USING GIS TO DEVELOP CHOLERA RISK MAP FOR EMERGENCY PREPAREDNESS IN GREATER ACCRA REGION, GHANA
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ABSTRACT
Following a cholera outbreak in Ghana in 2014, Geographic Information Science (GIS) was used to create a cholera risk map for Greater Accra Region. The map was intended to guide Ghana Red Cross Society (GRCS) to identify vulnerable areas/districts and develop a contingency plan for future responses within the Greater Accra region. All public facilities such as schools, churches, mosques, bus station, etc. were surveyed to access their sanitation and hygiene practices, which was used to develop an index and determine cholera risk levels. The risk levels were determined for each facility on a three-point weighted scale (high risk, medium risk and low risk) and mapped. An optimized hot spot analysis was conducted on facility risk levels to find spatial clusters of high risk and low risk facilities. The cluster scores were then interpolated using inverse distance weighting (IDW) method to create a rasterized map for better visual appearance and easy conceptualization. GRCS used the results which showed concentrations of district/cities that are more vulnerable to develop an Emergency Plan of Action (EPoA) for raising awareness in communities, surveillance, promoting good sanitation and hygienic practices, cholera preparedness and response in Greater Accra region.

BACKGROUND
Ghana has a constant trend of cholera outbreaks over the years. In 2014 there was deadliest outbreak of cholera in recent times, with over 29,000 cases and 250 deaths reported in 130 districts from all 10 regions of Ghana.

The most affected regions were Greater Accra, Central, Eastern and Brong Ahafo. 243 (87%) of the cases occurred in Accra Metro Assembly.

Most cases emanated from urban metropolitan communities, normally associated with lack of access to water and sanitation as well as weak and or non-existent waste management systems.

OBJECTIVE
To develop cholera risk map to identify possible hotspots that should be targeted for control programs, interventions and to intensify education on Cholera within Greater Accra Region.

DATA & METHODOLOGY
Ghana Red Cross Society (GRCS) conducted a survey on all public facilities in the Accra Region Assembly to assess their hygiene practices and compute an index for cholera risk levels.

The facilities included; schools, churches, mosques, major markets, major bus stations, water vendors, public and private latrines.

Risk level index was computed for each facility, weighted on a 3-point scale: 1 was low risk, 2 medium risk, 3 high risk and mapped (Fig. 1).

Run optimized hot spot analysis with ArcGIS 10.x on their risk levels to find spatial clusters of high or low risk facilities (Fig.2).

Cluster scores were interpolated using Inverse Distance Weighting (IDW) method to create a rasterized map for better visual appearance and easy conceptualization (Fig: 3).

RESULTS
Ga South Municipality had higher concentration of high-risk areas especially areas that boarded the Weija dam; Amanfro, Mandella, and Weija.

Coastal areas such as Kokrobite, Tuba, Oshiyie and Botianor in Ga South Municipality also showed large clusters of high-risk facilities. They are predominantly newly developing areas and share boundary with the central region.

Teshie, Tema, Kokomlemee and Avenor were other towns that also had cluster of high-risk facilities.

In the LEKMA, there was a concentration of high risk which is consistent with many of the cases reported at LA Polyclinic.

Slums, which tend to have characteristics that make them candidates for high risk zones did not have lots of high risk. Examples include Nima, Sukula, Mamobi, etc.

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