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Roles of Primary Healthcare in Emergency Preparedness, Response and Prevention of Re-emerging Infectious Disease Outbreaks: A Narrative Review

Ijeoma Kingsley Ogor[1,2], John Esimaje Moyegbone[3], Ezekiel Uba Nwose[1,4], Michael Ogorchuku Otutu[1]

[1]Department of Public and Community Health, Novena University, Ogume, Delta State, Nigeria

[2]Directorate of Public Health, Headquarters Nigerian Army Medical Corps (HQ NAMC), Bonny Camp, Victoria Island, Lagos, Nigeria.

[3]Department of Environmental and Public Health, Faculty of Optometry, University of Benin, Benin City, Edo State, Nigeria

[4]School of Health and Medical Sciences, University of Southern Queensland, Toowoomba, Australia

Correspondence: Ijeoma Kingsley Ogor, Department of Public and Community Health, Novena University, Ogume, Delta State, Nigeria, Tel: +2347038375447

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Abstract

World Health Organization defined primary health care (PHC) as an essential component of a nation's healthcare tiers serving as a focal point of each community's socioeconomic growth. For people, communities, and entire national health system, PHC is the grassroots contact point linking individuals with health services**.** A narrative review of previous literatures were done using search engines including google scholar, Mendeley reference library, and Pubmed. The key words used includes; roles of PHC in infectious disease outbreaks, community engagement in disease outbreaks, roles of PHC in psychological problems secondary to infectious disease outbreaks. Disease surveillance and early detection are critical components of PHC initiatives targeting management as well as control of disease outbreaks. Studies has shown that PHC employees play essential roles in response to outbreaks of infectious diseases worldwide. The roles of PHC cannot be overemphasize in immunization by providing equitable access to vaccines, ensuring their proper storage and distribution, and engaging communities in vaccination programs. PHC supports WASH programs by promoting safe water use, hand hygiene, and waste disposal, reducing disease transmission. Findings indicated adjusted odds ratio for diarrhea was found to be 33% greater in children who did not reside in WASEP communities than in those who did. Primary healthcare in emergency preparedness carry out significant functions in numerous ways with regards to re-emerging infectious disease prevention and control.

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1. Introduction

Primary health care **(**PHC) was structured to stand as a health emergency response point for management of health risks. It roles include but not limited to prevention and mitigation of health risks in order for communities' and countries' to develop resilience to disease cycle (Lamberti-Castronuovo et al., 2024). PHC as an essential component of a nation's healthcare tiers serving as a focal point of each community's socioeconomic growth. For people, communities, and entire national health system, PHC is the grassroots contact point linking individuals with health services (Moyegbone et al., 2020). Health Centers (HC) being the hub of PHC perform majority of the initiatives in the public setting. It is imperative that Government at different tiers allocate large portion of annual budget to healthcare particularly HC where most of the health promotion and disease mitigation take place (Odoko et al., 2020). Records have it that the Nigerian government introduced the PHC as component of the national health policy in 1985 with emphasis on preventive medicine against curative medicine. The National Primary Health Care Development Agency (NPHCDA) was inaugurated in 1992 in order to control and implement PHC initiatives (Cueto, 2004). It is worthy of note that primary healthcare plays an important role including emergency preparedness and response to re-emerging infectious disease outbreaks. Studies has shown that PHC employees play essential roles in response to health emergencies worldwide. Their roles in control of pandemic disease outbreaks are indispensable through different strategies such as isolation, containment, quarantine, infection prevention, and public health education (Zhang et al., 2024).

PHC workers need to be equipped with the basic skills and abilities such as rapid response, effective communication, collaboration with other health professionals, and judgement to manage health emergencies (Zhang et al., 2024). One of the main things affecting disaster response effectiveness to core competencies in disaster preparedness is a lack of PHC personnel (Park & Kim, 2017). Other essential factors that may contribute to PHC personnel' capabilities to respond swiftly to disasters or public health emergencies include educational status, personnel grade/step, work experience, level of training, knowledge and attitude to health emergencies (Zhang et al., 2024). This narrative review aimed to enumerate PHCs' roles in response preparedness, mitigation, control and management of infectious disease outbreaks in Nigeria with focus in Delta State.

2. Method

This evaluation followed a narrative literature review approach to elucidate relevant information. Published material from Nigeria, sub-Saharan Africa, and other parts of the world was searched and evaluated using search engines like PubMed and Google Scholar as well as the Mendeley reference library for citation. Variety of the key words used include 'roles of PHC in infectious disease outbreaks', 'community engagement in disease outbreaks', 'roles of PHC in psychological problems secondary to infectious disease outbreaks', 'disease surveillance and

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PHC', 'immunization and PHC', 'roles of PHC in vaccine delivery'. Additionally, each of the references were checked and reviewed appropriately for important information.

3. Results and Discussion

PHC provides essential healthcare services including health education, health promotion, disease control and prevention initiatives (World Health Organization, 2018a) in variety of ways discussed as follows:

Disease Surveillance and Early Detection

Disease surveillance (DS) refers to a systematic collection, collation, sorting, analysis, interpretation and dissemination of health-related information to health authorities for planning, implementation, and evaluation of public health interventions (Centers for Disease Control and Prevention, 2021). Early detection is referred to as prompt identification of unusual occurrence of disease patterns or disease outbreaks, thereby prompting emergency response measures to mitigate the disease spread (Lal et al., 2022). It is worthy of note that both DS and early detection are fundamental aspects of public health strategies design to mitigate and contain infectious disease outbreaks. PHC serves as first-point of contact among population at risk aimed to monitor disease patterns, identify warning signs early, and promptly respond to emerging diseases that threatens public health (World Health Organization, 2020). PHC through organized surveillance systems helps to identify onset of disease outbreaks, thereby, reducing socio-economic burden, morbidity and mortality (Agege et al., 2020; Moyegbone et al., 2022). PHC also helps to monitor the trends of diseases and report cases to the necessary public health authorities before outbreaks escalate (Lal et al., 2022). The various types of surveillance systems like passive surveillance, active surveillance, integrated disease surveillance and response (IDSR) e.t.c. are useful for data collection, enhancement of emergency preparedness and responses to infectious disease (World Health Organization, 2020).

PHC facilities participate actively in recording infectious cases like tuberculosis (TB), onchocerciasis, malaria, as well as cholera. It also monitors rate of hospitalization, mortality and morbidity patterns, as well as identify risk factors such as poor sanitation, overcrowding e.t.c contributing to disease outbreaks. For instance, in malaria-endemic regions, PHC clinics help in tracking fever cases and carry out test for malaria using the rapid diagnostic kits. Data collected helps in predicting seasonal outbreaks and deploy preventive and/or control measures like pesticides and insecticide-treated bed nets in order to mitigate infection rate (Nsubuga et al., 2019).

PHC facilities sometimes provide initial diagnostic services, such as rapid testing for COVID-19, HIV, TB, and malaria. Early identification allows for early treatment and reduces the likelihood of widespread dissemination of diseases (Dye et al., 2019). Many PHC facilities collaborate with reference labs in order to confirm and report cases of infectious diseases. Laboratory confirmation is a crucial component of disease surveillance in order to correctly diagnose and

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categorise cases. PHC facilities in collaboration with local laboratories provide the basic diagnostic services such as microscopic detection of parasitic diseases as well as Polymerase Chain Reaction (PCR) testing and confirming infectious agents (Dye et al., 2019). A good example of the roles of PHC was demonstrated in COVID-19 pandemic where PHC clinics helped with disease surveillance, reported symptomatic cases, performed quick antigen tests, and referred patients to specialized care. This made it easier to collect data and responded swiftly to public health emergency (Lal et al., 2022). Furthermore, in sub-Saharan Africa, PHC surveillance systems have been instrumental in tracking the patterns of malaria and other tropical infections and predicting seasonal outbreaks with a view to planning interventions (Nsubuga et al., 2019). Health workers performs vital roles in cases identification and classification based on clinical features. They notify public health authorities of suspected and confirmed cases, as well as putting prompt containment measures (such as patient isolation and contact tracing) in place (Zhang et al., 2024). Additionally, PHC uses volunteers and community health workers (CHWs) to track and identify infectious diseases at the local level, notify communities about early warning signals, report unusual symptoms, and identify probable cases. This approach strengthens passive and active surveillance efforts (Ali et al., 2015). CHWs link health systems with the communities; identifying early symptoms, reporting suspected cases, and educating residents on disease prevention. CHWs play key functions in visiting households to check for signs of emerging infections, reporting sudden deaths or clusters of illness in the community, and encouraging timely healthcare-seeking behavior among residents (Ali et al., 2015). A good example was demonstrated during Ebola outbreak in 2014–2016, in which CHWs at Sierra Leone and Liberia helped to identify new cases, ensured safe burials, and disseminated important public health information that significantly reduced the infectious disease transmission rates (Richards et al., 2019).

Immunization and Delivery of Vaccines

Immunization can be defined as the process of administering a vaccine to make someone resistant to an infectious disease, which promote the development of protective immunity (World Health Organization, 2018b). The systems and logistics involved in distributing, administering, and monitoring vaccines to specific populations are referred to as vaccine delivery (Lal et al., 2022). Immunization being the cornerstone of public health is an effective strategy for averting infectious disease outbreaks especially in children (Lal et al., 2022). This have been made possible through developments of modern technologies aimed to develop vaccines and medications more quickly and effectively. As a matter of fact, PHC facilities play crucial role in immunization by providing equitable access to vaccines, ensuring their proper storage using vaccine designed refrigerators, distribution, and engaging community volunteers in vaccination programs (Moyegbone et al., 2022; Rachlin et al., 2022) in order to reduce the illness and death linked to diseases that can be prevented by vaccination, like measles, diphtheria, polio, and influenza (Lubanga et al., 2024).

PHC contributions helps strengthen vaccine delivery and outreach programs towards the achievements of Sustainable Development Goals (SDGs), especially SDG 3 (Good Health and

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Well-Being), and Universal Health Coverage (UHC) (Chotchoungchatchai et al., 2020). However, there are numerous challenges that bedevils vaccine delivery and immunization efforts globally. They include hesitancy to vaccine, cold chain failure, logistical constraints, and resource limitations (Erassa et al., 2023; Goje & Kapoor, 2024). Vaccination plays a vital role in mitigating, controlling and eliminating infectious diseases especially in the tropical regions of the world. Evidence showed that immunization averts 2–3 million deaths annually associated with vaccine preventable diseases like tetanus, diphtheria, pertussis e.t.c (Rachlin et al., 2022). Real-time administration of vaccines lower the occurrence of new infectious diseases, reducing hospitalizations as well as healthcare costs especially in poor countries (Sáfadi, 2023). The outcomes from vaccines cannot be overemphasized in providing herd immunity due to a large percentage of immunized population, disruption of disease transmission and protection of unvaccinated individuals (Bullen et al., 2023). Vaccines also prevent resurgence of diseases like measles, yellow fever and polio (Lubanga et al., 2024). Of a particular interest, is the role of COVID-19 vaccine in controlling the pandemic due to mass immunization efforts (Lal et al., 2022). All these vaccine benefits would not have been achieve if there were lack or dysfunctional PHC facilities which serve as the frontline providers of immunization services by administering routine childhood vaccines (Kapuria et al., 2023). Additionally, PHC facilities provide booster doses of vaccines to individuals to ensure long-term immunity, especially among high-risk populations (Schnyder et al., 2024).

Health Education and Community Engagement

PHC facilities educate communities about hygiene, sanitation, and infection prevention measures, empowering individuals to adopt healthy behaviours (Ali et al., 2015). Community engagement through awareness campaigns helps combat misinformation and encourages compliance with public health guidelines during outbreaks (Hafez et al., 2024). Health education and community engagement are fundamental components of Primary Health Care (PHC) in preventing diseases, promoting well-being, and improving health outcomes (Erku et al., 2023). PHC serves as the initial point of contact with health services with individuals, providing education, awareness, and behavioural change interventions that empower communities to take responsibility for their health (Odoko et al., 2020; Shami et al., 2023). In fostering community participation, trust, and culturally appropriate health promotion strategies, PHC strengthens disease prevention, early detection, and healthcare-seeking behaviour (Haldane et al., 2019). This is particularly important for infectious diseases mitigation, chronic conditions, maternal-child health issues, and overall community well-being (Behera et al., 2021).

Health education being a planned learning experiences equip community members with adequate knowledge, skills, and motivation to enable them make informed decision about their health (Moyegbone et al., 2021). It is a critical tool for disease prevention, health promotion, and improving health literacy (Rizvi, 2022). Public health education and awareness can be achieved through social media, websites, and mobile apps usage in order to communicate needed information about developing diseases, how to prevent them, and what to do if infected. This can assist boost public awareness and prevent illness spread (World Health Organization, 2015).

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PHC facilities serves as a frontier for community engagement towards collaborating with individuals, groups, and organizations to identify health challenges, develop interventions, and implement solutions that are socially, culturally, and contextually relevant (Durrance-Bagale et al., 2022). Obligations of CHWs at the grassroots level of health services include; health education, data collection, prevention and treatment of local endemic diseases (Perry et al., 2016). They are employed in HCs to promote health seeking behaviours and healthy lifestyles among indigenous population. Ebola outbreaks showcased the unique roles of CHWs such as their collaboration with community leaders, house-house dissemination of health information, active cases search and contact tracing. They also helped local faith-based leaders expand their knowledge in educating their followers in order to reduce disease transmission during funerals and burials (Cole, 2015). PHC promotes mental health awareness, early intervention, and counselling services to support communities affected by stress, depression, and substance abuse (Kaswa, 2021). Sanitation and portable water supply are crucial components of PHC in preventing water-borne infectious diseases like cholera, malaria and typhoid (Hutton & Chase, 2017). PHC supports WASH programs by promoting safe water use, hand hygiene, and waste disposal, reducing disease transmission. In Pakistan for instance, Water and Sanitation Extension Program (WASEP) involved communities in latrine construction. WASEP empowered community members to construct latrines with locally made building materials, and foreign made materials should be less than 15% of the total cost. Hygiene-related behaviour and sanitation facilities awareness and practices were communicated to villagers using community-oriented health education efforts (WASEP, 2003). Between 1997 and 2001 WASEP conducted a case-control study to evaluate the project in selected villages in northern Pakistan. The project's goal was to provide a comprehensive package of activities including availability of drinkable water at the grassroots levels, knowledge, attitude and practices of hygiene behaviour. Findings showed that adjusted odds ratio for diarrhea was found to be 33% greater in children who did not reside in WASEP communities than in those who did (Nanan et al., 2003)

Ensuring Access to Essential Medicines

When considering treatment of locally endemic infectious diseases, PHC is an appropriate tool for increasing access to medicines (Sambala et al., 2010). Inequities, disparities and access to essential medicines are still public health issues for most people and countries worldwide (De Maeseneer et al., 2008). Health innovation and global trade rules (trade-related intellectual property rights (TRIPS) and neo-liberal economic policies) are major hindrance to direct supply of essential medicines. According to WHO, inadequate access to essential medicines in healthcare system will continue to be a public health issue unless the roles and principles of PHC are revised (Huynen et al., 2005). A fundamental part in Universal Health Coverage and Sustainable Development Goal is “access to safe, effective, quality and affordable essential medicines and vaccines for all”. In order to accomplish SDG target, PHC facilities being the first-point of interactions linking patients with health system must be functional and accessible (Wirtz et al., 2017). As a result of inadequate funding specifically for medical supplies and technology, availability of essential medicines is typically lower in PHC facilities (Rathish et al., 2017). In regard to this, there is an urgent need to ensure availability of essential medicines

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especially at the lower tier of healthcare services which will both increase access to health care and effective referral mechanism (Karumbi et al., 2020).

Mental Health and Psychosocial Support during Infectious Disease Outbreaks

Infectious diseases outbreaks can cause psychological distress. Mental distresses like fear, panic, denial and stigmatization have been recorded among some individuals during recent disease outbreaks (Agege et al., 2020). Of particular note, denial, anxiety and frustration were reported to be predominant among quarantined patients during SARS outbreak in Canada and Amoy Gardens in Hong-Kong (Lee et al., 2005). People may suffer from a variety of psychological traumas including witnessing the suffering and death of victims, directly experiencing the symptoms and unpleasant treatment when an infectious disease strikes (Fiorillo & Gorwood, 2020). Psychological trauma may also affect relatives of health workers due to their worries about risk of infection of their loved ones at work, family separation as a result of staying too long at work, fear of contracting diseases, and stigma that will follows if the worries become true. Social supports from families and relatives of individuals that contract diseases play critical roles in improving mental and physical health of patients (Gentry et al., 2022). Finding showed that while the prevalence of anxiety disorder following post infectious disease outbreaks ranged from 24-42%, depression ranged from 17–51% (Gentry et al., 2022). Infectious disease outbreaks can result in specific stressors including; physical isolation, pressure of the strict procedures to follow, burn-out syndrome, the risk of being contaminated and contaminating others, the fear of being infected since developing common symptoms like fever could be mistaken as diseases like, Ebola, COVID-19, the fear of death due to the high mortality rate of disease, abandonment of patients by family, resistance of the community to health authorities on burial rites during infectious disease outbreak (Okeafor et al., 2020).

In several countries, hospital-based psychiatric management are the only form of mental health-care available to individuals with mental health disorders (Funk et al., 2008). Many people neglect to seek the treatment they require because these facilities are frequently situated in large towns and cities, far from their homes (Funk et al., 2008; Moyegbone et al., 2020). If mental healthcare is made available in PHC, people will easily have access to treatment within the reach of their homes. This will unite patients with their families, maintain social support with friends and relatives as well as integrate them into their community (Funk et al., 2008). PHC help in increasing health literacy so as to reduce stigmatization and anxiety among community members in cases of mental disorders (Pappas et al., 2009). PHC workers provide home-based care to patients with infectious diseases, particularly during outbreaks or when hospital resources are limited. This includes follow-up visits, medication adherence support, and community-based treatment (Uneke et al., 2014; World Health Organization, 2007).

4. Conclusion

Primary healthcare is a vital component of the national tiers of healthcare system and a key component of community socio-economic development. Primary healthcare plays important

roles in infectious disease control, eliciting adequate preparedness response to public health emergencies. PHC serves as first-line defence by monitoring disease patterns, detecting early warning signs, and responding promptly to emerging health threats. Furthermore, PHCs play fundamental roles in immunization by providing equitable access to vaccines, ensuring their proper storage and distribution, and engaging communities in vaccination programs. Another vital obligation of PHC is providing education, awareness, and behavioural change interventions that empower communities to take control of their health. Timely diagnosis of infectious diseases facilitates early treatment and risk reduction of widespread transmission.

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