



MENINGITIS; THE RESIDENT GUEST AND THE HEALTH CARE SYSTEM IN NIGERIA (A CASE OF 2017)

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AUTHORS' CONTRIBUTIONS

This work was carried out in collaboration among all authors. Author BA designed the study, performed the statistical analysis, wrote the protocol and wrote the first draft of the manuscript. Authors AC and LA managed the analyses of the study. Author BA managed the literature searches. All authors read and approved the final manuscript.

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Review Article

ABSTRACT

This article seeks to review the preparedness of the health care system in the last outbreak of meningitis in Nigeria that has come to be our residential guest. Nigeria is one of the 26 countries within the extensive region of sub-Saharan Africa known as the "meningitis belt," where large epidemics occur. The outbreaks peak in the dry season in certain states is due to the low humidity and dusty conditions and usually end as the rainy season approaches. Meningitis is a tough disease and it is associated with overcrowding, which is why Nigeria records some of the highest incidences of the disease on the continent. Concerted efforts should centre on bringing the outbreak under control, as all stakeholders must work towards preventing outbreaks of this scale in the future. It is expected that States take ownership of outbreak preparedness and ensure that all efforts put into preparedness translate to meaningful action for response. Hence local and international collaborations cannot be overemphasized in managing the epidemic.

Keywords: Meningitis; outbreak; resident guest; season; Nigeria.

1. BACKGROUND

Nigeria experienced an outbreak of Cerebrospinal Meningitis (CSM) in 2017 that spread across the country and mostly affecting States in the upper parts of the country which fall within the African Meningitis Belt. Other Countries that faced similar outbreaks include our West-African Neighbours like Niger, Chad, Cameroun, Togo, and Burkina Faso. The larger African Meningitis Belt consists of 26 Countries that stretch from Senegal, Gambia and Guinea Bissau in the west coast to eastern countries of Eritrea and Ethiopia [1].

Although that was not the first time or the worst Epidemic ever faced by Nigeria, this round of epidemic has come with a difference, as all previous epidemics were caused by *Neisseria Meningitidis* type 'A' but this last one recorded *Neisseria Meningitidis* type C in epidemic proportion for the first time [2].

Historically, the worst CSM epidemics experienced in Nigeria occurred in 1996 when about 109,580 cases and 11,717 deaths were recorded, followed by the one in 2003 (4,130 cases and 401 deaths) then in 2008

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(9,086 cases and 562 deaths) and in 2009, when 9086 cases and 562 deaths were recorded [3].

These historical records and past experiences influenced Health Authorities in Africa (especially countries within the African Meningitis Belt), the World Health Organization and Many Development Partners to roll out a strategic intervention for the effective prevention of such epidemics [4]. This gave birth to the mass vaccination campaign using a new conjugate vaccine called the “MenAfriVac-A” in about 16 out of the 26 Vulnerable countries (including Nigeria). This resulted in a reduction of over 94% incidence of the disease in those countries, thus significantly reducing the risk of type A [5].

Therefore, the objective of this article seeks to review the preparedness of the health care system in the last outbreak of meningitis in Nigeria that has come to be our residential guest.

2. EPIDEMIOLOGY OF MENINGITIS

Epidemic meningitis is often caused by, *Neisseria meningitidis* Sero-group A, B and C (meningococcus) [6,1]. Other Sero-groups X, Y, W13 rarely cause epidemics. Meningitis is common in sub-Saharan Africa Countries like Benin, Burkina Faso, Chad, Niger, Nigeria and Mali which made up the Meningitis belt where large scale epidemics occur after every few years [7].

In Nigeria, cases can occur all through the year and increase during the dry season, however, an epidemic threshold is used to differentiate epidemic emergence from simple seasonal rise in incidence. Epidemic meningitis diseases caused by the meningococcus bacteria is common in Nigeria. In 1996 over 3,386 people died of meningitis in Nigeria. In 1998, the disease killed 11,717 of the 109 580 recorded cases [4]. The subsequent epidemics of 2009 affected 19 of the 35 states with a case fatality rate (CFR) of 7.9%. There was also an epidemic in 2010 in Yobe state [8].

After mass vaccination campaign using a conjugate vaccine targeted at the predominant *N. meningitidis* sero-group A between 2011-2014, an epidemic of sero-group C was observed in 2015 in Kebbi & Sokoto. In this, there were 652 cases and 50 deaths [9].

2.1 Meningitis Outbreaks around the World

Since the 1970s serogroups A, B, and C have accounted for 90% of meningococcal disease globally; before then serogroup A was dominated in African and European countries [10,3]. Outbreaks due

to serogroup A have also been reported in Russia and Greece in the 1960s and 1980s, although epidemics have not been observed over these times across Europe [11,12]. Over the last decade, there has equally been a noticeable increase in the incidence of disease caused by serogroups W135 and Y particularly among adults and the elderly [13].

Serogroup A was the dominant cause of infections in Europe and Africa before and during both World Wars but largely disappeared after World War II [14].

2.2 Track Records of Meningitis Outbreaks in Nigeria

As one of the countries within the Meningitis Belt, Nigeria has recorded outbreaks in the past. Up until recently these outbreaks were caused mostly by *Neisseria meningitidis* serogroup A (NmA). These outbreaks occur in the dry season, due to its low humidity and dusty conditions and usually ends with the onset of the rainy season. The 2009–2010 West African meningitis outbreak is an epidemic of bacterial meningitis which has been occurring in Burkina Faso, Mali, Niger, and Nigeria since January 2009, an annual risk in the African meningitis belt. A total of 13,516 people were infected with the meningitis, and 931 death were recorded [1]. Nigeria has been the most adversely affected, with over half of the total cases and deaths occurring in its nation [8].

In the past, the worst CSM epidemics experienced in Nigeria occurred in 1996 when about 109,580 cases and 11,717 deaths were recorded, followed by the one in 2003 (4,130 cases and 401 deaths) then in 2008 (9,086 cases and 562 deaths) and in 2009, when 9086 cases and 562 deaths were recorded [15,16].

In December 2010, a new meningococcal A conjugate vaccine was introduced nationwide in Burkina Faso, and in selected regions of Mali and Niger (the remaining regions were covered in 2011), targeting persons 1 to 29 years of age. As of June 2015, 220 million persons have been vaccinated with this vaccine in 16 countries; Benin, Burkina Faso, Cameroon, Chad, Côte d’Ivoire, Ethiopia, The Gambia, Ghana, Guinea, Mali, Mauritania, Niger, Nigeria, Senegal, Sudan, and Togo [17].

2.3 Outbreak Trends

Meningococcal meningitis occurs in small clusters throughout the world with seasonal variation and accounts for a variable proportion of epidemic bacterial meningitis. The largest burden of meningococcal disease occurs in an area of sub-

Saharan Africa known as the meningitis belt, which stretches from Senegal in the west to Ethiopia in the east [18]. During the dry season between December to June, dust winds, cold nights and upper respiratory tract infections combine to damage the nasopharyngeal mucosa, increasing the risk of meningococcal disease. At the same time, transmission of *N. meningitidis* may be facilitated by overcrowded housing and by large population displacements at the regional level due to pilgrimages and traditional markets. This combination of factors explains the large epidemics which occur during the dry season in the meningitis belt [13].

Following the successful roll-out of the MenA conjugate vaccine, epidemics due to *N. meningitidis* serogroup A are disappearing, but other meningococcal serogroups such as NmW, NmX and NmC still causes epidemics albeit at a lower frequency and smaller size [17].

2.4 Current Outbreak in Nigeria

As at 30th May 2017, the number of affected LGAs still remains 230 in 25 affected states, including the Federal Capital Territory. Total number of suspected cases reported so far is 14,473. Of this, 998 samples have been tested. 460 (46.6%) of the samples tested have been confirmed positive for *Neisseria meningitidis* and 80.6% (371) have been positive for *Neisseria meningitidis* serogroup C. The total number of deaths recorded so far was 1,155 with a case fatality rate (CFR) of 8%. This current outbreak started in Zamfara State in the 50th week of 2016 i.e. November 2016, Weekly Epidemiological Report (2017).

3. STANDARD STRATEGY RESPONSE EXPECTED

World Health Organisation promotes a strategy comprising epidemic preparedness, prevention and response [3].

- Preparedness focuses on surveillance, from case detection to investigation and laboratory confirmation.
- Prevention consists of vaccinating all 1-29-year-olds in the African meningitis belt with the appropriate conjugate vaccine. WHO regularly provides technical support at the field level to countries facing epidemics?
- Epidemic response consists of prompt and appropriate case management with reactive mass vaccination of populations not already protected through vaccination.

3.1 What to do to Contain the Disease

On getting information about the outbreak, procuring vaccines and drugs to contain the spread of the deadly disease becomes a major concern for international health agencies, the federal government, state governments, local governments and concerned individuals across the globe [19].

4. HOW PREPARED WERE WE (NIGERIA FACTOR)?

The current outbreak in Nigeria and the fatality that it recorded in the process have revealed the rotten underbelly of Nigeria's response to outbreaks of sicknesses and diseases that have been with it for decades. That the CSM, a disease that had been the fate of some parts of the country for years could catch the Nigerian medical authorities napping can only suggest governmental tardiness which on the surface, the Nigerian medical authorities had a strong defence in their response to allegation of unpreparedness. According to the Ministry of Health, while the country had always been afflicted by the outbreak of serotype A and was prepared for its attack through millions of immunisation drugs every year, the serotype C that suddenly erupted was not anticipated at all, since it was alien to the country [5]. As a result of this suddenness, 839 Nigerians lost their precious lives [2].

What makes this excuse unacceptable is the proactiveness by government and all its agencies for occurrences that should logically be anticipated because CSM is not a strange ailment in Nigeria. Indeed, the ecology and geography of many states in the northern part of the country are so conducive to the disease that the possibility of perennial attacks is very high. Having established this fact, a proactive government would not have rested on its oars, waiting for that same ailment to attack it yearly. Such a government would have anticipated that there was the possibility that out of the two other serotypes B and C, the country stood the possibility of a variant serotype attacking it suddenly. This is so because the serotypes bear similar manifestations [9].

The meningitis serotype C outbreak is said to occur frequently in the African meningitis belt [6] Reportedly, Burkina Faso, before now and specifically in 1979, was the latest victim of the serotype [20]. Médecins sans Frontières (MSF), which has been at the vanguard of the curtailment of the outbreak of the disease in the north western part of Nigeria since 2007, is said to have failed to closely monitor this move. However, in 2013, a novel strain was discovered in Sokoto State, followed by another

smaller outbreak in the contiguous Kebbi State in 2014. Details of the serotype samples were collected from patients and sent to the WHO Reference Laboratory in Oslo, Norway, where analyses were performed [5].

The point is that government must accept that its inability to proactively engage the CSM serotype C caused the death of at least 839 people. The delay in procuring vaccination and the consequent deaths of these Nigerians should have been averted.

4.1 Lesson Learnt

As the outbreak declines gradually, it is important that every State affected or not, reviews lessons from preparedness and response activities during the outbreak. Conducting reviews will provide insight into levels reached for preparedness, details of outbreak response, identifying gaps and areas that need to be strengthened, identifying areas of collaboration and support the evaluation of systems. Reports from this can be channelled into preparedness plans for the next outbreak season [21].

Lessons to be learnt from this outbreak cuts across all thematic areas in outbreak response.

1. **Coordination:** Development of Preparedness plans for disease outbreaks which should also be used as a tool for advocating for resource allocation. Constitution of Rapid Response Teams (RRTs); Early engagement of key stakeholders and partners with leadership from the State Government.
2. **Surveillance:** Improvement in the surveillance systems starting from the health facility level to the National for immediate case detection, notification and subsequent investigation; Improved data management systems at all levels; Improve bio surveillance activities for rumour capturing and verification; Capacity building for healthcare workers and disease surveillance and notification officers.
3. **Case Management:** Development or review of disease guidelines and protocols, Capacity building for case management team.
4. **Laboratory:** Improved turn-around-time for sample confirmation and result sharing; Capacity building on sample preservation and transportation, Improve stockpiling of testing commodities.
5. **Logistics:** Early forecast of outbreak commodities, Mapping and Pre-positioning of commodities in States, LGAs or Wards based on data review of previous outbreaks.

6. **Risk Communication:** Early community sensitization and mobilization in States and at the National level, Early engagement of the mass media for sensitization programs and extended use of diverse communication tools [22].

5. CONCLUSION

In view of the above, it is therefore imperative that mass immunization with polysaccharide conjugate vaccines must be an improved method and reliable strategy for the prevention of meningococcal disease in any other occurrence in order to control mortality rate associated with an epidemic of this reemergence of serogroup C meningococcal disease and concerted efforts should centre on bringing the outbreak under control, as all stakeholders must work towards preventing outbreaks of this scale in the future.

6. RECOMMENDATIONS

Disease-specific outbreak reviews should be a routine activity following an outbreak as it Provides guidance on improvement opportunities and next steps to take. The Nigeria Centre for Disease Control (NCDC) should continue to support and collaborate with States so as to plan to prepare for subsequent seasons of CSM outbreaks, and indeed, other outbreaks and events of public health concern. It is expected that States take ownership of outbreak preparedness and ensure that all efforts put into preparedness translate to meaningful action for response.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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