transportation, communication, and funding needed to support the function of the IDSR strategy. To measure stability of IDSR within the sub-district, the following questions were asked of the SDHT: Does the facility ever experience a stock-out of reporting forms; why is the stock not adequate; what access does the SDHT/health facility have to reliable transportation methods including fuel resources; what access does the health facility have to means of communication (telephone, facsimile, radiophone, Email, others); what surveillance related activities and functions of the SDHT/health facility are not operating properly due to a lack of funding or other resources? CBS supervisors were asked what problems they have had with obtaining supplies necessary for CBS. Volunteers were asked if they had a problem getting a new annual register at the beginning of the year.

The following are the measures created to measure the performance of the seven core functions (identify, report, analyze and interpret, investigate, respond, provide feedback, evaluate and improve the system) of the community level of IDSR as described within the Technical Guidelines for Integrated Disease Surveillance and Response in Ghana, 2002 [21]. Identify is carried out by employing simple case definitions to identify priority diseases or conditions in the community. Volunteers were asked to give the case definition of each of the diseases listed in the CBS register. Each picture within the register was pointed out when asking the question. Community members and
community leaders were asked if they were knowledgeable of the CBS volunteer in their community and to describe any communication they had received related how to identify and report priority diseases.

The report core function of the community level can be described as the community’s ability to know which health events to report to the local health facility and when to report them. Report was measured by asking disease control officers, clinicians, or community members responsible for providing supervision to the CBS volunteers which diseases and events volunteers and community members have reported to the health facilities. The review of the CBS register included the observation of how frequently supervisors have signed the register. Volunteers were asked how often they present their registers to a supervisor.

Analyze and interpret at the community level is conducted by involving local leaders in observing and interpreting disease patterns and trends in their community. To measure the performance of this function sub-district CBS supervisors were asked to give examples of when data had been shared with the community from which it originates. Community leaders were asked to describe any activities in which they were involved during which the observation and interpretation of disease patterns and trends found within their community were discussed.

Investigate can be described as supporting case investigation activities such as informing the community of the problem, case finding, and collecting specimens. Community members (chemical sellers) and CBS volunteers where asked to describe their awareness of investigation, case finding, and the collection of specimens that had
taken place within their community.

Respond at the community level of IDSR can involve the following: assisting health authorities in selecting response activities; participation in response activities; mobilization of community resources appropriate for a response activity; and performing community health education. Community level KIs (chemical sellers, community leaders and volunteers) were asked to describe or give examples of how their community has or could perform each of the above actions.

Provide feedback relates to the provision of information about reported cases and prevention activities to community members. Community level KIs were asked to give examples of when the health facility shared with them the community’s health data or the outcome of prevention activities.

Evaluate and improve at the community level refers to the process of determining if public health action took place as planned and to evaluate the community response to the public health action. Sub-district CBS supervisors and community KIs were asked to give examples of activities conducted to evaluate and improve CBS.

The following measures are those which were employed to measure the performance of the seven core functions of the health facility level of IDSR as described within the Technical Guidelines [21]. The core function identify includes the following activities: use of standard case definitions to identify priority disease conditions; use of local laboratory capacity to diagnose suspected cases; use of standard protocols to process laboratory specimens; and the collection and transport of clinical specimens for laboratory investigation. KIs within health facilities were asked to: a) demonstrate a
booklet, poster, or other material within in the facility which lists the priority disease case definitions; b) give the definition of AFP; c) give examples of when the local laboratory capacity to diagnose suspected cases had been utilized; d) explain the standard protocol to process an AFP specimen.

The report function includes the reporting of case-based information for immediately notifiable diseases, summary data to the district level, and laboratory results. The performance of the report function at the level of the health facility was measured by asking health facility personnel to provide documentation of cases eligible for immediate notification that had been reported to the next higher level and give an account of epidemic prone diseases which had been previously reported by any means including telephone. Facilities were asked to provide copies of completed CD1 and CD2 forms for the last three reporting months prior to the evaluation visit. Informants at each level of the strategy were asked the requirements for submitting the CD1 and CD2 forms as well as reporting deadlines. Health facility personnel were asked to provide laboratory sample documentation sent to and received from the next higher level. In the absence of documentation, health facility personnel were asked to give an account of all laboratory samples that had been previously sent to the next higher level. They were also asked to explain the procedure for receiving the results.

The analyze and interpret function includes the preparation and update of graphs, tables and charts to describe time, person and place for reported diseases and conditions. Health facilities are expected to identify any disease or condition that meets the criteria for immediate reporting by means of standardized data analysis procedures and inform
the district level immediately. The *analyze and interpret* function was evaluated by asking health facilities to provide examples of their use of graphs, tables and charts for surveillance purposes. Informants were asked to provide examples of the use of the following data analysis procedures:

a. Identification of a trend change in laboratory data.

b. Detection of a new epidemic through data analysis.

c. Established alert and epidemic thresholds for epidemic prone diseases.

d. Identification of diseases that have: exceeded the epidemic threshold; presented unusual trends or patterns; occurred in locations where it was previously absent or more often in a population group than previously.

The *investigate* function at the health facility level involves the following activities: investigation of reported outbreaks; collection, packaging, or storing and transport of specimens for laboratory testing; use of investigation and laboratory results to confirm an outbreak; processing and recording of laboratory results; and provision of laboratory results to the district health management committee, clinical staff and patient. This function was evaluated by asking informants to recall previous participation in outbreak investigations; describe the procedure for processing an AFP specimen; give examples of reported use of investigation and laboratory results to confirm outbreaks; provide accounts of the processing and recording of laboratory results of priority diseases; and give examples of the provision of laboratory results to the district health management committee, clinical staff, and patient.

*Respond* entails the treatment of cases and contacts according to standard case
management guidelines and the use appropriate infection control measures. The facility level carries out public health response with the district level, mobilizes community involvement and advocates for resources. A number of measures were used to evaluate the performance of respond within facilities and sub-districts. The records review included a preview of the available standard case management guidelines within facilities. Informants were asked to describe the facility’s preparedness to conduct a public health response and infection control measures. They were also asked to give examples of the facility’s attempts to advocate upper levels for resources and community involvement in outbreak response. Informants at the district and sub-district levels were asked to give the status of outbreak committees (epidemic management committees.)

The facility level is required to give feedback about the outcome of reported cases and prevention activities to community members. Both community and health facility level informants were asked to provide examples of feedback provided to community members.

The evaluate and improve function can be described as the periodic evaluation and monitoring of surveillance and actions taken to improve the core functions of surveillance within the facility and community. Health facility personnel were asked to describe evaluation efforts that had been carried out by the facility and actions taken to improve readiness for timely response to outbreaks. The documents review included a request to see a monitoring and evaluation plan. Additionally, health facility KI was asked to provide examples of efforts to monitor each of the following:

1) Timeliness and completeness of reporting to the district level.
2) Interval between the sending and receipt of specimens/results.

3) Quality of laboratory results.

4) Supplies necessary for emergency situations.

The following were employed to evaluate the three determinants of performance described within the PHRPlus report (2006) [17]. Measurements applicable to the determinants of performance previously described within the two methodologies described above (CDC evaluation guidelines and Ghana Technical Guidelines) have not been repeated here.

The technical determinants were described and evaluated by asking informants from the national through the facility level to list all IDSR documents and technical materials of which they had knowledge. Available documents were reviewed in an attempt to find mention of additional documents. An international consultant who had previously worked on IDSR in Ghana directed the researcher to PHRPlus report (2006), which lists many resources created for Ghana.

Organizational and workforce determinants were evaluated by many of the measures described above under the other two major methodologies. In addition, health facility personnel were asked to describe who from higher levels of the GHS as well as individuals or organizations outside of the GHS have expressed an interest in the subdistrict level data and the function of IDSR. An account of any noteworthy shortage of resources was given. The records review provided a substantial amount of information.

Workforce performance was also evaluated by many of the measures described above under the other two evaluation methodologies. Knowledge was measured, for
example, by asking health facility level informants to give the definition of AFP and the
deadlines from weekly, monthly and quarterly reporting. CBS volunteers were asked to
give the definitions of each of the priority diseases listed in the CBS register.
CHAPTER 4: Results

During the period of March 2011 – April 2012, the following activities were performed: background interviews, pursuit of ethical review from the GHS and Boston University, procurement of letters of support for field work, logistical preparations, and travel within three regions (provinces) to collect data. Data were collected during the period of January 20 through March 8, 2012.

A total of twenty-nine individuals were interviewed. A minority of KIs, all of whom came from the sub-district teams, were administered more than one questionnaire as these held more than one role within the strategy, i.e. sub-district disease control officer and CBS supervisor. One information officer from the national surveillance unit and ten disease control officers representing the regional (Eastern, Greater Accra, and Northern regions), district (Accra Metropolitan, Akuapim South, Ga West, and Npandai), and sub-district (Aburi, Ashiedu Keteke, Kitari and Pokuase) levels were interviewed. Four community health nurses were interviewed within either a health center or a Community-based Health Planning and Services (CHPS) unit. Community level informants were interviewed within the town of Pokuase and Bokum neighborhood (Accra) of the Greater Accra Region, the town of Kitari and village of Wassawassa of the Northern Region, and the town of Aburi located in the Eastern Region. They included four CBS volunteers, four CBS supervisors (three GHS personnel and one volunteer zonal coordinator), four community leaders (assembly members and one village elder), and four community members. Each of the community members was an active “chemical seller” - the term used in Ghana for someone licensed to sell pharmaceuticals to the public.
A documents review, including clinic registers, reporting forms, and reports or other materials related to surveillance or laboratory results, was conducted within the Kom clinic in Aburi, the Ussher Polyclinic in the Ashiedu Keteké sub-metropolitan district, the Kitari health center of the Npandai district, and the CHPS unit and Mayera health center located in the Pokuase sub-district. Two CBS registers were reviewed. No CBS registers were available for review within the remaining two study sites.

**Description and usefulness of the strategy at the level of the sub-district**

**Description of the strategy**

Figure 4 provides a general description of the strategy as given by national, regional, and district officials when asked to describe the process and structure for reporting a suspected case of AFP. The following can be applied to any of the diseases eligible for immediate reporting with little modification. Feedback generally follows the same structure in reverse order. Additional elements contributing to the description can be found throughout the paper including Tables 1, 2 and 3, and below.

**Usefulness of the IDSR strategy at the sub-district level**

One of five facilities sampled reported having detected a new epidemic through data analysis. One of the five facilities, in which a disease control officer is posted, reported detecting a disease or condition that had exceeded the epidemic threshold. The same facility could provide examples of when the district was informed of diseases that presented unusual trends and patterns. None of the facilities, however, could provide examples of diseases or conditions that had occurred in locations where previously absent or more often in a population group than previously. Facilities were able to provide very
Figure 4. Flow chart of the process required to collect and report one suspected case of acute flaccid paralysis (AFP)

A CBS volunteer or clinician who has identified a suspected case notifies the sub-district position in charge (sub-district disease control officer or clinician). In some cases the district may be notified directly.

The district level officer is notified by the sub-district. The sub-district disease control officer (or district) takes two samples twenty-four hours apart and transports them to the district along with the required paperwork.

A district disease control officer transports the sample to the region.

The sample and paperwork is received by the Deputy Director of P.H. or the Regional Disease Control Officer. The regional lab checks the quality of the specimen in some regions.

The region sends the sample to the Noguchi Memorial Institute for Medical Research located within the University of Ghana in Legon, Greater Accra Region.
few examples of when the higher levels had been advocated for resources, especially to undertake public action. Examples of advocacy came almost exclusively from disease control officers.

Two of four CBS volunteers reported having ever identified and reported a disease or condition. The volunteer interviewed in the urban sub-metro, had reported suspected cholera, tetanus, and measles cases to the health facility in the past. The volunteer interviewed in the rural community of the Northern Region reported one case of suspected Guinea worm in the past. Equally few examples of CBS volunteer reporting could be provided by supervisors. An outbreak of cholera (2006) was reportedly detected by CBS in a sub-district where a disease control officer supervises the volunteers directly. Neonatal tetanus (2005) and Buruli ulcer (2010) have been accurately identified by volunteers in the same area.

Attributes of the strategy at the community and health facility levels

Simplicity: Figure 4 above includes the personnel and offices involved in the collection, reporting, and submitting a laboratory sample. Although this procedure can be considered “simple”, a more detailed look at this procedure in the discussion section provides evidence of the unnecessary expenditure of fuel, human resources, and time for the processing of one such laboratory sample.

Flexibility: Each of the sub-district team members interviewed reported that there would not be any difficulty associated with the addition of new disease categories, conditions or health events. They expected that the higher levels would make the necessary changes to the reporting forms and provide any additional materials and supplies which may be
needed and provide any instructions associated with changes in reporting. The most commonly reported needs associated with the addition of new disease categories included a computer to store current and additional data stemming from new disease categories, funds to pay for photocopies of reporting forms, adequate staff (community health nurse or disease control officer), and an update of clinic registers. All volunteers and supervisors reported that it would not be difficult to add additional diseases and health events to CBS. It was frequently stated that volunteers would require training or a workshop on the new category.

**Data quality:** All columns in all of the registers of each facility were found to be complete with the exception of a few observations of missing diagnoses in one facility and an example of no entries during a one month period another. Missing entries were most often explained by periods when the sole person knowledgeable of the recording procedure was ill or on vacation. Registers were generally in good condition and legible with a few exceptions. All boxes or lines of the monthly reporting forms (CD2) sampled were found to be complete in each of the five facilities. In two of the five facilities where weekly forms (CD1) are being used, all responses were found to be complete with the exception of missing weekly dates and geographic information for one month in one of the sampled facilities. Three facilities were found to have underreported malaria cases in individuals five years of age or older on monthly reporting forms by 5%, 7%, and 25%. The remaining two had over reported by 10% and 16%. It was observed that the inclusion of non-eligible cases under five years of age may have been responsible for some of this error. Suspected cases that have not been confirmed as malaria, designated
as "? Malaria", and cases formally diagnosed and presumably included on a reporting form from an earlier period, as indicated by "malaria rev" or "malaria review", may also have been mistakenly recorded on the form.

The epidemiologic reporting sheets which serve as an intermediate step between the register and reporting forms in some facilities were found to have some terminology which did not correspond with the standard case definitions. The “Diarrhea with blood (shigella)” classification serves as a good example of how the language on the locally created epidemiologic reporting sheets could cause confusion. “Diarrhea with blood (shigella)” was found to be referred to as “dysentery” by all of the health workers questioned. A diagnosis is also noted as “dysentery” within the diagnosis column of clinic registers and on the locally created epidemiologic reporting sheets mentioned above. Another noteworthy aspect of the local epidemiologic reporting sheet is a lack of some of the categories or details required for the reporting of some priority diseases. Viral haemorrhagic fever and lymphatic filariasis, for example, were not included amongst the diseases listed on the local epidemiologic reporting sheet of one facility evaluated. In other instances the disease classification corresponded with that of IDSR but sub-categories or other details required of the standardized IDSR reporting forms were missing. The Technical Guidelines, for example, make the distinction between “diarrhea with severe dehydration in children < five years of age” and “diarrhea with some dehydration in children < five years of age”. The epidemiologic reporting sheet used by one facility, for example, lists only “diarrheal diseases”. Similarly, the epidemiologic sheet in the same facility requires no detailed information for the category
of "Pneumonia". The Technical Guidelines recommend reporting "Pneumonia in children < 5 years of age" and "severe pneumonia in children < 5 years of age". In a second facility, the data on the facility's epidemiologic reporting sheet did not correspond with that found on the CD2 form due to the fact that the CD2 contained data from more than one facility.

Both of the CBS registers available for review had many unanswered or incomplete entries. One of the two had no new entries half-way through the last available register (2010). No data were available to make a comparison of a sample of the six diseases and conditions found within the CBS register for the last one year compared to that recorded by the supervisor or supervising health facility.

Acceptability: Health facility personnel rated the responsibility of identifying and reporting disease and health events compared with their other duties as "more important" or "much more important". Completeness of registers and monthly reporting forms (CD2) was generally satisfactory (see Data quality above). It is important to note that clinicians are responsible for reporting in two of the three facilities where the weekly reporting form (CD1) was not being used. Timeliness was found to be satisfactory.

One supervisor reported that the relationship between the health facility and the community is less strong than it was before they lost the participation of the volunteers four years ago. He cited a lack of interest on the part of the community as one reason why CBS is not functioning. Other health facility informants reported that CBS has helped them to do their work and that it has helped to improve surveillance in general. However, some community leaders and all of the community members (chemical sellers)
had no knowledge of CBS. Two of four of the volunteers interviewed who no longer possessed registers were both located in the Greater Accra Region. One reported that volunteers in his community have abandoned their CBS responsibilities altogether. His supervisor was no longer keeping a CBS log and he reported that the facility had not been working with CBS for four years. In the two communities where the volunteers did have registers, the quality of the data was found to be very poor. One volunteer’s register had never been signed by a supervisor and had no entry beyond mid-2010. The volunteer indicated that his was the last register remaining in the community of those distributed during the original training session.

**Timeliness:** According to the district level officials responsible for the two facilities that routinely submit paper based weekly reports (CD1), data were submitted on time 70 – 80% and 86% of the time. Timeliness of weekly reporting was not obtained for the remaining three facilities as weekly data are submitted exclusively by phone or reporting forms are submitted after weekly data has been reported by telephone. Four of five (80%) of the facilities had reported monthly data (CD2) on time during the months of October, November and December 2011.

**Stability:** With few exceptions, facilities were found to have the minimum necessary forms to perform IDSR reporting (integrated case-based reporting form, line-listing form, case-based reporting form for AFP, CD1, and CD2.) Stock-outs of reporting forms occur rarely. Four of five facilities reported having an adequate supply of forms for at least the next three months. The fifth reported having an adequate supply for the subsequent month. Stock may not be adequate at times since some facility level personnel may have
to rely on personal funds to replenish reporting forms and other official documents. The Standard Case Definitions, very important to the function of IDS at the facility level, were missing in all but one facility.

Although a lack of motorcycles, vehicles, and fuel was frequently mentioned by sub-districts, the minimum transportation resources necessary for case investigation or outbreak response were found to be available. Sub-districts do not have adequate access to transportation for routine activities, such as supervision, however.

With the exception of one sub-district health center with access to a landline telephone, mobile phones are the only means of communication for the health facilities beyond sending messages by a third party traveling between facilities or sub-district and district. All facilities had adequate cell phone coverage with the exception of the most remote site in which health workers had to find a suitable connection elsewhere within the village from which to make calls. Text messaging from cell phones is reportedly a frequent means of communication between some districts and sub-districts.

Although reportedly not ideal, sub-district disease control officers did report having supplies to package and transport an AFP specimen. Clinicians, where no disease control officer was present, expected the district to handle specimen collection and bring supplies when the need arises. Four of five facilities did not have some or all of the minimum materials for creating and maintaining analysis documents including graph books, paper, pencils or computers.

Two facilities reported not having an emergency stock of urgent drug and treatment supplies to respond to epidemic-prone diseases. Similar to specimen
collection, it is expected that the district or another higher level will supply these items when an outbreak occurs.

In most cases, CBS registers had not been given to the volunteers for a number of years. Per diems, which motivate volunteers to conduct their activities, were found to no longer be given in most sub-districts.

The seven core functions of IDSR – community-based surveillance

In addition to the findings provided below, Table 4 summarizes the findings and conclusions of the community level by core function.

Identify: Two out of five volunteers gave the correct definition of AFP, meningitis or neonatal tetanus. Three out of five gave the correct definition of measles. All gave the correct definition of Guinea worm and cholera. The definitions of deaths and births were also known by all. Some uncertainty surrounded “unusual events”.

None of the community members, all chemical sellers, knew a CBS volunteer or had been exposed to a message related to how to identify and report diseases and conditions via posters, newsletters, announcements or other means. Community leaders were more likely to know of the CBS volunteers but also had received little or no information related to how and what to identify and report.

Report: A sub-district disease control officer reported that the volunteers have correctly identified diseases or conditions that have been reported to him approximately fifty percent of the time. CBS supervisors provided very few examples of diseases, conditions or events that have been reported by volunteers. One sub-district received reports of neonatal tetanus (2005) and Buruli ulcer (2010) from volunteers. Cases of diarrhea had
been reported a number of months prior to the evaluation in a second sub-district in which Guinea worm surveillance is strong. The same facility received reports of Guinea worm and measles within the last few years. Community member informants report never having reported any diseases, conditions or health events in any of the four sub-districts. Supervisory signatures were found in the CBS register (2011) in one of four sub-districts sampled. Registers in the remaining three sub-districts had not been presented to the health facility by volunteers or checked by GHS personnel for a number of years.

**Analyze and interpret:** Two sub-districts reportedly had held meetings with the CBS volunteers a number of years ago to review data. Three others reported no regular provision of data to the community beyond that which may be given during outbreaks. Assembly members reported having received some data at meetings held by the district for non-surveillance purposes. Local leaders reported that they are not routinely involved in the observation and interpretation of disease patterns and trends found within their communities. Some had received data during and following an outbreak response.

**Investigate:** Community members (volunteers or community leaders) in three of four sub-districts sampled were knowledgeable of an investigation that took place during the cholera outbreak (2011). There was no evidence that community members or volunteers had been actively involved in case searches or other investigation activities.

**Respond:** Although a number of volunteers expressed that their communities were not prepared for an outbreak, evidence from the cholera outbreak (2011) response demonstrates the success of communities (and the GHS) in responding to the epidemic.
Table 4. Summary of the evaluation findings and conclusions of the seven core functions of the community level

<table>
<thead>
<tr>
<th>Core Function</th>
<th>Conclusion</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.0 Identify</td>
<td>Non-functional</td>
<td>CBS registers found to be outdated or unavailable; community members were not familiar with CBS volunteers; community leaders were not knowledgeable of objectives of CBS; volunteers were not able to give all of the definitions of the CBS priority diseases; CBS was functioning in one of five communities sampled.</td>
</tr>
<tr>
<td>2.0 Report</td>
<td>Non-functional</td>
<td>Recent (within three months of evaluation) supervisory signatures were found in the register evaluated in one community; volunteers had not reported any suspected priority diseases within the one year period prior to the evaluation in four of five communities; community members with a stake in the community health, i.e., traditional healers, have not been sensitized to identify and report.</td>
</tr>
<tr>
<td>3.0 Analyze and Interpret</td>
<td>Non-functional</td>
<td>Community leaders are likely to receive information related to their community’s surveillance data during or following outbreaks only; community members receive information even less frequently; very few examples could be given by communities of meetings held to discuss health information.</td>
</tr>
<tr>
<td>4.0 Investigate</td>
<td>Functional</td>
<td>Community members expressed an awareness of case investigation and related activities; no account of opposition to case investigation on the part of communities was given by informants of any level.</td>
</tr>
<tr>
<td>5.0 Respond</td>
<td>Functional</td>
<td>Anecdotal evidence from the response to the cholera outbreak demonstrates strong community participation; the urban community creates additional challenges which may deserve more attention of the GHS in anticipation of future outbreaks; untapped resources, such as the chemical seller and others with a stake in the community’s health, could be valuable additions to the response mechanism in all community types.</td>
</tr>
<tr>
<td>6.0 Provide Feedback</td>
<td>Functioning at a minimum</td>
<td>Feedback is most likely to be provided to communities in the form of positive laboratory test results or during outbreaks only. There is little evidence that feedback is provided routinely or during meetings with the community. SDHT informants report that they have not been encouraged or instructed to provide routine feedback.</td>
</tr>
<tr>
<td>7.0 Evaluate and Improve the System</td>
<td>Functioning at a minimum (outbreak only)</td>
<td>Reportedly performed by the GHS post-response; no evidence of the evaluation or improvement of routine CBS activities was found; communities have not met to discuss the improvement of CBS amongst themselves or with SDHTs.</td>
</tr>
</tbody>
</table>
Each of the communities described various methods employed within their local area for reaching community members during a response. A number of respondents mentioned that a gon-gon (gong) has been beaten to gather people early in the morning to inform them of health education messages during an outbreak. The most rural community with fewer residents simply employed house-to-house visits in the past. Only the urban community described difficulty with getting people’s attention by simply calling them to gather to provide them with health education messages. Urban households reportedly do not welcome volunteers who come door to door without a monetary offering. Durbars in this community will only be attended by the community members if dance entertainment and loud speakers with music are provided as incentives to gather. It noteworthy to mention that none of the four chemical sellers (pharmaceutical vendors) interviewed, including the informant in the urban community, reported having been ever asked to participate in an outbreak response by the GHS or community leadership.

*Provide feedback:* Facilities reported that they had not been instructed by higher levels to provide regular feedback to communities. In three out of four communities, routine feedback on facility or CBS data had reportedly not been provided. No feedback related to CBS registers was found to be provided by districts to the sub-districts or by sub-districts to communities. If feedback had been provided to communities it was only given during outbreak response. It is most likely given in the form of positive laboratory results for immediately reportable diseases, such as AFP, given to directly to the case and their family members. In one sub-district, a health facility reported holding quarterly meetings with communities to review health information. A volunteer in the same sub-
district reported, however, that the community does not receive regular information from the health facility. Volunteers reported receiving some information during trainings or other meetings held at the district, such as, annual meetings. This information was not usually specific to their communities, however. In communities where a representative of the GHS participated in quarterly meetings with the assembly member and community leadership, ongoing outbreaks or the provision of health services were most likely to be discussed. All of the community members interviewed (chemical sellers), with the exception of one, reported that they had never received information from a volunteer or leader regarding illness that had been identified in the community.

Evaluate and improve: Communities reported having met during and following an outbreak response, reportedly on a weekly basis, to discuss public health action taken by the community. None of the four communities had ever met to discuss the improvement of CBS independently or in the company of representatives of the GHS, however. No evidence of evaluation and improvement of the overall function of the strategy or seven core functions of the community level were found.

The seven core functions of IDSR – health facilities

The following are the results of the health facility evaluation organized by core function. A summary of findings and conclusions are provided within Table 5 below.

Identify: None of the personnel of the five facilities sampled gave the complete or correct definition of AFP. Minor errors in the case definition of AFP given by health facility informants included failure to mention “sudden (within three days) onset”, “< 15 years of age”, and “any person of any age in whom the clinician suspects polio”. More
serious errors included naming unrelated signs and symptoms and/or failing to include "paralysis" or an equivalent description thereof within the definition given. No standard case definitions were available in any form (23 Priority Diseases Case Definitions booklet, Technical Guidelines (2002) or case definition fact sheet) in four out of the five sampled facilities.

Report: Both of the sub-district disease control officers provided documentation of immediate reporting to the district level. None of the three remaining facilities in which clinicians were in charge of surveillance had similar documentation to provide, however. One facility reported using case-based forms during a recent cholera outbreak but no copies were available for review at the time of the interview. Other facilities reported that districts are informed by phone and no records are kept locally.

No suspected epidemic prone diseases were investigated in 2011 from one sub-district health center serving a population of over ten thousand. Evidence from another facility suggested that clinicians in this particular sub-metro facility may not be actively communicating information on diseases eligible for immediate reporting. Measles diagnosed by a physician but not reported, for example, had been found in a register by the disease control officer during monthly data extraction.

Regional and district level officials reported that all health facilities, including CHPS, are required to send CD1 in paper form to the next higher level. Two of five facilities complete and send CD1 weekly forms to the district level. A third facility reports weekly data to the district by phone only. Two facilities (one of which is a CHPS) were not submitting the CD1 and may have not been reporting in any form on a
weekly basis. The two sub-district disease control officers reported that none of the CHPS within their jurisdictions were submitting weekly reports (CD1) in any form (including by phone).

All of the facilities and sub-districts sampled are submitting a CD2 monthly form to their respective districts. The evaluation did not access the monthly reporting compliance of facilities not visited within the sampled sub-districts. One sub-district disease control officer, however, reported that none of the CHPS in his jurisdiction are submitting the CD2. Anecdotal evidence and observations made during the evaluation suggest that some sub-districts do not collect data from more peripheral health facilities within their jurisdictions, i.e. CHPS.

Most laboratory testing of suspected cases is performed by one of two national laboratories. Sub-districts are most likely to be informed of laboratory results from the district disease control officer once the results have made their way back through the surveillance infrastructure. All sub-districts reported that only positive results of suspected cases investigated within their jurisdiction have been provided to them. Results are normally given by phone. Negative lab results are rarely if ever communicated to the sub-district.

*Analyze and Interpret:* The two health centers where disease control officers were posted had graphs, tables, and charts posted on the wall of the surveillance unit office for some of the priority diseases. Malaria and cholera graphs and a distribution map for cholera were posted in one office. Additional analysis documents were kept on a desktop computer including malaria, HIV, hepatitis, schistosomiasis, and Guinea worm data in
Table 5. Summary of the conclusions and findings of the seven core functions of the facility level

<table>
<thead>
<tr>
<th>Core Function</th>
<th>Finding</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.0 Identify</td>
<td>Functioning at a minimal level.</td>
<td>Few examples of suspected case investigation (laboratory samples) were provided by the health facilities; no laboratory sample records were available; clinicians report deferring to districts for the collection of samples; standardized case definitions of priority diseases were available in one of five facilities only; evidence was found within registers of priority diseases which had not been identified or sent for laboratory testing; identify was strongest where a disease control officer was posted.</td>
</tr>
<tr>
<td>2.0 Report</td>
<td>Functioning at a minimal level.</td>
<td>Few records are available of immediately reportable diseases, conditions or events reported to the next higher level; most facilities are not submitting a CD1 form (weekly reporting); informants report that some peripheral facilities (CHPS, for example) are not submitting the CD1 and CD2 (monthly reporting) at all; the CD2 was found to have been submitted routinely within the three months prior to the evaluation by all facilities sampled; some facilities reporting (CD1) only by phone; report was strongest where a disease control officer was posted.</td>
</tr>
<tr>
<td>3.0 Analyze and Interpret</td>
<td>Functioning at a minimal level.</td>
<td>Tables, charts and graphs were found in the facilities where disease control officers are located; only one HF level informant (disease control officer) could provide evidence of using data analysis to detect changes, trends or outbreaks; clinicians were found to be performing very little or no data analysis.</td>
</tr>
<tr>
<td>4.0 Investigate</td>
<td>Functioning at a minimal level.</td>
<td>Sub-districts in which a disease control officer is posted are more likely to perform outbreak investigation; clinicians are more dependent upon the district to perform investigation; few records of laboratory samples sent for testing (to confirm an outbreak) were available at the time of the evaluation at the level of the health facility.</td>
</tr>
<tr>
<td>5.0 Respond</td>
<td>Functional.</td>
<td>The response during the 2011 cholera epidemic provides evidence that sub-districts have the capacity to respond in a timely and efficient manner; informants report that response committees are functioning for the most part— they are more likely to have met more recently in areas where there has been an outbreak; case management guidelines were not available in three of five facilities.</td>
</tr>
<tr>
<td>6.0 Provide Feedback</td>
<td>Functioning at a minimal level.</td>
<td>Feedback in the form of positive priority disease laboratory results is likely the most frequent form of feedback provided by districts to facilities and facilities to communities; negative laboratory results, data analysis, prevalence data and routine data reports are usually not provided to the community; information which is received may not be transmitted beyond the community members who receive it first; no regular mechanism (bulletin or memo) for providing data specific to the sub-district or health facility was found to have been distributed by districts or other levels.</td>
</tr>
<tr>
<td>7.0 Evaluate and Improve the System</td>
<td>Generally non-functional.</td>
<td>Very little evidence exists of periodic monitoring and evaluation of the seven core functions by the sub-district or facility levels.</td>
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</tbody>
</table>
tables. The second sub-district health center had a bar graph posted on the wall that included under-five malaria, diarrhea, measles, malnutrition and pneumonia by year. A hand drawn spot map with the location of cholera, yaws, TB, and Buruli ulcer cases posted on the wall of this office cannot be considered useful as it was from a number of years ago and no date or other data beyond case plots were indicated.

Very little or no analysis is being performed in sampled facilities where clinicians are responsible for surveillance. No evidence was found of the plotting the number of cases and deaths of epidemic prone diseases on graphs, tables or charts.

None of the five facilities was able to provide evidence of the identification of disease that had occurred in locations where it was previously absent or more often in a population group than previously.

One of five facilities, where a disease control officer was responsible, was able to provide evidence of the following:

e. Identification of a trend change in laboratory data.

f. Detection of a new epidemic through data analysis.

g. Established alert and epidemic thresholds for epidemic prone diseases.

h. Identification of diseases that have exceeded the epidemic threshold or presented unusual trends or patterns.

*Investigate:* All of the sampled facilities (5) reported some level of participation in outbreak investigation. Disease control officers reported having more of a role in investigation than clinicians; however, each reported having had experience with the collection, packaging, storing and transport of priority disease specimens. Whereas the
disease control officers have confirmed outbreaks with laboratory results in the past, clinicians responsible for surveillance reportedly rely on the district team to perform sample collection, processing and results reporting tasks.

Very few examples of the collection of laboratory samples of priority diseases, whether performed by the sub-district or upper levels, were provided by the informants, however. None of the five facilities had records of laboratory results within the facility. The following verbal accounts of case investigation were provided: yellow fever samples were collected and sent for testing in September 2011 (no results had been received); five H1N1 samples were sent in April and May of 2010 by a sub-district health center; a rural facility reported having sent a Guinea worm sample in 2010 and TB samples in 2011 (results were received in both instances). A lack of funds for transportation and availability of vehicles can reportedly deter from the prompt investigation of suspected cases. One disease control officer estimated that only about half of suspected cases can be visited on some days as the shared vehicle he had access to must be returned to the health center after a half day’s use.

Evidence of suspected cases eligible for investigation that had not been sent for laboratory testing was found during the records review. Cases of “Diarrhea with blood (shigella)”, for example, one of Ghana’s six epidemic prone diseases, found in the registers of three of the five facilities during the records review had not been sent for laboratory testing. Two of these facilities did not report these cases in any form to the next higher level.

Due to the nature of the surveillance structure, districts will most likely be aware
of laboratory results before a sub-district. Facilities are likely to only receive positive results. The two sub-district health centers, which have disease control officers, reported providing results to the clinical staff and patients. Three facilities, which lie in sub-districts where disease control officers have not been posted, reported having less of a role in the provision of laboratory results.

Respond: Facilities provided examples of participation in outbreak response including extensive collaboration with communities, citing most frequently actions taken during the cholera outbreak (2011). Sub-districts provided very few examples of when they had advocated higher levels of the health system for outbreak response materials, however. The two sub-district health centers had comprehensive standard case management guidelines available within their facilities. On the contrary, the three peripheral facilities had very limited or no standard case management guidelines available. Four of five facilities reported having been provided with instruction or training related to infection control measures. Three of five facilities reported that they are prepared to conduct public health response. Outbreak committees had recently reorganized after a number of years of inactivity in response to the cholera outbreak. Others have not met since the last local outbreak a number of years ago. Some districts reported that sub-district committees are stronger than those of the district level. Others have reported the opposite experience. It is likely that the community level is the least active, however.

Provide feedback: Feedback is likely to be provided most frequently regarding information related to suspected cases and prevention activities carried out during outbreaks. Little or no feedback on routine reporting has reportedly been received by
communities from SDHTs, however. Positive laboratory results are the most likely form of feedback that community members receive from health facilities or upper levels. In some cases, however, no one beyond the cases themselves or family members may be informed. As was mentioned above, it is likely that negative lab results are almost never provided to health facilities and communities. Albeit very infrequently, community members may receive data during durbars or volunteer training sessions.

**Evaluate and improve:** Although informants provided some anecdotal evidence of informal evaluation during outbreaks, none of the facilities and sub-districts had documentation of a plan for evaluation and monitoring or documentation of evaluation activities conducted in the past.

- There is very little evidence that sub-districts and facilities are monitoring the timeliness and completeness of reporting to the district level, including that of the peripheral facilities that report to them.
- One of five facilities reported monitoring the interval between the sending and receipt of specimens/results (sub-district disease control officer).
- Facilities and sub-districts are not currently set up to monitor the quality of lab results.
- Facilities and sub-districts are not likely to monitor the number of supplies to set aside during an emergency situation. Informants reported waiting for the upper levels to evaluate their needs and make appropriations.
- One of five facilities reported having taken action to improve readiness for timely response to outbreaks.
Determinants of IDSR Performance

The following findings are organized under the three determinants of performance as described within the PHRPlus report (2006): technical; organizational and workforce; and workforce performance. Tables 6 and 7 provide syntheses of the results for the community and health facility levels respectively.

Technical determinants:

A comprehensive collection of appropriate documents and forms has been produced and tested within the country. The Community Register for Vital Health Events in Ghana (2006) [42] provides communities with a means of recording vital health events and diseases, births, deaths and immunizations. A health staff visit log sheet within the register provides for documentation of supervisory visits made by a zonal coordinator or a GHS supervisor. The CBS Supervisor Log, maintained by a zonal coordinator or GHS supervisor, is used to aggregate data from the community registers within a sub-district or zone. A Training Module for Community-Based Surveillance Workers and Guidelines for Community-Based Surveillance System in Ghana are listed within the Community Register (2006) as companion documents.

The following documents, forms, and guidelines created by the GHS and/or partner organizations include those that are required or could be utilized by the sub-district level.

- Standard Case Definitions for 23 Priority Diseases for Integrated Disease

- Fact sheet on epidemic prone diseases with standard case definitions and reporting requirements for clinicians (PHRplus report, 2006).
- Reporting forms: Case investigation forms; line listing forms; CD1 (weekly reporting form); CD2 (monthly reporting form); single disease case-based forms (influenza, AFP, diarrhea (GAR), and Guinea worm); and an integrated case-based form (yellow fever, measles, meningitis, and shigella).
- Rumor booklet/log.
- Letters and memos with information on specific diseases of interest that may include prevention information, alerts, or other supplementary information.
- Health Facility Analysis Book (PHRplus report, 2006).
- Facility level IDSR training package materials including a pre- and post-test evaluation, post workshop assignment, facilitator’s guide, participants’ guide, and a handbook for IDSR at the facility level. Developed by PHRplus and the NSU for the three northern regions in 2005 (PHRplus report, 2006).
- Wall poster with reporting requirements and deadlines (PHRplus report, 2006).
- Supervision guides (PHRplus report, 2006).
- Standard treatment guidelines (also referred to as the “blue book”).

Organizational/workforce determinants:

Essential structure: Sub-district health teams were found to have a strong relationship with community leadership and community volunteers. Existing communication channels and modes of providing incentives to communities during activities such as
Table 6. Summary of the *determinants of performance* for the community level

<table>
<thead>
<tr>
<th>Level of strategy</th>
<th>Minimum technical determinants</th>
<th>Minimum Organizational/ workforce determinants</th>
<th>Minimum workforce performance</th>
<th>Final evaluation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Community</td>
<td>Satisfactory</td>
<td>Not yet achieved</td>
<td>Not yet achieved</td>
<td></td>
</tr>
</tbody>
</table>

- The minimum technical determinants have been met. Some materials, documents and resources may no longer be in circulation, however.
- Basic volunteer and supervisory documents/materials are no longer available within sub-districts.
- The Northern Region can serve as an example of how strong leadership at each level, the provision of T&T or “motivation” for volunteers, and clarity of roles and accountability have created strong CBS. These elements were lacking in each of the other sites.
- The exclusion of volunteers from the benefits other volunteer activities has proven to have a negative impact on motivation of and acceptability by community members.
- Community members, especially those involved in the community’s health have not been incorporated into community level surveillance as described within the *Technical Guidelines* (2002).
- The CBS volunteer approach is not feasible due to financial and administrative limitations of the GHS.
- The culture of some populations, such as the urban neighborhood, may require more effort on the part of GHS to develop unique solutions to gain the participation of communities in surveillance and response activities.
- Both clinicians and disease control officers could benefit from training and documented instructions focused on the supervision of community level surveillance and response.
- A mechanism for sustaining the supervision of the community level is lacking at all levels.
Table 7. Summary of the determinants of performance for the health facility level

<table>
<thead>
<tr>
<th>Level of the strategy</th>
<th>Minimum technical determinants</th>
<th>Minimum organizational/workforce determinants</th>
<th>Minimum workforce performance</th>
<th>Final evaluation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Health facility</td>
<td>Satisfactory</td>
<td>Some determinants lacking or weak</td>
<td>Some determinants lacking or weak</td>
<td>o The minimum technical determinants have been met. Some valuable materials, documents and resources may no longer be in circulation, however. o Leadership at all levels focusing on the guidance and motivation of clinicians is lacking. o Standard case definitions and essential instructional documents were not found within facilities. o No evidence of monitoring and evaluation plans was found for the facility level or within facilities. o Supervision guidelines were found to be lacking. o Some peripheral facilities, including CHPS, not producing weekly and monthly reports on paper or by phone in some cases. o Some facilities may not be knowledgeable as to how to budget for surveillance activities. o The only access to communication in many cases is the personal cell phone. Having to pay out-of-pocket for phone calls may serve as a disincentive. o Knowledge of procedures essential to surveillance may only be held by one individual of the SDHT. o Knowledge of the seven core functions of IDSR and the standard case definitions is low amongst clinicians. o Little evidence of the &quot;bottom up&quot; approach to implementing the strategy within facilities including the provision of training within facilities was found. o Districts are likely not monitoring the quality of the seven core functions within facilities in their jurisdictions. o Facilities were not found to be held accountable for the performance of the seven core functions.</td>
</tr>
</tbody>
</table>
immunization campaigns has helped sub-districts to mobilize community participation with relative ease for response and other health related activities. The number of individuals who may be motivated to participate varies by community, however. Many creative solutions to a lack of transportation and limited access to communication have been developed in each of the areas sampled.

Although not ideal, private taxi buses or “tro tros”, personal bicycles, personal cell phones, and oral communication provide the main means of transportation and communication. Schools and churches had reportedly been used to hold community meetings related to outbreak response. Enthusiastic and capable personnel maintaining regular communication with the higher levels were found in all of the facilities visited. Each of the facilities visited was found to be in good physical condition, manned by at least two health workers at any one time, and actively providing services to patients. Additional details can be found under Stability in Chapter 4.

Management Capacity: Each of the sampled facilities was observed to have the minimum necessary number of capable personnel necessary for the maintenance of the seven functions of IDSR.

Leadership: A strong leadership capacity was observed amongst district, sub-district and communities in general. This capacity was not always applied to the management and improvement of the IDSR strategy, however. Varying levels of demonstrated leadership were observed amongst sub-district and district team members ranging from a strong dedication and commitment to community surveillance through total neglect. Supervisory signatures found within the last available annual register (2011) in the sub-
district where the Guinea worm initiative had supported community level surveillance suggests that registers had been checked relatively recently. In the remaining communities, however, community leaders, community members, and volunteers reported little or no perceived interest of the GHS or NGOs in the performance and improvement of their communities’ surveillance. Community leaders reportedly have not discussed the improvement of community surveillance amongst themselves or with community members.

**Processes and Procedures:** Some processes and procedures for surveillance were found in each of the facilities visited. As is described throughout the results section, the number of essential procedures operating and their quality varied greatly across sub-districts. Districts and regions report having contact lists of all facilities and districts respectively.

**Processes and procedures** were lacking at the community level, however, in all but the Northern Region sub-district where volunteers were found to have a regular schedule for CBS activities. None of the sub-district teams were found to have supervisory plans for community level surveillance.

**Access to resources:** The documents, forms, and guidelines listed under the Technical Determinants section above provides an overview of the policy, instructional documents, and reporting forms which were created to guide the implementation and management of the IDSR strategy in Ghana. The following is a comprehensive account of the documents and forms corresponding with the aforementioned list which were found during the records review:
One of the sub-district disease control officers was in possession of the Technical Guidelines. None of remaining four facilities visited had this document.

This booklet was not found to be available in any of the health facilities or the offices of sub-district disease control officers sampled.

Fact sheets with standard case definitions and reporting requirements for clinicians (PHRplus report, 2006). A fact sheet was found in one health facility (CHPS unit).

CD1 form (weekly reporting). This form was found in the majority of facilities and sub-districts.

CD2 form (monthly reporting). This form was found to be available within all of the sampled facilities in duplicate.

Quarterly reporting form. A limited number of quarterly forms were found in a few of the facilities sampled. If a facility was in possession of a quarterly reporting form, it was likely to be only one of the numerous forms in circulation. One facility, for example, had a copy of the quarterly leprosy reporting form.

Case-based reporting form – Influenza. This form was not in the possession of most facilities sampled.

Case-based reporting form – AFP. This form was in the possession of the majority of facilities.
Case-based reporting form - Guinea worm. This form was available in the majority of facilities.

Case-based reporting form - Neonatal tetanus. This form was found within most facilities.

Line-listing form. All facilities were in possession of blank line-listing forms.

Integrated case-based reporting form (yellow fever, measles, meningitis, and Shigella). This form was found within all facilities.

Rumor book/log. Facilities are not in possession of these. Where available, however, only outdated out-of-use copies were found.

Official letters. All facilities and sub-districts possessed letters from the district or higher levels including information on specific diseases of interest, which may include prevention information, alerts, or other information.

Health Facility Analysis Book (PHRplus report, 2006). None of the facilities were in possession of this book. Only one informant of all levels of the strategy mentioned having knowledge of it.

Facility level IDSR training package materials developed by PHRplus and the MOH for the three northern regions (PHRplus report, 2006). These materials were not referred to by any level (national, regional, district or sub-district). None of these materials were found during the sub-district and facility documents review.

Wall poster with reporting requirements and deadlines (PHRplus report, 2006). Not found to be posted in any of the sub-districts or facilities.
Supervision guides (PHRplus report, 2006). Not reportedly in the possession of any of the facilities or sub-districts.

Community Register for Vital Health Events in Ghana, GHS, 2006. Copies of the register were found in two of five communities evaluated. Each of the copies reviewed was outdated. All of the volunteers interviewed reported having had a copy at one time in the past.

Community-based surveillance register data log (CBS supervisor). One disease control officer and one zonal coordinator possessed outdated files related to CBS (two of five sub-districts).

Training Module for Community-Based Surveillance Workers (mentioned within the Community Register for Vital Health Events in Ghana, 2006). None were available within any of the facilities and sub-districts sampled.

Guidelines for Community-Based Surveillance System in Ghana (mentioned within the Community Register for Vital Health Events in Ghana, 2006). None were available within any of the facilities and sub-districts sampled.

Informants at the sub-district level reported a reduction in the availability or in some cases quality of resources during the last few years. Annual CBS registers have not been made available across the sampled sub-districts. No evidence of the bicycles distributed to some of the volunteers during the implementation of the strategy could be found. Fuel to make supervisory visits to volunteers and peripheral health units and perform case investigation had reportedly been reduced. Landline phone access has been discontinued in two of the sampled facilities. Computers for surveillance activities were
found to be lacking in all but one sub-district. One of the districts visited did not have a dedicated surveillance computer.

**Incentives:** Volunteers reported the importance of the per diem or travel reimbursement ("T&T") in providing motivation to perform their surveillance duties. A reduction or elimination of "T&T" was reported across sub-districts. Health facility personnel did not report the benefit of financial compensation for costs associated with case investigation.

In some cases, volunteers are losing income when not present at their place of work (most are self-employed and/or vendors). Some have even mentioned having to use personal funds to pay for transportation to make visits to community member's homes as a volunteer. The loss of income or use of personal funds to carry out volunteer duties, whether for transportation, phone credit or other means, serves as a disincentive.

Although secondary to the financial incentive, volunteers offered examples of other benefits they receive from volunteering. One volunteer, for example, stated that the best thing about CBS is that it "opens your mind." Speaking about why he continues to volunteer, he says, "...to become a volunteer is not easy work, it brings challenges. It helps to become known in the community and allows me to study a lot [about health]." He added that volunteering is useful to him as it helps him to acquire [social capital] and therefore the chance to gain profitable opportunities within the community when they arise. He says that people will think of him first if there is work to be given. He intends to mention his volunteer role when applying for a job one day and will ask for a letter of recommendation or certificate of participation from the GHS.
Roles within the strategy: The role of district and sub-district disease control officers as managers or facilitators of community level surveillance was most evident in the Northern Region. Roles were less clear within communities. In many instances, informants, including the volunteers themselves, were not able to distinguish between the role of the CBS volunteers and those of other health related volunteer positions. “Volunteer” was most often used to describe the volunteer role for which the most recent training has been given or motivation distributed, i.e. vaccinator or CBA. This phenomenon was not observed, however, where CBS volunteers have been provided with routine incentives and kept interested by means of rotation through non-CBS volunteer trainings and other opportunities (Northern Region). The role of traditional healers, TBAs, chemical sellers or other members of the public with access to the community as described within the Technical Guidelines has not been established. At the facility level, the role of the sub-district disease control officer was found to be very well understood by KIs holding this position. The role of the clinician within the IDSR strategy was not very well understood by the clinician themselves, however.

The role of the disease control officer, however, was not completely void of variability related to accountability and responsibilities. In one region, a district disease control officer did not have the same information about their role in CBS as that which was reported by his supervisor. The regional disease control officer reported that all districts should be promoting and maintaining CBS including the attachment of one volunteer to each CHPS unit. On the contrary, the district disease control officer reported that CBS had been piloted a number of years ago, had failed and has been since been
suspended. He therefore did not see it as his role to hold sub-districts accountable for the maintenance of CBS. Another district level official responsible for surveillance was not aware of the status of the volunteers in his jurisdiction and was unable to provide information related to who was in charge of volunteers within the sub-district sampled within his district. Not surprisingly, the sub-district team sampled within the same district was not able to fully explain who was in charge of community surveillance at the local level.

*Responsibility and accountability:* Accountability for the supervision and collection of community level data was only observed in the Northern Region district.

Responsibilities related to IDSR were not as well understood by health facilities and sub-districts where clinicians were solely responsible for surveillance. The reporting requirements of districts varied greatly. In one district, facilities and sub-districts were not required to complete any reporting forms beyond the CD2. In another district, the sub-district health center was expected to regularly fill out all required reporting forms, including the CD1. The other facilities within the same sub-district reporting to the health center were not required to fill out any reporting forms, however. Sub-districts were found to not be accountable for carrying out the core functions of routine data analysis, feedback to the communities, or evaluate and improve. In some cases it appeared that no accountability for performance of the *identify, report and investigate* functions was expected.

*Workforce performance:*

*Knowledge:* CBS volunteers were not generally able to provide the goals of CBS, stating
that it had been a long time since they had heard them. Some gave the goals of other volunteer initiatives stating things like “to reduce teenage pregnancy”. The zonal coordinator and CBS volunteer in the Northern Region, where the Guinea worm initiative has a strong presence, were very knowledgeable of the purpose and goals of CBS, however. The community leader interviewed in the same sub-district was able to give the objective as well. Most of the community leaders within other areas, however, were not aware of CBS or its goals. None of the community members (chemical sellers) in any of the sub-districts had knowledge of CBS or its purpose.

One of the volunteers gave the correct definition for all case definitions of the diseases and conditions. The knowledge of the others was more variable. Details of volunteers’ knowledge of the case definitions can be found under Identify of the The Seven Core Functions of IDSR – Community-based Surveillance in Chapter 4.

Sub-district disease control officers had the greatest level of knowledge of the seven functions of IDSR of the health facility and the overall function of surveillance. Clinicians responsible for surveillance were generally knowledgeable of the identify, report, and respond functions. They were less likely to have basic knowledge of the core functions analyze and interpret, investigate, provide feedback, and evaluate and improve the system. Clinicians had difficulty giving the correct case definition of AFP. Evidence of a lack of understanding of how to perform reporting duties was found in three facilities where clinicians were responsible for reporting. In one example, a nurse responsible for extracting data from registers for routine reporting, and a supervisor responsible for overseeing her surveillance reporting activities were unable to describe or agree amongst
themselves which malaria cases were to be extracted from the register for inclusion on
the monthly reporting form (CD2). When asked to reproduce the number of cases
reported to the district for a certain period in the past, they were unable to arrive at the
same number of cases that had been originally reported. A discussion ensued between
them about which cases were reportable and the correct procedure to produce monthly
data. Similar discussions were stimulated during the documents review in the other two
facilities where clinicians were also solely responsible for producing reports.

Although SDHT members possessed basic knowledge of routine precautions to be
taken with all patients, knowledge of standard precautions for attending to febrile patients
was lacking by most informants. All were found to be knowledgeable of the reporting
deadlines.

The following is an account of select training content reportedly received by SDHTs’
within the last twelve months:

a. Use of case definitions: Received by three of five facilities.

b. Safe handling of specimens: Received by two of five facilities.

c. Collection and reporting of data: Received by three of five facilities.

d. Analysis and interpretation of trends: Received by two of five facilities.

e. Use of thresholds for action: Received by one of five facilities.

f. Supervisory skills: Received by one of five facilities

Motivation: Motivation amongst both volunteers and SDHTs to perform duties related to
CBS was found to be low with the exception of the Northern Region sub-district. Some
volunteers remarked that they may be less motivated to perform their duties if not
accompanied by supervisors or colleagues, such as during the collaborative activities that occur during national immunization days. Having something to report (suspected cases) was mentioned as a motivation to make entries in the volunteer register. Other motivations reported by volunteers include a sense of duty to one’s community, the opportunity to learn about healthcare, and the business or employment opportunities that may arise through their participation. As was mentioned above, financial compensation is especially important to volunteers.

The availability of resources to perform surveillance related tasks was the most frequently mentioned factor associated with motivation for health facility KIs. In addition to sharing the volunteers’ interest in helping community members and protecting their families from disease, SDHTs described the ethic of “doing one’s duty” to protect the population as sufficient motivation for performing their surveillance responsibilities. Verbal moral support was the most frequently mentioned form of motivation sought by health system personnel. A number of respondents expressed the desire to receive a simple “thank you” or “pat on the back” from time to time from superiors.

Organizational culture: A strong team-oriented atmosphere amongst GHS personnel was observed across sub-districts. SDHTs appear to have a good working relationship amongst themselves and with the communities that they serve. All of the volunteers reported that they believed that the sub-district health team appreciated their work. Little evidence of relationships or partnerships with non-GHS institutions or other organizations working at the local level that have an impact on IDSR was found.

Some volunteers were observed to be overburdened by the numerous volunteer
initiatives to which they had been assigned. Some were in the possession of a large stack of partially completed volunteer books and registers collected from various trainings. The opposite experience of others was found to be equally as limiting. These volunteers were told that they could not participate in new volunteer initiatives, such as the community health agent (CBA) scheme, due to the fact that they had already been assigned as CBS volunteers.

In rural areas, volunteers who work on farms may leave the village where they serve for up to a month for agricultural activities. Volunteers from all types of communities may be absent during periodic travel for commerce or other reasons.

The experience communities have had with development projects and NGOs can have a significant impact on the success of community level surveillance. Some communities may have become accustomed to collaborating only when a financial benefit is received. The homes in the urban site, for example, would only allow the CBS volunteer to enter if he offered something material or financial in exchange.

One example of an organizational culture limitation was observed during a phone conversation between the region and a sub-district. The morale of the SDHT was reduced by the negative feedback received from the region after the collection of an AFP sample. The satisfaction the SDHT had initially gained from its hard work in procuring two AFP samples according to the standard protocol was quickly stripped away by the talking down it received from the region. When questioned as to why they were being reprimanded, they responded that they had not sent the samples with the “new” cased-
based form. Ironically, they had never received this form from either the district or the region.
CHAPTER 5

Discussion

_CDC attributes: simplicity, flexibility, data quality, acceptability, timeliness, and stability_

The measures corresponding with those described within the _CDC's Updated Guidelines for the Evaluation of Surveillance Systems_ [44] allow for a general assessment of the functioning of the strategy. Evidence demonstrates that the IDSR strategy of Ghana has generally been implemented according to the technical guidelines and is functioning.

With the exception of examples such as the complicated procedure for transporting an AFP sample (Appendix 5) found in one region, the strategy is relatively simple (simplicity). The strategy can described as having flexibility. The training of personnel on new disease/condition categories would most likely require transport and other training-associated costs (meeting venue, meals, per diems). KIs mentioned the necessity of providing “motivation” or financial compensation to help volunteers start reporting on a new category as volunteer activity was low at the time of evaluation. In other words, the addition of new disease categories could be interpreted by communities as re-initiating CBS, a process that would require incentives for the volunteers. This approach may not be reasonable, however, as resources to support the basic activities of CBS were observed to be lacking at the time of evaluation.

Assuming that an error of up to 20% over or underreporting is acceptable, only one facility can be rated as having poor _data quality_ as indicated by the comparison of
malaria cases found within the clinic register and monthly reporting form (underreported by 25%). It is important to point out that the two facilities demonstrating the greatest amount of discordance between the register and reporting forms, 16% and 25% respectively, have clinicians, as opposed to disease control officers, who prepare the reporting forms. Data quality could be improved by assuring that more than one individual is trained on record keeping procedures including clinic registers and reporting forms.

Acceptability by those responsible for the strategy at the health facility level was found to be higher than that of KIs responsible for the community level, whether these individuals were from the GHS or the community itself. The volunteers interviewed, however, all of whom have served in numerous non-CBS health-related volunteer initiatives, describe volunteering in a very positive way. This high level of acceptability should be capitalized upon to implement the community level of the strategy as described within the Technical Guidelines and detect and respond matrix (Table 2).

Monthly reporting can be described as being timely (timeliness) in all but one facility. Districts reported that sub-districts are reporting around the minimum level required (80%). The sub-district health center which was routinely late to report to the district had one public hospital within its jurisdiction which would not send its data by the deadline as the deadline fell before a hospital-wide data review meeting each month. Sub-districts such as this one should be empowered to advocate higher levels to intervene or create policy to address such issues. Performance of timeliness cannot be evaluated without considering completeness, however. KIs had reported that many facilities, likely
smaller peripheral ones, are not reporting regularly. More attention should be given to
the core functions of IDSR within the smaller facilities as these have likely not been the
focus during implementation efforts and could contribute to the detection of cases and
conditions in more remote populations.

Facilities were found to generally have the minimum elements necessary in place
to sustain IDSR and can therefore be described as having stability. Further reductions in
budgets for fuel, photocopies, and cellular telephone credit could serve to reduce the
effectiveness of IDSR, however.

The seven core functions of IDSR – community level

The majority of the IDSR core functions of the community level were not
performing at the minimal level required of the strategy. It is likely that the knowledge
volunteers possess related to a limited number of case definitions and their use is directly
associated with the frequency that certain diseases and conditions have been found in
their area or the level of resources that have been put into the control or elimination of
certain diseases, i.e. Guinea worm, in their district.

It was observed that the strategy is working in areas where the Guinea worm
eradication initiative has provided extra support. This evaluation cannot conclude,
however, that the IDSR strategy of the community level is effective in Guinea worm
focus areas for the detection, investigation and response of the priority diseases beyond
Guinea worm. Additionally, although evidence of an attempt to implement a CBS
volunteer component was found in most of the sampled communities, the strategy for the
community level had not been implemented as described within the Technical Guidelines
Key community members, including chemical sellers, for example, had not been sensitized. The strategy of gaining the participation of "...trained birth attendants, community or village health agents, or similar care providers, village leaders (religious, traditional or political) or school teachers, veterinaries or health extension workers, pharmacists, and traditional healers [21]" to actively identify and report suspected priority diseases had not been realized or attempted in any of the sampled communities. The community-based surveillance methodology has been demonstrated to be effective in developing countries especially in areas where logistics constraints exist [49, 50]. Although the CBS volunteer model may not be realistic for Ghana at this time, an effort to implement the community level of the strategy as described within the Technical Guidelines is warranted.

Communities demonstrated an understanding and commitment to outbreak response. The community members of the urban community were reportedly often reluctant to participate, however. Extra effort on behalf of the GHS may be necessary within this and communities with similar characteristics to provide health messages and garner community participation during outbreak response. Additionally, the chemical seller and other individuals with a stake in the community’s health could be valuable assets for the detection of cases and provision of health communication messages to customers during an outbreak response.

Communities may be more willing to actively identify and report suspected priority diseases, conditions and events when periodically engaged to participate in analyze and interpret activities and provided with routine feedback related to their efforts.
and local epidemiology. Likewise the employment of the evaluate and improve function, including the participation of community, would be beneficial to the sustainability of the community level.

**The seven core functions – health facility level**

The seven core functions of the level of the health facility, although varying greatly across the sampled sub-districts, can be said to be performing at the minimum required of the strategy. Improvements targeting a number of weaker performing aspects of the strategy could help to bring the strategy to the level of performance desired of the GHS.

The records review provided evidence that not all eligible cases are being correctly identified. This phenomenon may be partly explained by the clinicians' level of knowledge of the case definitions. A number of health facility level KIs were not able to give the correct case definition of AFP, for example. This lack of knowledge may be associated with the absence of standard case definitions within facilities and inadequate training. Additionally, further investigation may demonstrate that facilities are more likely to identify and report diseases and conditions which have been given more attention by the GHS or ones that have appeared in their jurisdiction previously. Those which people have less knowledge of or exposure to may be missed and therefore underreported. The difference in performance of the identify functions found within sub-districts and facilities where clinicians were responsible for surveillance compared to those where a sub-district disease control officer was posted deserves further consideration. An outbreak of cholera (2011) in a sub-district where clinicians were
responsible for the strategy most likely only came to the attention of health officials when infected individuals starting arriving at a district health center located in a neighboring sub-district. Neither of the facilities in the sub-district had identified or reported any cholera until the district launched an investigation. It is difficult to speculate how widespread this phenomenon is throughout the country, however. It would be useful to survey districts in which outbreaks have occurred to determine how effective the sub-district level was in identifying and investigating cases early in the epidemic. The identify and report functions in sub-districts which have a disease control officers responsible for surveillance could likely benefit from closer scrutiny as well. This assumption is supported by the example of sub-district district disease control officer responsible for a population of over ten thousand people who had not reported any suspected cases of immediately reportable priority diseases in all of 2011.

Empirical evidence allows for deeper understanding of the level of discordance between that which is recorded in the clinic register and reported to the district level. A similar level of error related to data extraction from clinic registers was found by both the present evaluation and a similar evaluation conducted approximately six years earlier. The PHRPlus report (2006) found that reporting forms reflected that which was recorded in facility registers 86% of the time in the three northern regions [17]. Similarly, none of the monthly forms reviewed by the evaluation accurately reflected the number of malaria cases found in clinic registers. The number of cases found in registers ranged from 86 - 133% of that which was recorded on reporting forms. This observed over and under reporting could be due to factors related to errors made when data are taken from the
register or during subsequent steps in the reporting procedure.

The additional step in the reporting procedure observed in some facilities could have an effect on data quality. Whereas some facilities were found to extract data directly from registers to complete the CD2 forms, others were found to be completing an epidemiologic reporting sheet including the aggregate of cases and deaths from which reporting forms were then completed. In two facilities where such forms were found it was observed that not all of the disease classifications or names corresponded with those described within the Technical Guidelines or the Standard Case Definitions for 23 Priority Diseases. The discordance between the local classification of "dysentery" and the classification listed on official reporting forms, "diarrhea with blood (shigella)", may be responsible for the observed failure of some facilities to report this condition. The national standardization of reporting procedures and all facility level forms, especially the epidemiologic reporting sheet in question, may help to eliminate discordance between registers and reporting forms and improve reporting in general.

Additional evaluation may find that the practice of not requiring all facilities to submit weekly, monthly and quarterly reporting forms or keep a log may serve to reduce the performance of active surveillance within facilities. Similarly, not providing facilities with feedback on negative laboratory results may serve to decrease the perceived importance of actively looking for and reporting priority diseases. Regardless of the type of position responsible for surveillance and response, the facility level would benefit from sustainable access to the standard case definitions, standardized terminology for use in registers, standardized epidemiologic sheets, and reporting forms, and accountability.
and incentives for identifying priority diseases and conditions. It may be noteworthy to mention that some countries in the region provide reimbursement for the transportation and expenses incurred by health facility personnel from throughout the country who deliver samples to the national laboratory. This reimbursement may serve as a strong incentive for health workers to routinely carry out the identify, report, and investigate functions. A similar type or reporting incentive is not available to clinicians in Ghana.

The PHRPlus report (2006) found that 78% of facilities had performed any analysis of an IDSR disease and 70% of these analyses were current at the time of evaluation in 2005. Seventy percent had performed analysis for malaria. Less had performed analysis for measles, meningitis and Guinea worm [17]. Two of the five (40%) facilities evaluated by this study in 2011 were able to demonstrate any evidence of analyze and interpret procedures. The methodology and materials for the facility level described within the PHRPlus report (2006) can serve as a valuable resource to introduce the core function of analyze and interpret to facilities where it is not yet performing.

Curiously few accounts and even less documentation of investigation are available at the sub-district level related to the collection and laboratory testing of suspected cases of priority diseases. Although evidence of investigation was provided, the facilities are highly dependent upon the districts to initiate and perform related tasks. Clinicians who are given more responsibility for surveillance and response procedures and made accountable for performance may become empowered to take on ownership of the seven functions of IDSR within their respective facilities. Additionally, the provision of materials for sample collection and training on the collection and processing of
laboratory samples may serve to encourage more active identification and reporting of priority diseases.

Although facilities provided accounts of epidemic response, sub-districts are likely to be very dependent upon districts for the initiation of response activities. Sub-districts, for example, provided very few examples of when the higher levels had been advocated for response materials. Outbreak committees may only be motivated to meet when the GHS asks them to discuss an ongoing outbreak response. Committees would likely meet more regularly if the GHS requested periodic meetings. Consideration of one respondent’s remark that stand alone outbreak committees may be more productive than those which are also the general health committees is warranted. Perhaps response would take place earlier in an epidemic if facilities were given the responsibility to take a more active role in detecting outbreaks and planning response activities with committees before outbreaks occur.

*Feedback* from health facilities to communities rarely occurs. In the rare instances when it does occur, it is most likely to be in form of positive laboratory results during an outbreak investigation. Although SDHTs report that some prevalence data is provided at quarterly durbars, volunteer trainings, and child health clinics, no solid examples of the content provided during these meetings were provided. Community members, on the other hand, generally did not have any memory of receiving data specific to their village, town, or neighborhood. A policy of regularly sharing routine, case-based, and laboratory (positive or negative) data could serve to motivate communities to contribute to surveillance activities.
Facilities have little or no understanding of evaluation and improvement procedures. Sub-district level respondents report that the higher levels have not encouraged evaluation. Some simple guidelines for the sub-district level describing how and when to conduct evaluation is called for. Encouragement from higher levels to conduct and participate in evaluation could be also be beneficial.

**Determinants of performance: technical, workforce/organizational, and workforce performance**

The determinants of performance described by Abt Associates consist of three essential areas that must be satisfied to achieve IDSR performance. Of these, the technical determinants were found to be very adequate. Aspects of the remaining two, workforce/organizational and workforce performance, were found to be either lacking or missing. The most important observation related to the technical determinants was the fact that many of the valuable materials developed for the IDSR strategy of Ghana during the early implementation phase as described within the PHRPlus report (2006) were not mentioned by any of the informants from the national through the community levels or observed during reviews of records within facilities. A review by the NSU of these valuable materials described within the report is warranted.

Some of the essential workforce/organizational determinants were found to be in place. Only those found to be lacking or in need of improvement are mentioned here. The management capacity was found to be adequate but in need of improvement. Observations made during site visits led the researcher to believe that ample human resources were available at the time of the evaluation for the management of IDSR of the
health facility level. Unlike some other countries in the AFRO region which give the responsibility of health facility IDSR management exclusively to clinicians, Ghana's strategy has the additional position of sub-district disease control officer. This model has been relatively successful - IDSR is performing in the sampled sub-districts where disease control officers are posted. This model, however, may be responsible for the observed lower quality IDSR in some sub-districts. In addition to lacking a competent disease control officer, sub-districts "waiting" for the position to be filled were found to have a passive approach towards surveillance and response. This phenomenon may be related to a lack of accountability required from the district level in such instances and the expectation by facilities that districts will perform most functions of IDSR until a sub-district disease control officer is hired. Health facilities may even be less knowledgeable of and empowered to carry out the seven core functions of IDSR than their counterparts in countries where the sub-district disease control officer model is not part of the national strategy and clinicians have more of a stake in IDSR.

Policies designed and strictly enforced by higher levels without consideration of the unique characteristics of districts and sub-districts may lead to less optimal processes and procedures at the level of the health facility. The flow chart for the collection and transport of one case of AFP found in Appendix 5 provides an example of how the regional policy that does not allow for flexibility regarding geographic and other differences amongst sub-districts can complicate the transport of specimens and create unnecessary expenditure of time and resources. In this particular example, a sub-district disease control officer who has been notified by a volunteer or CHPS unit makes a visit
to the home of the suspected case by motorcycle (up to 3 hours round-trip) to procure the first sample. The trip is repeated by the sub-district disease control officer within 24 hours to prepare a second sample. A two hour one-way trip to transport the sample to the district is made on a rough unpaved road which has reportedly compromised the quality of samples in the past. Pending the availability of a district vehicle, the district disease control officer takes responsibility for transporting the sample to the regional office. This trip also entails a couple of hours of driving over a road that is mostly unpaved and difficult to pass during the rainy season. Upon receiving the sample, the regional office takes on the responsibility of transporting the sample to the Noguchi Laboratory located within the University of Ghana, Legon outside of the capital city Accra. The sub-district health facility that had originally packaged the sample is passed on the way. Thus, a two hour trip from the sub-district health center to the laboratory has been made into one that takes unreasonably more time, possibly a number of days, and resources. Additional factors including seasonal variability of road conditions and the availability of vehicles and personnel could lengthen the time to complete this procedure. Taking into account the numerous accounts of informants at all levels of the strategy expressing a lack of vehicles, fuel, and money, this procedure for transporting a specimen is unreasonable.

The most noteworthy observation made related to access to resources concerns the disappearance of the tools developed during the implementation stage of IDSR and the lack of essential tools expected to be found in all facilities, most notably the Standard Case Definitions. The PHRPlus evaluation conducted in 2005 in the three northern regions provides data with which select findings related to the availability of documents
and other technical materials can be compared. Please note that PHRPlus evaluation and this study only share one region in common (Northern Region) (Table 8) [17]. Some of the missing materials may not have been distributed widely or even implemented at all by the national level. Others may have been used during the last decade but have since disappeared or forgotten. Although most regional level disease officers did not share the opinion, one explicitly stated that no resources for surveillance were lacking at the sub-district level. This statement, at least in this case, may indicate some level of discordance between the needs of the sub-district level and the knowledge or perception of the regional level.

Table 8. The availability of documents within health facilities: A comparison with the findings of PHRPlus (2005)

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Standard Case Definitions for 23 Priority Diseases for Integrated Disease Surveillance and Response (I.D.S.R.), May 2002</td>
<td>80%</td>
<td>0%</td>
</tr>
<tr>
<td>Facility level IDS R handbooks</td>
<td>60%</td>
<td>0%</td>
</tr>
<tr>
<td>Log book of rumors and investigations</td>
<td>50%</td>
<td>0%</td>
</tr>
<tr>
<td>Community-based surveillance summary forms</td>
<td>65%</td>
<td>20%</td>
</tr>
<tr>
<td>Generic case-based forms</td>
<td>75%</td>
<td>100%</td>
</tr>
<tr>
<td>Weekly reporting forms</td>
<td>100%</td>
<td>100%</td>
</tr>
<tr>
<td>Monthly reporting forms</td>
<td>98%</td>
<td>100%</td>
</tr>
</tbody>
</table>

The materials, lessons learned, and techniques employed during the implementation of IDSR within three northern regions beginning almost a decade ago could be helpful as Ghana implements its updated Technical Guidelines nationally. A
close examination of the PHRPlus report (2006) may be beneficial to both national and
regional officials responsible for IDSR as it likely possesses some of the much needed
solutions to the “gaps” mentioned often by those responsible for the strategy. The
“bottom up” approach described within this report beginning at the facility level may be
especially relevant considering the evaluation findings. The materials developed for
training facility level personnel in the three northern regions referred to as the Facility
Level IDSR Training Package included a pre- and post-test and evaluation, post
workshop assignment, facilitators guide, participant’s guide, and a handbook for IDSR at
the facility level. Job aids were also described that provided facility personnel with quick
reference and visual reminders and reinforcement of roles as well as the responsibilities
and skills required of IDSR [17].

A reduction or elimination of incentives formally provided to volunteers was
found to have had a profound impact on the performance of CBS. Volunteers who have
served and/or who were currently serving in various volunteer capacities at the time of
the study, including vaccinators during immunization campaigns, health educators and
other health related volunteer roles, are usually also the person chosen to serve as the
CBS volunteer. The inclusion of volunteers in each new (non-CBS) volunteer
opportunity has served as one of the strongest incentives for CBS volunteers. The
exclusion of CBS volunteers from new initiatives can have an equally strong impact on
the long established relationship between the GHS and volunteers, however. CBS
volunteers who are not invited to participate in non-CBS volunteer trainings, such as
those recently held by the BCS initiative, can be made to feel alienated. Similarly, the
provision of bicycles by a new initiative that excludes the CBS volunteer has been reported as a disincentive. One sub-district, where volunteers outnumber the number of volunteer opportunities (CBS and non-CBS), has addressed this issue by rotating volunteers through trainings and new opportunities.

KIs of the sub-district level were able to provide very few examples of when they advocated higher levels for needs associated with priority disease detection or response. Similarly, no examples of participation in evaluation activities were reported. These and other findings support the assumption that a top-down hierarchical IDSR structure in Ghana affords actors of the sub-district level with little opportunity to influence how IDSR is managed or make suggestions for improvement. Referring to the health system in Africa, Imhoff and Mathauer (2006) suggest that the institutionalization of the participation of health workers through the creation of opportunities for personnel to share ideas and suggestions for improvements and participation in decision-making on issues that concern their work and immediate work environment can create non-financial incentives [51]. Implementing such a policy in Ghana may serve as an economic solution to a number of the “gaps” of the sub-district level.

Some difference was found between the description of the role of the sub-district disease control officer by the district level and that which was observed within sub-districts. Of even greater concern is the finding that clinicians were unaware of their responsibilities within the strategy. Perry, et al. report how Tanzania took steps to assure that each of the activities or tasks listed under the IDSR core functions had a “champion”. The detect and respond matrix was used to create the job descriptions for those charged
with carrying out IDSR activities [52]. It is likely that both health facility and community level of Ghana would benefit from the establishment of well-defined supervisory roles at the district and sub-district levels. Job descriptions of all actors involved in IDSR, including community members and clinicians, could be helpful in creating accountability and a greater awareness amongst staff of their role and responsibility within the IDSR strategy.

Some informants had expressed that certain SDHT members who had been sent to district level trainings may not be the most appropriate position to receive surveillance related training. Perhaps individuals are chosen to attend trainings for the benefit of the per diem rather than the best fit technically. When this occurs it is less likely that these individuals will properly distribute the information they had received when they return to the facility.

Biostatisticians working in larger sub-district health centers may have the potential to take on many surveillance data related tasks. This position and its potential for providing manpower to the strategy may be of interest to the country as Ghana increases the number of priority diseases, conditions and events and responsibly of actors within the SDHT with the release of the second edition of the Technical Guidelines.

Some KIs reported that the volunteers had not been chosen by the community itself but rather the GHS. Individuals with personal connections to the GHS personnel may not be trusted by community members or concerned for the welfare of others. It is imperative that the community has a say in who represents them.
Responsibility and accountability within the IDSR infrastructure was found to be very variable. In at least one district there was some reported discrepancy related to whether the district or the sub-district had the responsibility of providing laboratory results to health facilities and communities. It has been reported that physicians may be reluctant to take on the task of reporting priority disease conditions to disease control officers because they are located lower than themselves within the medical hierarchy. Therefore, physicians may benefit from some additional sensitization related to their surveillance and response-related responsibilities.

The following describes some areas where the workforce performance determinants can be improved. The low knowledge level of the CBS volunteers is not surprising considering the time that has lapsed since training was last provided to most. Some had reportedly not received training related to surveillance in approximately ten years. Lower knowledge and surveillance and response related performance of clinicians might be linked to the expectation of clinicians and district teams alike that sub-district disease control officers will one day be placed in each sub-district. Thus, there appears to be little urgency to prepare clinicians to take on responsibility of the seven core functions. The fact that clinicians in all facilities sampled reported receiving some training related to surveillance is significant, however. Abt Associates reported in the PHRPlus report (2006) that high employee turnover was most likely responsible for the finding that only 25% of facilities in the three northern regions had personnel who had received training despite the extensive efforts undertaken in the region. The 100% training rate found by this evaluation (2011) may be deceiving, however. Although
personnel in each of the five facilities sampled reported having received training specific to surveillance, they were not likely to have received knowledge of all of the basic skills necessary for carrying out surveillance [17]. No evidence was found to suggest that the detect and respond matrix is being used to guide the training of health facility personnel (Tables 2 and 3).

Some of the facility personnel interviewed had only recently been employed. Similar to the phenomenon observed by Abt Associates in 2005, those who may have benefited from training on a specific function or procedure of IDSR may have since left the facility. Sending select clinicians to the district for training may not be efficient or effective. It may be much more productive and cost effective to train clinicians at the facility where they will employ the practices learned on a day-to-day basis. This practice may help to assure that procedures remain in place when health workers move on. The PHRPlus report (2006) suggests the provision of “supportive, on-the-job training and reinforcement of skills” within facilities as a component of supervision provided by higher levels [17]. Ideally the district or sub-district would visit the facilities within its jurisdiction, evaluate the performance of the seven core functions, train the clinicians or sub-district health officer to perform all tasks and then return periodically to reinforce the improvements made and training provided.

Motivation amongst actors appeared to be less frequent in sub-districts where the district provides less instruction specific to the routine tasks of surveillance (seven core functions), requires less accountability, and provides less encouragement or leadership.
The urbanizing sub-district

It is important to note the possible effect that rapid urbanization may have on the function of surveillance in formerly rural areas that are or will be urbanizing as populations descend upon the peripheries of large cities. The investment in surveillance has not kept pace with development of one sampled sub-district where the population has greatly increased over the last decade transforming a number of small farming villages into a suburban community of tens of thousands. Evidence points to the fact that this sub-district is ill prepared for public health threats that may be associated with rapid population growth and recent urbanization. These include a cholera death in a house across the street from a GHS facility during the 2011 outbreak, the disintegration of the CBS volunteer initiative, the non-use of the CD1 form, the lack of knowledge or interest in surveillance by at least one official responsible at the district level, no appointment of a sub-district disease control officer, and no knowledge of the use of data for the purpose of analysis and interpretation by any of the SDHT members. Limited resources and competing initiatives at the district level may have resulted in a lack of attention to the majority of the seven core functions observed within this particular sub-district.

The urbanizing sub-district should be a priority for any effort to scale-up IDS in Ghana. Additional research may find that the populations within these newly urbanizing areas may be of lower socio-economic status, be less educated, have less access to quality healthcare and public sanitation, and have unmet nutritional needs. The urban poor have been found to suffer from both the non-communicable diseases found within more affluent urban populations and the communicable diseases traditionally found in rural
areas [53]. Further investigation may determine that sub-districts around the country similar to the one described above and the districts in which they lie may be less prepared to quickly identify and respond to traditional and emerging treats that may accompany population growth and a surge towards the peripheries of large metropolitan areas. The warnings of the consequences of urbanization in the developing world in 21st century [54] are very applicable to disease surveillance and response. Considering the need to respond to such changes, Moore, et al. (2003) specifically call for policy that addresses the demonstrated need for systematic and useful urban health statistics [55]. The GHS should make special consideration of the important variable of urbanization when considering where to target limited IDSR resources.

The potential of the pharmacy

It is evident that many people in the evaluation communities were seeking first line care from pharmacies for one reason or another. It is likely that the only cases reported by pharmacies to the sub-district or nearest facility are those that the “chemical seller” feels he or she cannot “treat”. Thus, diseases and conditions are only passively reported when an individual moves on to a facility to seek treatment that could not be offered at the pharmacy. The potential contribution of the pharmacy to the identify and report functions could be enormous. Pharmacy surveillance and the employment of the pharmacist as a detection method have proven to be successful. A community blood pressure surveillance feasibility study conducted by Earle, et al. (2001), for example, found that a large proportion of patients with poor blood pressure control were detected by a pharmacist-led hypertension monitoring service [56]. Investment in the
sensitization of “chemical sellers”, in addition to other key community members with access to those seeking healthcare outside of the GHS system, is warranted.

**An urgent need for supervision**

The importance of supervision and follow-up for the maintenance and improvement of IDSR described within the PHRPlus report (2006) continues to be a relevant consideration especially in the wake of the availability of the updated *Technical Guidelines* for Ghana. The barriers to good supervision expressed by key informants or observed by the researcher provide a starting point from which improvement can be made. Supervision that includes the evaluation of reporting practices, clinicians' knowledge of the seven core functions, and the minimum processes required by each facility and sub-district to maintain the seven core functions could be very valuable. The strategy would equally benefit from uniform training on how to perform supervision and evaluation including the distribution of a supervisory checklist. Perry, et al. describe the use of the IDSR matrix of skills and activities in Tanzania to specify accountability for each function at each level of the health system [52]. The health facility and community levels of the matrix provide an excellent supervision tool for both districts and sub-districts (Tables 2 and 3).

Community-based surveillance may benefit from an effort by the GHS to assure that CHPS are playing their role in the implementation and management of surveillance and response activities within the communities they serve. The location of CHPS within communities provides the opportunity for frequent interaction between health workers and community members which may not be available to SDHTs located in more
centralized health centers. CHPS provides an excellent opportunity for the sensitization and supervision of community members as described with the Technical Guidelines, (i.e., TBAs, school teachers, etc.).

**Recommendations for the improvement of IDS R at the sub-district level**

The following recommendations are organized under the two levels of IDS R that have been evaluated: community and health facility. Please note that recommendations are not listed in order of priority or importance. Recommendations by informants for the improvement of the strategy of the community and health facility levels can be found in Appendix 6.

**Community level**

- The CBS volunteer position should be eliminated. All community health volunteers/agents (i.e. CBA and volunteer vaccinators) should be sensitized to *identify and report* and provided with regular supervision related to surveillance and response.
- Create a national coordinator of community level surveillance and response.
- Districts that have not done so already should appoint one surveillance focal person responsible for the provision of leadership to community level surveillance.
- Community level surveillance should be implemented as it is described within the *Technical Guidelines* (2002). Trained birth attendants, community or village health agents, or similar care providers, village leaders, school teachers, veterinaries or health extension workers, pharmacists (chemical sellers), and traditional healers and others should be sensitized and periodically visited by SDHT personnel who will reinforce their capacity to *identify and report* and provide motivation.
• SDHTs should be held accountable for the performance of community level surveillance within their jurisdictions.

• Sensitize NGOs and other organizations working at the community level to promote and support community level surveillance by integrating IDSR into all health related initiatives.

• Unusual events should be listed and explained clearly amongst the community level priority diseases listed in communication materials.

• Create or modify job descriptions for all positions with tasks related to IDSR of the community level (GHS and volunteer) to reflect the content of the detect and respond matrix (Tables 2 and 3).

• CHPS should be provided with materials and regular supervision to assure that they are fulfilling their role in the development and sustainability of community-based surveillance.

Health facility level

• Require all facilities to submit data collection forms (CD1, CD2, quarterly, line-listing, and case-based). A reporting log in place of the CD1 can be kept by smaller “zero reporting” facilities.

• Standardize a national facility level epidemiologic reporting sheet which corresponds with the standard case definitions found within the Technical Guidelines.

• Implement disease control officer and clinician training within the trainee’s home facility.
• Assure that two (ideally three) people are able to perform the duties associated with the seven core functions in each facility starting with the proper use of case definitions to identify and register entries upward.

• Make a checklist of all materials required of a health facility to carry out the seven core functions, including documents, forms, posters, investigation and response materials etc., to facilities. Facilities can use this list to monitor supplies and materials and make requests, photocopies, or budgets accordingly.

• Facilities should have at least two modes of communication, i.e. radio and cellular telephone.

• Sub-districts should be provided with health facility surveillance M&E guidelines and given encouragement and instruction to conduct periodic M&E activities.

• The NSU should review the policy and practices for detection and investigation targets for each priority disease (i.e. AFP rate) and evaluate if measures are being taken to meet these goals at the local level.

• Laboratory results should be given to the health facilities and all other levels regardless of the result (positive or negative.)

• Post all IDSR guidelines, training materials, reports and background information, reporting forms, PPS slides, and all other available information on a website. Provide all clinicians, disease control officers and others involved in the management of surveillance activities with the web link. New or updated documents would be posted as they become available. This is intended to supplement hard copy distribution by districts.
- Film and distribute surveillance related training sessions for clinicians and sub-district disease control officers. DVDs, MP4 files and online videos (i.e. YouTube) could be made available to sub-districts and facilities as learning tools.
- Produce and distribute IDSR supervision guidelines for the district and sub-district levels based on the detect and respond matrix for the health facility and community levels (Tables 2 and 3).
- Create or modify existing job descriptions for all positions, including clinicians, with tasks related to IDSR at the facility level to reflect the content of the detect and respond matrix (Tables 2 and 3).
- Plan for the increased demands on IDSR that accompany growing populations and urbanization.

**Conclusions**

The IDSR strategy of Ghana, one of the earliest and best documented in sub-Saharan Africa, has benefited greatly from the assistance of donor organizations and international technical assistance. The Public Health Division of the GHS believes that the strategy is working well with the exception of “gaps” which have been described as existing at the level of the sub-district, the health facility and community levels of IDSR. The evaluation of the community and health facility levels of IDSR in three regions of Ghana provides evidence that surveillance and response is functioning but has not been fully implemented.
In a time when addressing the threat of emerging diseases and the consequences associated with globalization has become increasingly more pressing for the public health community, the community level of the IDSR strategy can be considered integral to our capacity to protect populations through timely detection and response activities. The additional programming and resources associated with the Guinea worm eradication initiative, which relies on the CBS volunteer, have helped to sustain community level surveillance and response in the Northern Region. The community level was not found to be functioning, however, in the three communities evaluated within the Eastern and Greater Accra Regions where similar support had not been provided. Resource and other limitations make the CBS volunteer an unrealistic approach to community level IDSR nationally. Additionally, the recommendations for community level IDSR provided within the Technical Guidelines of Ghana (2002) have generally not been followed.

The establishment of clear roles and accountability at each level of the infrastructure for tasks related to the management of the strategy at the community level are necessary for sustainability in the long term. The Technical Guidelines provide an excellent approach to the strategy of the community level especially considering resource limitations. Sensitization of key individuals of the community level described within the Technical Guidelines, “…trained birth attendants, community or village health agents, or similar care providers, village leaders (religious, traditional or political) or school teachers, veterinaries or health extension workers, pharmacists, and traditional healers”, to perform the essential identify and report functions is a logical first step. Strengthening
of district level leadership associated with community level implementation is also essential. The detect and response matrix should be focused upon as it provides an excellent tool for planning the essential roles and responsibilities of the community level.

The strategy was found to be functioning within the health facilities sampled. Of the seven core functions, respond was found to be the strongest. Although some variability was observed across the facilities sampled, identify, report, and feedback were found to be functioning at a minimum level in most. As expected, these functions were stronger where a disease control officer was present. In sub-districts where clinicians are solely responsible for surveillance, facilities rely upon the district to conduct many of the activities related to the seven core functions. These facilities are entirely dependent upon the district to perform the investigate function, for example. Analyze and interpret and evaluate and improve were not found to be functioning in most facilities regardless of the position responsible.

Further analysis may find that non-disease control officer sub-districts may be less functional than their equivalents in AFRO countries where clinicians are exclusively responsible for surveillance and response. The GHS might consider diverting resources used to transport and train clinicians at large workshops to the installation of more sub-district level disease control officers and the training of clinicians within their home facility. Training of clinicians locally could result in higher content retention, the immediate implementation of processes tailored to each unique facility, and increased ownership of and responsibility for the seven core functions. Additionally, the provision of incentives for clinicians to investigate suspected cases of priority diseases may prove
to increase case detection.

The evaluation found that many of the numerous, high-quality technical materials created for Ghana were absent within facilities or other levels. A number of these can be found within the PHRPlus report (2006). All essential technical materials should be made available to health facilities immediately. The Standard Case Definitions rest at the top of this list.

The high population density urban sub-metro poses unique challenges not encountered within other sub-districts. Whereas a small group of community leaders demonstrated interest in the health of the community and working with the SDHT, the general population is disinterested and demands compensation for any participation in community activities. The community sampled has reportedly lost interest in participation in initiatives such as community surveillance and response as a result of fatigue associated with exposure to numerous non-governmental and GHS initiatives as well as other social factors. Additional effort on the part of the GHS and SDHTs may be needed to recognize the unique needs of the urban neighborhood and develop creative solutions.

Consideration of the ever-changing environment in which IDSR must be sustained is of great importance. Multiethnic urbanizing areas that may have previously been characterized as rural areas or smaller towns comprised generally of one ethnic group are developing on the periphery of large cities. Districts will have to adapt to meet the objectives of the strategy as the demographics of these populations change reflecting the influx of people coming from different parts of the country in an effort to find
economic opportunities.

A decline in resources dedicated to IDSR within the last two or three years in the sub-districts evaluated may be somewhat responsible for the lack of leadership and accountability demonstrated by some responsible for the performance of surveillance and response within health facilities and communities. A focus on non-financial resources or intellectual solutions is especially important presently as resources are not likely to become more readily available in the near future. Strong leadership from the higher levels of the health system with a focus on the distribution of high quality detailed guidelines and instructional materials based on the seven core functions and the detect and respond matrix are needed. These improvements coupled with measures to assure accountability, the provision of “in-house” training within facilities, and supervision designed to support the goals of training and processes created within each unique facility may be amongst the solutions to filling in the “gaps”.

As an early implementer of IDSR that benefited from a great deal of assistance from donors, Ghana is positioned to be a leader in IDSR within sub-Saharan Africa. The *PHRPlus* report (2006) describes a model strategy with an extensive number of tools and materials created for the provision of training, management and sustainability of IDSR at the level of the sub-district [17]. The updated *Technical Guidelines* (2011) for Ghana may be best implemented by revisiting the methodology and materials developed for the three northern regions of Ghana a decade ago. A special focus on the “bottom up” approach should be considered.
Appendices

Appendix 1. Specific objectives of Integrated Disease Surveillance and Response (IDSR) for the African region

1) Strengthen the capacity of countries to conduct effective surveillance activities: train personnel at all levels; develop and carry out plans of action; and advocate and mobilize resources.

2) Integrate multiple surveillance systems so that forms, personnel and resources can be used more efficiently.

3) Improve the use of information to detect changes in time in order to conduct a rapid response to suspect epidemics and outbreaks; monitor the impact of interventions: for example, declining incidence, spread, case fatality, and to facilitate evidence-based response to public health events; health policy design; planning; and management.

4) Improve the flow of surveillance information between and within levels of the health system.

5) Strengthen laboratory capacity and involvement in confirmation of pathogens and monitoring of drug sensitivity.

6) Increase involvement of clinicians in the surveillance system.

7) Emphasize community participation in detection and response to public health problems including event-based surveillance and response in line with IHR.

8) Trigger epidemiological investigations in detection, investigation and reporting of public health problems, and in the implementation of effective public health interventions.
Appendix 2. Priority diseases, conditions and events for Integrated Disease Surveillance and Response - 2010

<table>
<thead>
<tr>
<th>Epidemic prone diseases</th>
<th>Diseases targeted for eradication or elimination</th>
<th>Other major diseases, events or conditions of public health importance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acute haemorrhagic fever syndrome*</td>
<td>Buruli ulcer</td>
<td>Acute viral hepatitis</td>
</tr>
<tr>
<td>Anthrax</td>
<td>Dracunculiasis</td>
<td>Adverse events following immunization (AEFI)</td>
</tr>
<tr>
<td>Chikungunya</td>
<td>Leprosy</td>
<td>Diabetes mellitus</td>
</tr>
<tr>
<td>Cholera</td>
<td>Lymphatic filariasis</td>
<td>Diarrhoea with dehydration</td>
</tr>
<tr>
<td>Dengue</td>
<td>Neonatal tetanus</td>
<td>less than 5 years of age</td>
</tr>
<tr>
<td>Diarrhoea with blood (Shigella)</td>
<td>Noma</td>
<td>HIV/AIDS (new cases)</td>
</tr>
<tr>
<td>Measles</td>
<td>Onchocerciasis</td>
<td>Hypertension</td>
</tr>
<tr>
<td>Meningococcal meningitis</td>
<td>Poliomyelitis1</td>
<td>Injuries (Road traffic Accidents)</td>
</tr>
<tr>
<td>Plague</td>
<td>1Disease specified by IHR (2005) for immediate notification</td>
<td></td>
</tr>
<tr>
<td>SARS*</td>
<td></td>
<td>Malaria</td>
</tr>
<tr>
<td>Typhoid fever</td>
<td></td>
<td>Malnutrition in children under 5 years of age</td>
</tr>
<tr>
<td>Yellow fever</td>
<td></td>
<td>Maternal deaths</td>
</tr>
</tbody>
</table>
*Ebola, Marburg, Rift Valley, Lassa, Crimean Congo, West Nile Fever |
**National programmes may wish to add Influenza-like illnesses to their priority disease list |

Diseases or events of international concern

| Human influenza due to a new subtype1 | SARS1 |
| Smallpox1 | Any public health event of international or national concern (infectious, zoonotic, food borne, chemical, radio nuclear, or due to unknown condition. |
| 1Disease specified by IHR (2005) for immediate notification |

Appendix 3. Case definitions for community surveillance as described in the Technical Guidelines for Integrated Disease Surveillance and Response in Ghana, 2002 [21].

Epidemic-prone diseases

Cholera: Any person 5 years of age or more with lots of watery diarrhoea and sometimes vomiting profusely as well. In case of cholera outbreak anybody who passes watery/loose stool.

Diarrhoea with blood: Any person who has passed 3 or more watery stool containing blood in the past day.

Measles: Any person with fever and rash.

Meningitis: Any person with fever and neck stiffness.

Viral haemorrhagic fevers: Any person who has an unexplained illness with fever and bleeding or who died after an unexplained severe illness with fever and bleeding.

Yellow fever: Any person with fever and yellow discoloration of the eyes.

Diseases targeted for eradication

Acute flaccid paralysis (poliomyelitis): Any person who develops sudden weakness in the limbs.

Dracunculiasis (guinea worm): Any person with worms emerging from any part of the body.

Diseases targeted for elimination

Leprosy: Any person with skin patch of a lighter colour with diminished or loss of sensation.

Neonatal tetanus: Any newborn who is normal at birth and then, after 2 days, becomes unable to suck or feed.
Lymphatic filariasis: In an endemic area, any person who suffers from any of the following:

- Repeated attacks of fever with painful swellings in the groin, testes, leg, breast or vulval area.
- Swollen legs (elephantiasis).
- Swollen scrotum (hydrocoele).

Diseases of special public health focus

Severe malaria: Any person who has an illness with high fever and a danger sign (Danger signs are severe pallor, lethargy, unconsciousness, confusion, sleeping all the time, yellowing of the eyes, passing dark or coca-cola urine, vomits everything, convulsions, inability to sit or stand and, in children less than 5 years, inability to drink or breastfeed).

Tuberculosis: Any person with cough for 3 weeks or more.

Other diseases of public health importance

Buruli ulcer: Any person who develops a firm, painless, often itchy swelling or an extensive swelling with/without colour change over the affected skin in a place where a lot of residents suffer from big sores with undermined edges and “dirty cotton wool-like” centre on different parts of the body in endemic areas.

Diarrhoea in children less than 5 years of age: Any child that has passed 3 or more watery stools within the past day.

Viral hepatitis: Any person with fever and yellow discoloration of the eyes.
Pneumonia in children less than 5 years of age: Any child less than 5 years of age with cough and fast breathing or difficulty breathing.

Onchocerciasis: Skin rash and nodules.

Urinary schistosomiasis: Any person passing blood during or after urination.

Trachoma: Any person with repeated discharge and redness of the eyes or the in-turning of the eyelids or the eyelashes rubbing on the eyes.

Yaws: Any person with small swellings on the skin looking like a boil which when peeled off, results in bleeding of the area instead of discharge of pus.

Note that the priority diseases for community-based surveillance includes all of the diseases reported within Ghana (23 priority diseases) less HIV and sexually transmitted infections (STIs) [40].
Appendix 4. Case definitions for identification and reporting of priority diseases or conditions

Epidemic-prone diseases

**Cholera:** Any person 5 years of age or more who develops severe dehydration or dies from acute watery diarrhoea (rice-water stools).

**Diarrhoea with blood:** Any person with diarrhoea (passage of 3 or more watery or loose stools within the past 24 hours) and visible blood in the stool.

**Measles:** Any person with fever and maculopapular (non-vesicular) generalized rash and cough, coryza or conjunctivitis (red eyes) or any person in whom a clinician suspects measles.

**Meningitis:** Any person with sudden onset of fever (>38.5°C rectal or >38.0°C axillary) and one of the following signs: neck stiffness, altered consciousness or other meningeal signs.

**Viral haemorrhagic fevers:** Any person with severe illness, fever and at least one of the following signs: bloody stools, vomiting blood or unexplained bleeding from gums, nose, vagina, skin or eyes.

**Yellow fever:** Any person with sudden onset of high fever (>39°C), followed by jaundice within two weeks of onset of first symptoms.

Diseases targeted for eradication

**Acute flaccid paralysis (poliomyelitis):** Any child less than 15 years of age with sudden (within three days) onset of flaccid paralysis or a person of any age in whom the clinician suspects polio.
Dracunculiasis (Guinea worm disease): Any person with a history of skin lesion and emergence of Guinea worm within one year of the skin lesion.

Diseases targeted for elimination

Leprosy: Any person with one or more of three cardinal signs of leprosy:
- Hypopigmented or reddish skin lesion.
- Loss or decrease of sensations in skin patch.
- Enlargement of peripheral nerve with or without bacteriological diagnostic confirmation and requiring chemotherapy (excluding patients released from treatment).

Neonatal tetanus: Any newborn with a normal ability to suck or cry during the first two days of life, and who, between 3 and 28 days of age, cannot suck normally and becomes stiff or has spasms or both.

Lymphatic filariasis: Any person living in an endemic area who experiences recurrent attacks of fever, adenolymphangitis, or epidydimo-orchitis.

OR
- Hydrocoele or lymphoedema in a resident of an endemic area for which other causes of these findings have been excluded.

OR
- Laboratory confirmation of lymphatic filariasis (i.e. microfilaria positive, antigen positive or biopsy positive) even if the patient does not meet the clinical case definition.

Diseases of special public health focus

AIDS in an adult:
AIDS is diagnosed if the patient has either:
• 3 major symptoms/signs

OR

• at least two major symptoms/signs and at least one minor symptom/sign and positive HIV antibody test.

OR

• Kaposi sarcoma and positive HIV antibody test.

OR

• Cryptococcal meningitis and positive HIV antibody test.

In a child <12yrs:

AIDS is diagnosed if the patient has:

• At least two major symptoms/signs and at least 2 minor symptoms/signs and a positive HIV antibody test.

  a. Major signs: more than 10% weight loss; chronic diarrhoea (for more than 1 month); prolonged fever (intermittent or constant, for more than 1 month).

  b. Minor signs: persistent cough (for more than 1 month); generalised pruritic dermatitis; recurrent herpes zoster; oropharyngeal candidiasis; chronic progressive and disseminated herpes virus infection; generalized lymphadenopathy.

Malaria

• Uncomplicated malaria: Any person with fever or fever with headache, back pain, chills, sweats, myalgia, nausea and vomiting diagnosed clinically as malaria. The person may feel unwell or tired. Young children may have abdominal pain and poor feeding
alone or in addition to any of the above symptoms. Uncomplicated malaria cases are those managed on an outpatient basis.

- **Uncomplicated malaria, lab-confirmed:** Any person with fever or fever with headache, back pain, chills, sweats, myalgia, nausea and vomiting and with laboratory confirmation of diagnosis by malaria blood film or other diagnostic test for malaria parasites.

- **Severe malaria:** Any person hospitalized with primary diagnosis of malaria and confirmed by a positive blood smear or other diagnostic test for malaria. In addition, the person may have any of the following: Change in behavior (confusion or drowsiness), altered consciousness, general weakness (prostration), convulsions, hypoglycemia (sugar < 2.2 mol/L), difficulty in breathing, renal failure (reduced urine output), severe anemia/pallor (Hb < 5g/dl), coca-cola dark urine, jaundice/yellow urine, hyperpyrexia (temp > 39.5°C), spontaneous bleeding (DIC).

**Other diseases of public health importance**

**Buruli ulcer:** Any person with painless nodule, papule, plaque or edema evolving into a painless ulcer with undermined edges, often leading to invalidating sequelae in an endemic area. The different clinical forms of the active type of the disease are as follows:

- Papule: painless and raised skin lesion less than 1cm in diameter.

- Nodule: painless palpable firm lesion, 1-2 cm in diameter situated in the subcutaneous tissue and usually attached to the skin.
- Plaque: usually painless, well-demarcated, elevated, indurated lesion more than 2 cm in diameter.

- Edema: diffuse, extensive, non-pitting, ill-defined margin, firm, and may be painful with or without color change over the affected skin.

- Ulcer: painless skin lesion characterized by a necrotic center, undermined edges and oedematous skin. An early ulcerative lesion has a diameter of less than 2 cm and a late ulcerative lesion has a diameter of more than 2 cm.

Diarrhoea in children less than 5 years of age:

Diarrhoea with some dehydration: Any child less than 5 years of age with diarrhoea (passage of 3 or more watery or loose stools within the past 24 hours) and 2 or more of the following conditions:

- Restless or irritable.
- Sunken eyes.
- Drinks eagerly, thirsty.
- Skin pinch goes back slowly.

Diarrhoea with severe dehydration: Any child less than 5 years of age with diarrhoea and 2 or more of the following conditions:

- Lethargic or unconscious.
- Sunken eyes.
- Not able to drink or drinking poorly.
- Skin pinch goes back very slowly.
**Viral hepatitis:** Any person with acute illness typically including: acute jaundice (within one week of onset of fever); dark urine; anorexia; malaise; extreme fatigue; and right upper quadrant abdominal tenderness.

**Tuberculosis:** Smear-positive pulmonary tuberculosis: Any patient with cough for 3 weeks or more and:

- At least 2 sputum specimens positive for acid-fast bacilli by microscopy.

OR

- 1 sputum specimen smear positive for acid-fast bacilli and radiographic abnormalities consistent with active pulmonary tuberculosis as determined by the treating medical officer.

OR

- One sputum specimen smear positive for acid-fast bacilli and one sputum specimen culture positive for acid-fast bacilli.

**Onchocerciasis:** In an endemic area, any person with fibrous nodules in subcutaneous tissues.

**Schistosomiasis:** Urinary schistosomiasis: Any person with terminal haematuria.

Intestinal schistosomiasis: A person with chronic or recurrent intestinal symptoms (blood in stool, bloody diarrhoea, diarrhoea, abdominal pains) or at a later stage, hepatosplenomegaly.

**Sexually transmitted infections (STIs):**

Genital ulcer syndrome: Any male with an ulcer on the penis, scrotum or rectum, with or without inguinal adenopathy, or any female with an ulcer on the labia, vagina, cervix or
rectum, with or without inguinal adenopathy.

Urethral discharge syndrome: Any male with urethral discharge with or without dysuria.

Trachoma: Any person with recurrent inflammation and scarring of the conjunctiva and inner lining of the eyelid. The late stage of the disease may manifest as in-turned eye lids (entropion) with the eyelashes rubbing on the cornea (trichiasis).

Yaws: Primary yaws: The presence of granulomatous ulcers (usually on the face or extremities) accompanied by enlargement of the regional lymph glands within 2–8 weeks of the spirochaetal infection.

¹Adapted from Standard Case Definitions for 23 Priority Diseases, Ghana Health Service/Ministry of Health, May 2002.
Appendix 5. Flow chart of the process required to collect, transport, and report one AFP case in the Aburi Sub-district

**End here:**

| Nouguchi Laboratory (Legon, GAR): The sample is received by the national reference lab. |

**Begin here:**

| Aburi sub-district community: A CBS volunteer, CBO or medical assistant notifies the sub-district disease control officer of a suspected case. A case investigation is likely to be performed in a home or clinic. |
| Aburi sub-district disease control unit: The sub-district disease control officer investigates and takes two samples 24 hours apart. The protocol stipulates that the sample and data collection form are brought to the district disease control officer by the sub-district disease control officer. Motorcycle is used to transport specimen. |

2 round trips

| District disease control unit (Nsawan): The district disease control officer transports the specimen to the regional disease control unit. |

| Regional disease control unit (Kofordiua): The regional disease control officers checks the quality of the sample and investigation form. The region transports the sample to the laboratory in Legon, Accra by means of a regional level vehicle. This trip takes approximately two hours depending on traffic. The sample will pass the Aburi Sub-district on its way to the laboratory. |
Appendix 6: Suggestions for the improvement of IDSR at the sub-district level offered by the evaluation informants

The following are the opinions of the informants from the national level official through the community member related to how the strategy may be improved at the sub-district level. The responses have been organized by the major categories mentioned most frequently by the informants.

Money matters

Volunteers, community leaders, clinicians and disease control officers reported that community level surveillance and response can be improved by providing a “motivation”, a financial incentive, on a regular basis. Weekly, monthly and quarterly distributions had been suggested. A district disease control officer in a district where CBS is likely to be functioning well believes that a quarterly allowance of 20 cedis (approximately USD 12.50) should be provided to volunteers. Some suggest withholding “T&T” or other forms of motivation from volunteers who are not performing their duties.

Supervision and accountability

One volunteer suggested that accountability could be created if the volunteers were required to report to someone on a regular basis to have their registers checked. Visits to communities by health workers or disease control officers to provide supervision would reportedly be more frequent if an adequate supply of fuel were provided. One regional disease control officer suggested providing health workers with a “motivation” to visit communities for supervision. Sub-districts have asked that a standard supervisory checklist (for community and health facility level supervision) be provided by the district or region.
A volunteer reported witnessing other volunteers filling in questionnaires or registers with false information. He recommended that the GHS help volunteers to understand the value and importance of volunteer work in order to take their responsibility more seriously.

The appointment of a surveillance focal person in each health facility was mentioned by one district as no one individual was generally in charge of surveillance related activities. The same officer suggested that districts perform regular monitoring of health facility surveillance activities and provide regular feedback.

**Community member participation**

Community level informants mentioned the need to increase community members’ knowledge about health in general and the health issues of their particular communities. They believed that community members who understand the importance of public health might be more motivated to participate in surveillance activities. A number of community level informants suggested using captive audiences as a means to reach-out to community members for surveillance-related activities including education. Antenatal clinics and durbars held for other purposes were specifically mentioned as appropriate platforms. A disease control officer suggested using media sensitizations to promote reporting by the public, such as radio “jingles”.

**Equipment and resources**

The need for bicycles was mentioned by many of the informants. They suggested that broken down bicycles should be replaced and that regular maintenance be provided. One regional disease control officer reported that some volunteers need
motorcycles. Presumably these are rare cases in which a volunteer must travel over many kilometers in a rural area where other transportation options are not available. Many informants at all levels suggested the distribution of "Wellington" boots, raincoats and ID cards. The ID card has been described as a way to appease community members who might not understand that volunteers are working in collaboration with the GHS. T-shirts were mentioned as a valuable incentive by one, as the volunteers feel proud to be working with GHS when wearing them.

Although not the case in all facilities, a number of clinicians and disease control officers reported a need for an adequate supply of reporting forms and the original copies of missing forms which may or may not have been provided by the district at one time. Numerous informants from different levels reported the need for transportation funds, fuel, motorcycles and vehicles (4X4) to facilitate movement. Maintenance for motorcycles was also mentioned as an essential need. Informants suggested that the GHS revert back to the stronger and more reliable Yamaha AG100 motorcycle. A number of informants expressed the need for cellular telephone credit for the reporting of priority diseases and other surveillance related tasks. Informants also mentioned the need for landline telephones. A number of informants reported the need for hand held radios like those used by security firms or the police. Pen drives and computers with internet modems were also mentioned. The urban sub-metro reported the need for a fax machine.

A regional disease control officer suggested that the use of a flexible budget based on a receipt system, locally referred to as "imprest", could help sub-districts to better utilize available resources for surveillance related activities. Training would be needed,
however, as some sub-districts haven’t yet been introduced to this concept. Under “imprest” sub-districts would be encouraged to use funds allotted for initiatives, like TB for example, to maintain and improve general surveillance activities.

Training and knowledge

Most of the volunteers in the areas where community surveillance was not functioning expressed the need for training. GHS informants also called for more training of volunteers, some even recommending it on a quarterly basis. A sub-district disease control officer suggested that training of volunteers could be improved by moving trainings from the district to the sub-district where they would be held in collaboration with a district official. Some informants suggested that the wrong individuals, usually those looking for money, have been recruited as volunteers. It was recommended at the community level that the community itself choose the volunteer.

Informants reported the need for training of health facility staff, especially in localities where no surveillance-specific training had been provided. The need to train clinicians on proper reporting of priority diseases and conditions was mentioned numerous times. The proper use of clinic registers and records and reporting forms was specifically mentioned. Some mentioned that training within the health facility would be more effective than large trainings held at the district level. A need to hold trainings as frequently as every quarter was mentioned by some. Others suggested semi-annual or annual refreshers. One sub-district disease control officer suggested appointing someone as a sub-district training coordinator, responsible for appointing personnel to attend workshops and trainings held by the district. This focal person would match the most
appropriate position with the content of the workshop offered and ensure that all of the information obtained from the activity is shared with other members of the SDHT upon returning to the sub-district.

Incentives

Certificates of appreciation were mentioned as potential incentives for volunteers by both health officials and volunteers. Some volunteers expressed an interest in receiving special treatment or some kind of recognition when they and their family members present at the health facility for care. A clinician also mentioned the importance of such attention to volunteers. Some officials expressed the importance of integrating CBS volunteers into other volunteer initiatives (i.e., EPI and child survival) as a means of providing incentive. The lunch, per diem, and t-shirts, as well as simply serving an important purpose during a periodic non-CBS volunteer initiative reportedly serve as incentives for the volunteers. A failure to integrate volunteers, however, as regional disease control officer remarks, can have a very negative effect on the productivity of volunteers. The morale of those who have not been invited to participate in a non-CBS initiative that provides a bicycle or a “motivation”, for example, may be significantly lowered.
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