

State of Public Health Emergency Preparedness and Response Capacity of Ghana

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Abstract

Introduction: In developing countries, health systems in general, and public health systems in particular are under-resourced in many respects. In February 2017, Ghana underwent the Joint External Evaluation (JEE) and followed up with the development of a National Action Plan for Health Security to address the numerous critical gaps identified in all technical areas. To complement the ongoing efforts of the World Health Organisation towards securing global health security, the West Africa Health Organisation (WAHO) embarked on country missions to all the Economic Community of West African States (ECOWAS) member states to identify best practices (successes), problems, challenges, gaps, and recommendations for preparedness and response to epidemics and health emergencies in the sub-region. **Objective:** We share WAHO's evaluation findings of Ghana's state of preparedness and capacity to respond to epidemics and health emergencies in the ECOWAS sub-region post the JEE. **Methods:** We conducted a cross-sectional study in September 2018 to assess the country's capacity. Desk reviews and interviews with key stakeholders of health were conducted. Findings from both sources were triangulated and described under the IHR core capacity themes. **Results:** Ghana has a substantial amount of skilled human resource capacity available to handle health emergencies and has strategic plans, SOPs and other guidelines for use at all levels. There is poor coordination at the local level and poor collaboration between other sectors. **Conclusion:** Though Ghana has the required human resource capacity to handle public health emergencies, it is faced with poor coordination and collaboration among the sectors as major barriers to achieving epidemic preparedness and response.

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Introduction

In developing countries, health systems in general, and public health systems in particular are under-resourced in many respects. These include inadequate funding, inadequate numbers of skilled workforce and poor infrastructure. Even in the absence of disease outbreaks, these countries are constantly struggling to deal with existing high burden of disease [1]. As the case would be, emerging diseases and infectious disease outbreaks mostly start in these developing countries [1]. For example, in the wake of the pandemic influenza, an illustrative study of the perceived adequacy of preparedness of sub-Sahara Africa using Ghana's 2009 - 2013 integrated strategic response plan for pandemic influenza, the results revealed that "Ghana's health emergency preparedness is in disarray" [2]. It further revealed that three out every four health facilities did not have emergency preparedness plans, surge capacity planning, triage system for mass health emergencies, and mutual aid agreements [2].

Even though the 2014-15 Ebola virus disease (EVD) outbreak in West Africa particularly amplified the limited preparedness and response capacities of Guinea, Liberia, and Sierra Leone, it also revealed weaknesses in response capacities across all levels - national, regional, and global [3,4]. Furthermore, given the late international response to the outbreak, many stakeholders and the global media called into question World Health Organisation (WHO)'s own rapid response capacity for epidemics [5]. Since the West Africa Ebola Outbreak, there has been a more proactive approach to preventing and mitigating the threats and consequences that could result from fragile national health systems, the laissez-faire international response to health crisis in vulnerable regions, and the lack of global leadership in resource mobilization and coordination [3]. Consequently, WHO in partnership with developed countries and regional bodies such as the West Africa Health Organisation (WAHO) is expanding assistance for the strengthening of the emergency preparedness and response capacities for the Economic Community of West African States (ECOWAS) countries; and similar partnerships are in place for other developing countries [1,6].

During the peak of the West Africa EVD outbreak, unaffected West African countries embarked on nationwide awareness campaigns, training of frontline healthcare workers to detect and manage suspected cases, and the retooling of health facilities in readiness for any EVD case. In a survey conducted in the last quarter of 2015 among a cross section of healthcare

workers in Ghana to assess their level of preparedness to handle cases of EVD, about nine of every ten of respondents thought they were not adequately trained to handle a potential EVD outbreak; one in every four of them thought their health facilities were ill-equipped to respond to EVD; and hence, more than half of respondents were unwilling to attend to a suspected EVD case [7].

The International Health Regulations (IHR) were approved by all member states of WHO in 2005 and came into force worldwide in 2007 [8]. All member states have agreed to develop and sustain a set of "core capacities" to detect, report, respond to, and prevent the spread of public health emergencies of international concern (PHEIC) [8]. This laudable undertaking notwithstanding, many member states across the globe still have serious challenges implementing the agreed strategies. It is anticipated that more serious health threats will emerge in the future. However, if the prevailing trend of slow and poorly coordinated national health systems continues, many countries will not be able to fully implement the IHR core capacities, and the world will be inadequately prepared to prevent and respond to the next wave of epidemics and pandemics [1,3].

From 13 to 15 July 2015, a WHO high-level meeting on building health security beyond Ebola sought to encourage stronger collaborations between countries in building preparedness and response capacities as stipulated in the IHR in anticipation of worse public health emergencies [5]. At the close of this meeting, the second of five action points for WHO was to collaborate with regional and sub-regional bodies such as ECOWAS to develop systems for collecting, analysing, reporting and publishing data on groups of countries [5]. WHO was tasked to lead global efforts and propose "a collective, coherent and synergistic approach among international and national stakeholders supporting joint assessments in countries; and to develop, implement, and test national plans" [5]. Subsequently, WHO developed the IHR Monitoring and Evaluation Framework (MEF) which includes four components: Annual reporting (self-assessment), Joint External Evaluations (JEE), Simulation exercises, and After action reviews [9]. The WHO Joint External Evaluation (JEE) was introduced as a voluntary, collaborative, multisectoral process to assess country capacities to prevent, detect and rapidly respond to public health risks whether occurring naturally or due to deliberate or accidental events [10]. By subjecting themselves to the JEE, countries identified the most critical gaps within their human and animal health

systems and were better able to prioritize opportunities for enhanced preparedness and response [10].

In February 2017, Ghana subjected herself to the JEE and followed up with the development of a National Action Plan for Health Security (NAPHS) to address the numerous critical gaps identified in all technical areas [6,11]. In December 2017, as part of capacity building efforts for emergency preparedness and response, the International Organisation for Migration (IOM) - Ghana and partners launched a new Public Health Emergency Response Plan (PHERP) for the Kotoka International Airport (KIA) as part of the Global Security Health Agenda (GHSa) project. The PHERP is a reference document with protocols and Standard Operating Procedures (SOPs) for mitigating the spread of infectious diseases through air transport. The plan complements existing ones and provides the basis for a multi-sector and multi-state response to public health emergencies at the Kotoka International Airport (KIA) [12]. Towards building the Ghana's capacity to respond to health emergencies, some international partners have been supportive with financial and technical assistance. These include WHO, WAHO, IOM, the US Centers for Disease Control and Prevention (CDC), the US National Institutes of Health (NIH), the US Agency for International Development (USAID), Korea International Cooperation Agency (KOICA), Korea Foundation for International Healthcare (KOFIH), Food and Agriculture Organization (FAO), International Association of National Public Health Institutes (IANPHI), Boston University, UNICEF, Japanese International Cooperation Agency (JICA) and the German Society for International Cooperation (GIZ).

To complement the ongoing efforts of WHO towards securing global health security, WAHO embarked on country missions to all ECOWAS member states seeking to gather information to feed a regional strategic plan for preparedness and response to epidemics and health emergencies in the ECOWAS sub-region. In particular, the mission sought pieces of evidence on best practices (successes), problems, challenges, gaps, and recommendations from all stakeholders - local and international on the functional state of Ghana's health system. In this paper, we share WAHO's evaluation findings of Ghana's state of preparedness and capacity to respond to epidemics and health emergencies in the ECOWAS sub-region post the JEE.

Methods

Socioeconomic and Health Situation of Ghana

The Republic of Ghana is an independent state, located in West Africa. It is bordered to east by Togo, to the west by Cote D'Ivoire, to the north by Burkina Faso, and the south by the Gulf of Guinea [13]. The country is made up of sixteen administrative regions and 260 districts. The surface area of Ghana is 238,533 square kilometers, inhabited by an estimated population of 29.6 million [14]. The male to female population ratio is nearly unity (50.9%: 49.1%); with a population growth of 2.2% per annum. Ghana is a middle-income country with an estimated Gross Domestic Product (GDP) per capita of approximately 47.33 billion US dollars. In the past two decades, Ghana has experienced rapid economic growth, along with the increase in spending on health [15].

Among others, the Ministry of Health (MoH) is responsible for providing public health services, policy formulation, monitoring and evaluation, resource mobilization, and regulation of health service delivery. The Ghana Health Service (GHS), Teaching Hospitals, and the Quasi Government Institution Hospitals (QGIH) are the implementing agencies of the MoH as stipulated in the Ghana Health Service and Teaching Hospitals Act (1996), Act 525 [16]. The GHS is the lead coordination agency of the MoH. It runs a three-tiered decentralized administrative system - national, regional and district levels; and a five tiered service delivery system- national, regional, district, subdistrict and Community Health Planning and Services (CHPS) zones. Services are delivered through a network of facilities, with health centers and district hospitals providing primary health care services, regional hospitals providing secondary health care, and teaching hospitals at the apex providing tertiary services. Currently, there are 321 hospitals, 760 health centres, 1124 clinics, and 601 medical laboratories manned by about a total workforce of 49,138.

Study population

All key health agencies, stakeholders, and partners participated in the assessment. Representatives from the Ministry of Health (MoH), Ghana Health Service (GHS), Veterinary Services Department (VSD), National Disaster Management Organisation (NADMO), Noguchi Memorial Institute for Medical

Research (NMIMR), 37 Military Hospital, and US Centers for Disease Control and Prevention (CDC) granted in-depth interviews.

Study design

We conducted a cross-sectional study which involved desk reviews and interviews with key stakeholders of health in Ghana. Data collection was done in-country in September 2018.

Data collection tools

A data review tool, a structured questionnaire and interview guide were developed based on the WHO IHR core capacities under sixteen (16) major areas viz.

- Coordination, Policy and Plans
- Structure and Function of Disease Surveillance Institute and Epidemic Response and Recovery
- Cross-Border Response
- Laboratory Capacity
- Public Health Emergency Communication/Risk communication
- Logistics
- Rapid Response Capacity, infection Prevention and Control (IPC), Clinical Case Management
- Medical Countermeasures and Personnel Deployment
- Vector Control
- Availability of Epidemiology/ Surveillance and Related Capacity (Institutional Capacity)
- Health Sector Workforce Development Plan
- International Health Regulation (IHR) and Joint External Evaluation (JEE)
- Stakeholder Engagement
- One Health Approach
- Resource Mobilization and Sustainability
- Monitoring and Evaluation and Research

These tools were tested and validated by the West African Health Organization and Ministers of Health of West Africa.

Data collection

We collected data in two phases. First, we conducted a desktop review of Ghana's IHR core capacity scores, JEE report and actions implemented after JEE, and the national integrated disease surveillance and response documents (policies, systems, plans, structures,

coordination mechanisms, documents on simulation exercises, responsibilities and procedure, guidelines including available assessment reports) at the national and regional levels.

Second, we used a structured questionnaire based on the IHR core capacities to conduct face to face interviews with representatives of MoH, GHS, VSD and other relevant stakeholders on their respective roles in health emergency preparedness and response and the prevailing status of Ghana's preparedness and response capacity for health emergencies. We also conducted key informant interview with the US CDC country representative.

All relevant records on the policies, plans, guidelines and relevant literature available were verified during data collection.

Data analysis

Key informant interview was transcribed and analysed by content analysis. Data from desktop records review, structured and key informant interviews were explored for the sixteen (16) IHR core capacity areas under the following themes: best practices (successes), problems, challenges, gaps, and suggested recommendations for improving on weaknesses.

Ethical considerations

WAHO obtained ethical approval from all ECOWAS countries. Permission was sought from each participating agency before the commencement of data collection. The purpose of the assessment was explained to participants who were interviewed and their approval was obtained before interviews were conducted. Participants understood that they had the right to summarily withdraw their consent to participate at any stage of the assessment without any consequences to themselves, their respective agencies, or countries.

Results

A total of thirteen (13) officers representing seven (7) health sector agencies and organisations granted interviews and provided documents for the desktop reviews [Table 1](#).

Coordination, Policy and Plans

Situation

Emergency preparedness in the country is coordinated by National Disaster Management Organisation (NADMO). NADMO was established by act of parliament (Act 517 of 1996) to coordinate emergency preparedness and disaster management. In 2016, Act 927 was passed to enhance the multisector coordination role and enforcement powers. NADMO coordinates agencies such as the police service, to provide security to transport vaccines, Ghana Education Service (GES) to provide education in schools, local government to provide some basic facilities. It focuses on bringing other sectors on board to support MoH in responding to outbreaks. There are 3 levels of governance in disaster management. These are: National Disaster Ministerial committee (NADMC) made up of ministers of state, the National Disaster Technical Coordinating Committee (NADTCC) made up of technocrats, and Regional and district levels. At the national level are the following structures: Inter-ministerial Coordinating Committee (IMCC) who provide general oversight of Public Health Emergencies in the country and formulates policy guidelines on how to manage epidemics. There is also the National Technical Coordinating Committee (NTCC), an entity made up of technical experts who provide advice to the IMCC for the management of Public Health Emergencies. At the regional and district levels are the Regional and District Public Health Emergency Management Committees who coordinate emergencies at those levels.

Some identified strengths are the existence of an organization backed by law to manage disasters and decentralized levels of coordinating committees for emergencies.

Gaps

None

Planning and Coordination Before, During and After a Public Health Emergency

The situation

The Inter Ministerial Coordinating Committee (IMCC) has the national oversight on Public Health Emergencies in Ghana. It receives technical advice

from the National Technical Coordinating Committee (NTCC). In the absence of emergencies, NTCC meetings are usually scheduled around the start of events such as during the dry season for Meningitis season and during the rainy season in preparation for Cholera. However, during outbreaks, meetings are held weekly or even more frequently. The NTCC meetings are chaired by the Director General of the Ghana Health Service and supported by the Country Representative of the World Health Organization. While Ghana Health Service is the lead agency in the management of Public Health Emergencies, NADMO is the main entity for the management of disasters.

Based on the location of the outbreak, the administrative level of the health system notifies the next level till the national level is notified. The capacity at the level of the outbreak determines the kind of response. In severe situations, a team from the national level joins teams at the region level to undertake joint investigations and take appropriate action. NADMO is mandated to coordinate emergency preparedness. The country has a contingency plan to help during the management of emergencies. During emergencies, resources are mobilized from the various NGOs, UN systems and other agencies to support the response. NADMO has a dedicated structure for EOC, but it not fully functional until the president of the Republic declares a state of national emergency. After an outbreak, the various institutions continue to conduct their respective routine surveillance. Currently meetings are only held when there is an emergency. Aside emergencies, no other meetings are scheduled.

Some identified strengths were the good political will in the promulgation of laws and formulation of policies. Also, there is an emergency fund through the District Assembly Common Fund and administered by NADMO.

Gaps

- Highly dependent on government funding which is often insufficient and delays in its disbursement. Lack of internally generated funds to supplement government funds.
- Stakeholders do not hold joint planning meetings. Standard Operating Procedures (SOPs) on multi-sectoral coordination are not institutionalized and there are no Memoranda of Understanding (MOUs) to operationalize NADMO's coordinating functions.

Structure and Function of Disease Surveillance Institute and Epidemic Response and Recovery

The situation

Ghana Health Service (GHS) is responsible for the management of Public Health Emergencies while National Disaster Management Organisation, coordinates disasters if they should occur. The types of disasters Ghana is prone to are contained in a multi-hazard contingency plan. The key hazards are: hydro-metrological, infectious disease epidemics, fires and lightning, pest and insect infestations, chemical, biological, radiological and nuclear emergencies, geological emergencies (earthquakes and landslides), and manmade (plane crash, road accidents, building collapses). NADMO keeps a register of disasters and manages post disaster recovery and rehabilitation. Specifically, post impact surveillance of public health epidemics are documented by the surveillance department of NADMO.

Gaps

- Inadequate funding
- The GHS EOC is not fully functional
- Weak multi-sectoral coordination

Cross-Border Response Capacity

The situation

NADMO and GHS have been involved with cross-border preparedness and response activities. Ghana has some generalised documented plans, policies or mechanisms on management of public health emergencies at point of entry. The Institutional Care Division of GHS works closely with the port health department to train their officers with the skills to promptly detect diseases at the various Points of Entries (PoEs). In each of the PoEs, certain facilities were identified, and mapped out, to serve as holding areas or isolation rooms.

Gap

- Ghana has no specific Point of Entry (PoE) contingency plan.
- There are no gender considerations in building Ghana's cross-border response capacity.

Laboratory

The situation

Ghana has three (3) different types of laboratories namely: biosafety level 2 (BS 2) GHS public health reference laboratories (one national and three Zonal); the GHS clinical service laboratories (from primary to tertiary level); and the advance level 3 laboratories of NMIMR [Table 2](#). The average turn-around time for sample collection and delivery for epidemic-prone diseases is seven (7) days. The one health concept is currently not really being used in routine laboratory testing but sometimes used during outbreaks of zoonoses. There are four BS 2 Public Health Reference laboratories somehow serving the various epidemiological zones of the country. These labs are for the confirmation of diseases and conditions of Public Health importance including epidemic prone ones like Yellow Fever, Measles and cholera. The Noguchi Memorial Institute of Medical Research is a specialized lab for the confirmation of highly infectious diseases like Viral Hemorrhagic Fevers; EVD, Lassa Fever etc.

Gap

-Ghana does not have a structured and functional laboratory referral and sample transportation network.

Risk Communication in Public Health Emergencies

The situation

Communication is not prioritized in the allocation of resources. More financial resources are allocated to disease management at the expense of disease prevention. It is only during epidemics that adhoc provisions are made for communication and educational materials such as posters, leaflets, and education in the mass media. Ghana has adequate numbers of skilled health promotion and communication officers at the national level, and technical officers at the regional and district levels. There are health promotion staff in the sub-districts too. The community health officers in the CHPS Zones are trained to carry out risk communication and social mobilization activities.

Gap

Risk communication is weak and limited to only epidemic times.

Logistics

The situation

The MOH and GHS are responsible for ensuring the availability of logistics before, during, and after health emergencies. The logistic component at the IMS coordination level is in place at the national level to define and put in place all requested means within the stipulated timeframe and quality standards. Suppliers of standard essential items for emergency response and their delivery capacity within given times have not been assessed. There is no dedicated space for storing stockpiles.

Logistics such as leaflets are prepared for routine use however when there is an outbreak the communication experts and relevant stakeholders come together to produce Information, Education and Communication (IEC) materials. The GHS plans for the common outbreaks such as cholera and meningitis but hardly has the funds to stockpile commodities. During outbreaks, emergency assistance is sought from WHO, CDC and/or UNICEF. Donor partners are the main source of support for stocking logistics.

Gap

- Ghana has no dedicated space for stockpiling logistics
- There are limited funds for stockpile commodities.

Rapid Response Capacity: IPC and Clinical Case Management

The situation

Response to health emergencies are usually multi-sectoral. MoH or NADMO or any other organization can play the lead role depending on the type of outbreak. Ghana has a national rapid response team (RRT) and 10 regional RRTs (RRRTs) who operate to contain outbreaks in their earliest stages. The composition of these teams include: field epidemiologists, doctors, nurses, clinical psychologists, mortuary men, cleaners, laboratory technicians, and public health officers. There is only one complete burial team at the national level. Infection prevention and control (IPC) guidelines and SOPs in all health facilities in Ghana. Each health facility, irrespective of the level has basic hygiene, sanitation, disinfection,

PPE, and basic amenities such as running water and electricity. Ghana also has a complement of IPC experts at all levels of the healthcare delivery system. There are also isolation units with at least two designated beds at all major hospitals. All teaching and regional hospitals, and many of the district hospitals have waste management facilities, including incinerators.

Gap

-Ghana has only one burial team.

Medical Countermeasures and Personnel Deployment

The situation

Ghana has a system in place for activating and coordinating medical countermeasures during a public health emergency. There are draft national countermeasures and personnel plan and case management procedures implemented for IHR relevant hazards. Also, there are case management guidelines for other IHR relevant hazards at applicable health system levels. There are also guidelines for priority epidemic-prone diseases, and SOPs for the management, transport of potentially infectious patients in the community and at points of entry, and a plan that outlines a system for sending and receiving medical countermeasures and personnel during public health emergencies. In the last one year preceding the assessment, Ghana conducted formal simulations of how to respond to public health emergencies as per the national plan.

Gap

-There is no validated national countermeasures and personnel plan and case management procedures.

Vector Control

The situation

Ghana is not able to fund vector control activities, hence there are no written plans for these

vectors. The malaria control programme has guidelines for control mosquitoes. Guidelines for the control of Lassa fever are being developed; a component of which deals with rodent control.

Gap

There are no written plans for vector control.

Institutional Capacity (Availability of Epidemiology/Surveillance and Related Capacity)

The situation

The Ghana Health Service through the Disease Surveillance Department and NADMO have a database of experts who could be rapidly mobilized during health emergencies. Also, there is a contingency plan which can be activated immediately in case of health emergencies.

There exists a functional 24/7 hotline at NADMO to ensure existing emergency numbers can manage alerts. The system was developed by NADMO and was verified by calling the hotline number 999. The system had options for reporting various emergencies. The NADMO staff are trained on alert processes and requests for information. Staff run shifts and have a plan for revision of staff schedule if needed. Surveillance department, ICD and NADMO provide guidance (guidelines, case definitions, and investigation forms) to all levels of the healthcare system adapted to the respective level as needed. Surveillance department and NADMO provide specific training on the use of case definitions and completing the investigation forms. Surveillance department and NADMO ensures that an event-based surveillance system is in place and enable timely follow-up of information/rumors from all sources including the community, media, etc.

Surveillance is mainly passive. When cases are identified, there are immediate lines of authority for reporting of potential cases (dead or alive) with clear report structure for such actions. Reporting may delay since it is not realtime. The existing surveillance systems have been tested through simulation exercises. Some human resources for community surveillance (community HCWs, volunteers, NGOs, traditional healers, community leaders) have been identified and trained with simplified community level case definitions. Samples of these were available for verification.

Gap

-There is no realtime data collection and reporting system

Health Sector Workforce Development Plan

The situation

Ghana had a 4-year Health Sector Medium Term Development Plan (HSMTDP), for the period 2014-2017. It contains a workforce development plan for public health emergency preparedness and response. The plan incorporates the one health approach. There is field epidemiology training programme (FETP) at two levels: frontline and advanced. The frontline programme has graduated 349 trainees in the last 3 years. The advanced programme has graduated its twelfth cohort, totaling 68 field epidemiologists as at November 2017. The numbers of trainees by year and gender is available at the Ghana FELTP (GFELTP) secretariat. Ghana has additional epidemiology training programmes for: MPhil. Applied Epidemiology and Disease Control and PhD Epidemiology hosted at the University of Ghana.

Gap

- Funding field epidemiologists is largely donor dependent
- Gender is not explicitly considered in this HSMTDP.

International Health Regulations and Joint External Evaluation

The situation

Ghana performed satisfactorily in the recent JEE conducted in February, 2017. The best performing IHR core capacities for Ghana were immunization coverage and workforce development where the capacities were rated as developed. A national action plan for health security was in its final stages of development and to be ready for implementation by October 2018.

Gaps

-Incomplete and untested legal frameworks for implementing all IHR-related activities.

Stakeholder Engagement

Ghana engages with many stakeholders. They are mostly international partners who provide financial and technical support in public health emergency preparedness and response. The following partners are currently lending active support to Ghana:

- WHO: Technical and financial support
- CDC: Workforce development in FELTP. Financial and technical support
- USAID: Financial and technical support to central government.
- The World Bank: Financial and technical support
- GIZ: Financial and technical support
- FAO: Financial and technical support
- IOM: Crisis management: technical support for Response and Recovery
- JICA: Technical and financial support

These organizations are closely involved in the planning, implementation, monitoring and evaluation of activities related to public health emergency preparedness and response.

One Health Approach Platform

The situation

Ghana is yet to have a One Health Policy and the activities being undertaken are adhoc. A number of stakeholder consultative meetings have been convened by FAO and NADMO towards establishing a functional one health platform with the requisite legal and policy frameworks. So far, these discussions have centered on veterinary and human health collaboration; the environmental component is yet to join. Currently, the GHS surveillance department shares weekly epidemiological bulletins with the veterinary service department. The veterinary service department are also working towards sharing routine surveillance data with GHS to promote early detection and response to zoonoses. A vibrant antimicrobial resistance (AMR) Platform exists that coordinates Human, Animal and Environment Sector activities related to AMR.

Gap

-There is no formal one health coordinating platform but there is a very vibrant AMR Platform that galvanizes the key players involved in One Health

Resource Mobilization and Sustainability

The situation

There is formal document for mobilizing resources towards disaster and epidemic preparedness and response. Central Government provides funding during outbreaks but donor partners are the main sources of financial support before, during, and after public health

emergencies. They have been unfailing in their support so far, but there are concerns of sustainability should these donor partners reduce or withdraw their support in the future. In terms of human resource mobilization, there is a contact tracing and data management team at the national level. There are trained contact tracing staff at district and subdistrict levels. Draft contact tracing guidelines and SOPs are currently under revision to incorporate the one health components. There is an existing data management system for EVD contact tracing at the national and sub-national levels.

Gap

-Lack of resource mobilization plan for disaster and epidemic preparedness

Monitoring and Evaluation (M&E)

The situation

Ghana has a monitoring and evaluation plan in place to track the progress of activities in epidemic preparedness and response. This is captured in the strategic plan under the component on preparedness and response. Ghana has a weekly open access national epidemiological bulletin where epidemiological events for each preceding week are published to provide information to all stakeholders. The key M&E indicators include:

- Timeliness of reporting
- Completeness of reporting
- Reporting public health events within 24 hours
- Investigation and reporting preliminary findings within 24 hours

Gap

None

Research

The situation

In Ghana, research is an important component of public health emergency preparedness and response even though it lacks consistency. GHS has a Research Division. There is no direct donor support to research.

The research division undertakes both predictive and implementation research. NMIMR is the main medical research support of the disease surveillance department of the GHS. Aside inadequate funding, some of the

challenges with research are: the non-implementation of recommendations resulting from research evidence, weak collaboration between individual researchers and research institutions, public health officers with weak research skills, and inability of the service to attract and retain skilled public health researchers.

Gap

Few predictive and implementation research due to lack of funding

Situational Analysis and Evaluation of Ghana's Preparedness and Response Capacity

Strengths of Ghana's Emergency Preparedness and Response System

- A substantial number of skilled human resource capacity is available to handle health emergencies
- Availability of strategic plans, SOPs, and other operational guidelines for use at all levels
- Good surveillance systems in place to track all epidemiological emergencies

Weaknesses of Ghana's Emergency Preparedness and Response System

- Poor coordination at the local levels
- Weak linkages and collaboration between other sectors
- Non-existence of a formal operational one health platform
- Resource mobilization is heavily dependent on donor partners
- Weak predictive and implementation research

Opportunities for Ghana's Emergency Preparedness and Response System

- The formal institutionalization and operationalization of the One Health Coordinating Platform -Ability to prepare good proposals for donor funding opportunities
- Availability of research support from WAHO

Threats to Ghana's Emergency Preparedness and Response System

- Over reliance on donor partner support for most activities
- Poor health security at borders especially along the multiple illegal ground crossings

Discussion

In this paper, we presented WAHO'S country mission findings on the state of Ghana's preparedness and response capacity in order to inform targeted interventions towards boosting collective public health security among ECOWAS countries. Following recent pandemics, it is now widely accepted that a health threat anywhere is a health threat everywhere [17]. Public health emergencies occur in both predictable and unpredictable ways in terms of when and where they occur, and who they affect. However, it is possible to mitigate the occurrence and consequences of public health emergencies if adequate preparedness and response mechanisms are in place everywhere as required by the international health regulations [8]. Furthermore, the recent reawakening to the realities of a borderless world reiterates the need for collaborations among nations in harmonizing the approaches for prevention, early detection, and appropriate response to public health emergencies.

The world over, safeguarding the health of a population hinges on a web of legal, policy, and regulatory frameworks from which all stakeholders derive their mandate to design, implement, or comply with international regulations [8]. The Government of Ghana has a satisfactory legal framework to support and enable the implementation of IHR (2005). This notwithstanding, these frameworks need to be operationalized in order to realize their intended benefits. Additionally, outstanding policy guidelines and those requiring revision should be done in the context of the collective health security of the ECOWAS sub-region while maintaining their local relevance. Safeguarding national health security is a multi-sectoral responsibility. In Ghana, Public Health Emergencies are coordinated by the Inter-Ministerial Coordinating Committee supported by the Technical counterpart called the national Technical Coordinating Committee. Public Health Emergencies are coordinated by the Ghana Health Service. In cases of a disaster, the National Disaster Management Organization (NADMO) is the main entity for coordination. While NADMO enjoys political good

will, its operations are also significantly hampered by political interference. Partisan interests of a ruling government often result in change of NADMO management and the replacement of some experienced staff with new ones who mostly require some training before they can perform their duties. Political interference has been shown to have negative consequences on delivering healthcare and providing health security for a population as reported in a case study of Nigeria [18].

While NADMO has guidelines for coordination of the relevant ministries and agencies, there is no operational communication and data sharing among the lead persons in these institutions. These institutions tend to communicate during emergencies and this situation does not allow for good planning and the effective response to health emergencies. Our findings suggest that communications among these institutions are mostly driven by good interpersonal relationships and professional networks on ad hoc basis. These relationships have the advantage of complementing more formalized communications among stakeholders for the common goal of safeguarding public health security. However, in the absence of a formalized communication platform, effective coordination is not sustainable in a system where management and staff turnover rates are high.

Aside internal coordination among national stakeholders, given the current cross border nature of outbreaks, countries that share borders need to have a formalized coordinating mechanism that would ensure regular information sharing on trends of epidemic prone diseases of common concern. If cross border coordination is well established, it improves response to cross border public health emergencies. In a qualitative case study of the preparedness and response against diseases with epidemic potential in five member states of the European Union, cross-border collaboration was greatly facilitated if the neighbouring country was a fellow EU Member State [19]. This suggests that good bilateral relations outside crisis time will enhance collaborations during crisis time and this principle should be encouraged among ECOWAS member states. Effective cross border investigations of public health emergencies could be enhanced by encouraging exchange programmes among critical workforce such as field epidemiologist whilst they are under training. In this way, the exchange programme between the Ghana Field Epidemiology Training Programme (which trains field epidemiologist from Anglphone West Africa except Nigeria) and the Burkina Faso Field

Epidemiology and Laboratory Training Programme (which trains from Francophone West Africa) is a laudable beginning to effective collaborations in the future. It also has the added advantage of enabling trainees acquire additional language skills in either French or English which is key to effective collaboration in cross border investigations.

By the JEE report, Ghana has attained a developed capacity in public health workforce development necessary for responding to public health emergencies [11]. The Ghana FETP was a key contributor owing to the competency based approach of training field epidemiologists capable of responding adequately to disease various outbreaks.

The one health approach to preventing and responding to health emergencies has gained global acceptance. The institutionalization of the one health coordinating platform is slow in Ghana. Compared to Liberia, where the one health coordinating platform is well established and seated at the office of the vice president who serves as its chairperson [20]. It is one implementation model that should be considered by Ghana and other ECOWAS countries if the full benefits of this approach are to be reaped.

There is an over dependence by Ghana on external donor funding for running the public health system. In their paper on whether donor aid for health can be effective in a poor country using Uganda as a case study, Nabyonga and colleagues found that donor aid was not effective in sustaining health systems and that substantial investments of state resources was necessary for building and sustaining effective health systems [21].

Conclusion

Ghana has built a human resource capacity within NADMO and the GHS to ensure immediate response to health emergencies. The preparations towards a potential EVD outbreak in Ghana revealed the weaknesses in Ghana's preparedness and response capacity. The findings of this country mission has reaffirmed these weaknesses for the attention of all stakeholders. In the short to medium term, the key priority areas towards ensuring health security in Ghana are: institutionalizing the One Health Coordinating Platform, ensuring a regular pre-positioning of emergency medical supplies and periodic

simulations at the county level and building on gains made so far in improving cross border collaborations. The MoH should consider instituting a dedicated budget line for preparedness and response within the budget of disease surveillance department to cater for activities before, during, and after public health emergencies. WAHO should ensure that member countries of ECOWAS actively participate in both in-country and joint research towards generating evidence for preparedness and response.

What is known about this topic

- In developing countries, public health systems in particular are under-resourced in many respects
- Since the West Africa Ebola Outbreak, there has been a more proactive approach to preventing and mitigating public health threats

What this study adds

- Ghana has built a human resource capacity within NADMO and the GHS to ensure immediate response to health emergencies
- The Ghana FETP was a key contributor owing to the competency based approach of training field epidemiologists capable of responding adequately to disease various outbreaks

Competing interests

Authors declare no competing interest

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Authors' contributions

Conceptualization: FAB, VL. Data collection: GMC, BKA, DAB, EK, SA. Report writing: FAB, GMC, BKA, DAB, EK, VL. Manuscript development and finalization: FAB, GMC, BKA, DAB, EK, BS, SA, VL. All authors read and approved of the final version of the manuscript.

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Tables

Table 1: Agencies and designations of representing officers who participated in the assessment, Ghana, September 2018

Table 2: Summary of key findings

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Table 1: Agencies and designations of representing officers who participated in the assessment, Ghana, September 2018

No.	Organization /Agency	Designation of Representing Officer
1	Ministry of Health	WAHO Liaison Officer
2	GHS (Public Health Division)	Head, Disease Surveillance Department
3	GHS (Institutional Care Division)	Director
4	GHS (Institutional Care Division)	Acting Deputy Director, Quality Assurance Unit
5	GHS (National Public Health Reference Laboratory)	Head
6	GHS (Communication Unit)	Head
7	GHS (Procurement Unit)	Head
8	Ghana Armed Forces (37 Military Hospital)	Head, Public Health Division
9	Ministry of Food and Agriculture	Director, Veterinary Services Department
10	Ministry of Food and Agriculture	Veterinary Services Department
11	National Disaster Management Organisation	Head of Disease Epidemics Preparedness and Emergency Response Planning
12	Noguchi Memorial Institute of Medical Research	Head of Virology Department
13	US CDC	Technical Advisor, Surveillance and Outbreak Response

Table 2: Summary of Key Findings		
Sections	Situation	Gaps
Coordination, Policy and Plans	At national level, public health emergencies (PHEs) are coordinated by Inter Ministerial Coordinating and National Technical Coordinating Committees. The National Disaster Management Organisation established by an Act of parliament coordinates emergency preparedness and disaster management at the disaster level	Weak multi-sectoral coordination
Structure and Function of Disease Surveillance Institute and Epidemic Response and Recovery	There exists a contingency help plan for the management of emergencies ^[1]	There is a dedicated EOC structure, but it is not fully functional
Cross-Border Response	Cross-border activities are implemented. Over 50 PoEs but only 14 are IHR designated sites; several unapproved routes.	Not all PoEs have contingency plans
Laboratory	Three types of laboratories exist: a) public health reference laboratories, b) clinical service laboratories, and c) advanced level 3 laboratories.	One health not practiced routinely at both human and animal laboratories
PHE Communication/Risk communication	Communication is not prioritized during resource allocation.	Communication is not well structured. Activities are initiated during outbreaks.
Logistics	Logistic component is in place at national level to define and implement all requests within the stipulated timeframe and quality standards	Logistics storage facility is temporary
Rapid Response Capacity, IPC, Clinical Case Management	Rapid Response Teams, IPC and Clinical Care management teams exist at the national and regional levels only.	Burial teams are found only in the regional capitals e.g. Accra
Medical Countermeasures and Personnel Deployment	System in place for activating and coordinating medical countermeasures during a public health emergency	No validated national countermeasures, personnel plan and case management procedures.
Vector Control	Malaria control programme has guidelines	Limited funding for Vector Control activities

Table 2: Summary of Key Findings		
Sections	Situation	Gaps
Epidemiology/ Surveillance and Related Capacity (Institutional Capacity)	Use both Indicator and Event based Surveillance, coordinated by the Disease Surveillance Department. Event Based Surveillance is limited to Community-Based Surveillance-common in rural and hard to reach areas. Hotline is not national, limited Media Scanning.	Electronic reporting at district level upwards but not real time
Health Sector Workforce Development Plan	Had a 4-year Health Sector Medium Term Development Plan with workforce development plan for PHE preparedness and response ^[2]	Field epidemiologists mostly donor funded
International Health Regulation and Joint External Evaluation	A national action plan for health security (NAPHS) has been developed but not officially launched.	Limited capacity for chemical preparedness and response
Stakeholder Engagement	Many stakeholders engaged, provide financial and technical support in PHE preparedness and response.	None
One Health Approach	One Health Concept exists. One health platform and requisite legal and policy frameworks is being developed. AMR Platform coordinates Human, Animal and Environment Sector activities.	One health platform not well structured. One Health Policy now being developed
Resource Mobilization and Sustainability	There is formal document for mobilizing resources towards disaster and epidemic preparedness and response.	Limited ring-fenced funding for PHEs
Monitoring and Evaluation and Research	Research is an important component of PHE preparedness and response but lacks consistency	Weak predictive and implementation research