



A semi-quantitative risk assessment model of primary health care service interruption during flood: Case study of Aroma locality, Kassala State of Sudan



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ABSTRACT

Primary health care (PHC) centers are very important to provide health facilities and services at the local level. The role of PHC centers becomes crucial during the flood and other natural disasters. PHC is an essential health care which is scientifically sound, socially acceptable, universally accessible through affordable cost, and geared towards self reliance, and based on practical methods and technology. This paper attempts to develop a semi-quantitative risk assessment model for primary health care service interruption during flood. The model is developed in the context of Sudanese PHC and validated further to add value and confirm its application in a wider context.

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1. Introduction

The WHO has initiated the campaign of making hospitals safe in emergencies on the World Health Day, 2009, to highlight how health facilities and their services are crucial to the community in times of disasters as they work to save lives, treat the injured and ensure continuous health care in post-disaster and accordingly they deserve to be protected because of their high serving and economic values [1].

One of the major impacts of disasters, including flood, is the disruption of the health services either through direct damage of the health facilities, inaccessibility, or affected health workers, besides the damage of supporting systems like logistics, communications, power and water supply [2]. The most commonly reported health system impact after

flooding is the disruption of health care services [3]. The supporting systems are important for functional continuity of the health facilities [4,5]. Their importance could clearly be shown during Hurricane Katrina in August, 2005, when health facilities stopped functioning due to non-operating generators and impossibility of providing supplies through the flooded road network. Arboleda and colleagues have shown the importance of including the analysis of infrastructure systems in the vulnerability analysis of health facilities as they significantly affect the functions of those facilities [6]. Loss of health facilities' functions was encountered during and after the tsunami disaster in 2004 in Maldives, Indonesia Thailand and Sri Lanka. Those facilities are most needed at the time of crisis to serve victimized people, especially the ones within the affected areas [7]. In Bangladesh, about 53% health facilities went out of function during 2007 cyclone (SIDR), and about 51.7% of the health care facilities in Orissa, India experienced dysfunction due to the flood of 2008 [8]. There are evidences that the prevalence of the interruption of treatment for patients with chronic diseases is proportional

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to the magnitude of damage to the health facility [9]. Similar damages were reported in Ecuador and Peru, 1997–1998, Bolivia, 2002, Argentina 2003, and in Australia [10,11].

The importance of low scale health centers can be realized by understanding their roles in delivering the services of the Primary Health Care (PHC) [12]. Despite their relatively less cost, PHC centers have roles and values to rural communities comparable to those of bigger hospitals. Those values make their protection cost effective and necessitate the integration of their safety in any health risk reduction plan. However, despite their importance and obvious vulnerability to floods not many original research papers are found in the literature to tackle the issue of the safety and risk assessment of those low scale facilities [8]. In Sudan the five year strategy for the Ministry of Health has clearly identified the importance of the continuous provision of health care during disasters as one of the main strategic objectives, to which the safety of health facilities is a key element [13]. The problems of PHC in developing countries are almost the same; an evaluation report in India diagnosed the PHC problems which are associated with insufficient human resources, inadequate infrastructures and drugs, and lack of community participation and quality health care [14]. Other factors that affect the service delivery at the level of public health centers are coverage, availability of human resources with different required specializations, incomplete package of services, shortage in equipment, and the dysfunctional referral system [15]. Access to PHC is a major determinant of service delivery affect the utilization of services and flow of functions and services provided by the facilities. Accessibility is a multi-dimensional concept that includes geographical accessibility, availability, affordability, accommodation and acceptability, as explained by the model developed by Penchansky [16]. In addition health can be seen as a commodity that is also affected by supply and demand factors such as quality of health care services, affordability, appropriateness of health personnel and social values and norms [17].

The health system in Sudan is a decentralized system with three tiers of care at primary, secondary and tertiary levels. About 33% of the population has no access to health facilities, the minimum PHC package is provided by 19% of PHC facilities. 39.8% of the PHC facilities are not functional because of human resource shortages and 34.7% because of the physical infrastructure condition [18]. PHC facilities include primary health care centers (PHCC), primary health care units (PHCU), dressing stations (DS), dispensaries, and health centers. Rural hospitals are considered part of the PHC level and serve as secondary referral level health facilities. Specialized and general hospitals are the tertiary level and are located in states' capital. About 41% of the total health visits take place in primary health centers, with a variation on the use of Family Health Units and dispensaries with a range of 18–1% in urban and rural areas. About 52.2% of urban centers provide the minimum package compared to 3.8% of the rural centers and 21.9% of the family health units [19].

1.1. Background

The study area is the “North Delta Gash” Locality in Kassala State of Eastern Sudan, 120 km north of Kassala

town, with a total area of about 14,000 km² and a population of 82,000. The population density in the area is 12 person/km² and there are of 55 villages [20]. Health services are delivered through one rural hospital in Aroma with 57 beds. There are nine functioning health centers and 22 basic health units, three of which are not functioning. No private health service is available in the area. In total there are two doctors, 14 assistant health personals, 13 medical assistants, 46 environmental health officers and workers, and 25 certified midwives. There is no psychiatrist, dentist, radiologist nor anesthesiologist in the area. Only seven villages have at least one midwife (13%) and 76% of the population live less than 5 km from the nearest health facility.

Kassala state is under the risk of annual flooding which significantly affects communities in the area with a five year interval. The most devastating floods occurred in 1975, 1983, 1988, 1993, 1998, 2003, and 2007, when 47,075 people were affected [21]. The Gash River is the main source of flood hazard as neither its course nor the timing of water rise can easily be predicted. Despite this high risk, people refuse to be either evacuated or relocated [22]. The state is frequently hit by disease outbreaks of malaria, Dengue fever, meningitis and diarrhea. One factor that increases the likelihood of disease outbreak is the high indices of vectors' density [23]. Kassala has the highest malnutrition rates in the country, the global acute malnutrition (GAM) is 29%, infant mortality rate is 56/1000 and maternal mortality ratio (MMR) is 140/10,000 live births. Those high indicators are mainly due to limited access to basic antenatal care and the deficiency of skilled birth attendants. Birth under medical supervision in public hospitals is about 13.3%, in addition to the widely practiced female genital mutilation which is estimated to be as high as 90% [24]. The health care in the state is not up to the national standards with low accessibility to health services [25].

Risk of service interruption during flood emergency can be a source of hazard to community health. As the resources are limited especially at the lower level of government structure, there is a need for prioritization to identify those health centers which deserve the urgent actions for risk reduction. Another point to be considered is that the study area is under the annual risk of flooding and with such capacities and vulnerabilities the health care facilities would be facing an extensive risk of service interruption if no immediate actions are taken. Therefore there is a need for simplified and practical assessment procedure and tools that can be applied by the staff of the health centers and the local authorities. This goes in line with the role of the health staff at their centers and community [26,27]. Such a simplified method is important to avoid the complexity of sophisticated and lengthy procedures without jeopardizing the utility and validity of the assessment model.

This paper refers to the definition of risk assessment as “a methodology to determine the nature and extent of risk by analyzing potential hazards and evaluating existing conditions of vulnerability that together could potentially harm exposed people, property, services, livelihoods and the environment on which they depend” and defines vulnerability as “the characteristics and circumstances of

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