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# NNT Elimination and the Nigeria's Health System: Where is the Missing Link

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**Abstract:** In 1994 when the global neonatal tetanus (NNT) elimination campaign started gaining momentum, there were 104 out of the 161 developing countries that achieved the NNT elimination in 2000 with 24 other countries close to achieving. Nigeria is among the remaining countries that are yet to achieve the global NNT elimination target as set by the WHO. Although Nigeria plays a strategic role on the African continent, the government has failed to uphold the goals of the universal basic primary health care; this made the healthcare system operating below the minimum expected standard. The problems are more pronounced in the public health sector where there is a lack of timely information to combat infectious and communicable diseases, inadequate tracking of disease outbreaks to adequately treat and preventive further spread, poor surveillance and infectious disease tracking procedures; the adverse of all these would be health insecurity potentially endangering our security as a nation.

**Keywords:** Neonatal Mortality, Neonatal Tetanus, Surveillance System, Vaccine Stock-Out, Health System

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## 1. Introduction

Still much needs to be done to ensure that neonatal tetanus (NNT) is totally eliminated across the globe; this is notwithstanding the significant achievement made in the global fight against maternal and neonatal tetanus (MNT) as evidenced by recorded success in immunizing at least 118 million women in 50 countries<sup>1</sup>. This effort has further helped in the elimination of MNT in Mozambique, China, Turkey, Sierra Leone, Burundi Liberia, Laos, and recently Madagascar in June 2014<sup>1</sup>. The global NNT elimination campaign began in 1988, when the WHO estimated that around 787,000 newborn annual deaths attributed to Neonatal tetanus (NNT); thus as an estimated proportionate mortality rate due to NNT, this translates to 6.7 deaths per thousand live births<sup>1</sup>. Still, at the 42nd World Health Assembly (WHA) held in 1989, this alarming statistics made public health leaders to call for the total elimination of maternal and neonatal tetanus (MNT) by 1995; this deadline was later reviewed to 2005, and then subsequently 2015 to allow other remaining NNT prevalent countries to meet with the revised deadline<sup>2</sup>. Importantly, the number of NNT cases that reports to the health facilities especially in the developing countries was estimated at about 5%; this is in spite the increased

commitment from governments of NNT countries. Consequently, the actual NNT death rates are greater than what the surveillance system captures, further challenging the sensitivity of the NNT surveillance system in the under-developed countries<sup>2,3</sup>.

## 2. Neonatal Tetanus

The neonatal tetanus (NNT) is a bacterial disease caused by clostridium tetani that are found especially in soil, dust and animal faeces. This disease of the newborn, which is grossly underreported in the developing countries, is preventable by administering minimum of two doses of the TT. The neonatal tetanus is one of the most underreported diseases in the developing countries seen in the newborn within the first 28 days of life. The disease NNT, which has a high case fatality rate of between 70% to 100%, is considered as one of the leading causes of deaths among neonates in the developing countries with about 130,000 neonatal deaths recorded in 2004<sup>4-6</sup>.

It has been shown that this vaccine preventable disease, typically contracted through unhygienic childbirth practices, kills one newborn child every eleventh minute and approximately 134 babies daily<sup>1</sup>. The disease occurs within the first 4-14 days of birth (average of 7 days) when an

unimmunized pregnant mother gave birth to an unprotected child through unhygienic birth practices<sup>5</sup>. The unhygienic birth practices include delivery of a newborn by an untrained and unskilled traditional birth attendant (TBA), delivery through unsanitary conditions, cutting the umbilical cord with unsterilized or contaminated sharp instruments (such as scissors, kitchen knife, blade), and dressing of the cord with a cow dung, ghee/surma or charcoal<sup>7-11</sup>.

The clinical signs and symptoms of the NNT can start manifesting as early as the 3rd and up to the 28th day after delivery. Often the history is that an apparently healthy newborn that hitherto sucks the breast suddenly stopped sucking. The picture of a child is that of a progressively more rigid newborn, with painful convulsions and arching of the whole body. However, some of the NNT cases do not have a classical presentation but rather the symptoms are atypical with mothers having difficulties in recognizing it and eventually go unreported<sup>6-9</sup>.

The bed-rock of treatment for this disease in addition to good nursing care of a newborn child in a specialized health centre is the use of antitetanus serum, intravenous penicillin, anti-convulsions, open dressing of the umbilical cord, sedation and avoidance of stimulants that trigger spasms, and use of supplemental oxygen for the child to breathe<sup>6</sup>.

It was observed that vaccination of pregnant women with the tetanus toxoid vaccine is one most important intervention towards reducing mortality due to neonatal tetanus in both low and middle-income countries<sup>12</sup>. Additionally, there is the need for regular and effective antenatal checkups by pregnant mothers and clean delivery practices.

In a study conducted on NNT in a tertiary health centre in northeastern Nigeria, NNT accounted for a significant cause of neonatal morbidity and mortality with a prevalence of 4.9% and a case fatality rate of 66.7%<sup>13</sup>. The unacceptable high prevalence and mortality in a tertiary health centre could be related to poor immunization coverage of mothers as only 9.8% of the mother of NNT children had full immunization. As shown in other similar studies, other factors to the high prevalence include harmful cultural practices of caring for the umbilical cord such as hot fomentation, application of charcoal amongst others<sup>14-16</sup>.

### 3. The Global NNT Elimination Initiative

The global NNT elimination initiative aims to reduce maternal and neonatal tetanus to a level that is no longer a major public health problem. The initiative requires achieving immunization of pregnant women and other women of reproductive age (WRA), the practice of hygienic deliveries, and hygienic caring of the umbilical cord<sup>2,3</sup>. The hygienic caring of the umbilical cord aims to avoid infection by bacteria of all sorts especially the tetanus bacteria from reaching the umbilical cord of the neonates. The umbilical cord care is done by keeping the cord clean through rubbing the base of the cord with a methylated spirit, use of Goldenseal root and Echinacea, adequate ventilation to keep the area dry, or use of sponge bath up to the time when the

cord falls off to allow the cord to heal naturally<sup>3,17</sup>.

Starting from 1994 when the NNT elimination campaign started gaining momentum, there were 104 out of the 161 developing countries that achieved the NNT elimination in 2000 with 24 other countries close to achieving<sup>1,2</sup>. This significant achievement resulted in a drastic decrease in NNT deaths globally from 470,000 to 215,000. In spite of the appreciable drop in the number of NNT cases that was attributed to the global NNT elimination campaign and the millennium development goals (MDG) target four<sup>18</sup>, it is overwhelming to note that NNT still remain among the leading causes of death in 24 developing countries<sup>1-3,6</sup>. In a community-based survey conducted to assess the incidence of NNT, the outcome clearly shows NNT as a major contributor to neonatal deaths. The two main factors attributed to this include erosion of confidence in immunization by parents and lack of clean deliveries by those who deliver at home<sup>19</sup>.

In collaboration with partner agencies such as the WHO and UNICEF, and other stakeholders in the same direction, the 24 remaining countries that have NNT shows increase commitment toward meeting with the 2015 NNT elimination deadline. Likewise, the emergence of the MDG in 2000 has positively contributed to the reduction of the neonatal death rates most importantly NNT; this is through improvement in both childhood immunizations and maternal health<sup>1,18</sup> as enshrined in the fourth MDG goal. The fourth MDG goal aims to reduce mortality rates among children under the age of 5 years by two thirds at the end of 2015. Globally, the number of deaths in children under the age of 5 worldwide has dropped from more than 12 million in 1990 to 7.6 million in 2010<sup>20</sup>. Notably, the under-five mortality rate especially in the sub-Saharan Africa region, which is the largest contributor of under-five mortality across the globe, has dropped from 1.2% annually between 1990-2000 to 2.4% annually from 2000-2010<sup>20</sup>. It has been shown that one of the contributors to the high MNT prevalence in the developing countries is the lack of skilled health professionals to attend to pregnant mothers and their newborn; hence the need to advocate for free access to quality ANC during pregnancy to achieve the global reduction in both maternal and neonatal mortality rates<sup>20</sup>.

While there is an appreciable drop in child mortality rate globally, the progress is rather sluggish in the sub-Saharan Africa and Southern Asia regions with a recorded 6.2 million child deaths in 2010, which translates to about 82% on a global scale<sup>20</sup>. Although between 1990 and 2010 there was an appreciable increase in the proportion of deliveries that were attended by skilled health personnel in the developing countries from 55% to 65%, the coverage from the sub-Saharan African is not encouraging as it falls short of the 65%. This is not surprising as in 2010, about half of the pregnant women in the sub-Saharan African region did not achieve the recommended WHO minimum of four ANC visits<sup>6</sup>. Of the small proportion of mothers who received the ANC visits, it is vital to mention that the quality of care obtained is dismal<sup>20</sup>.

In public health practice, immunization and surveillance are two important measures that aims to control and eliminate vaccine preventable diseases. In the current global NNT elimination plan, the rationale for NNT surveillance is to ensure that all suspected cases are captured for further investigations to be carried out, treatment commenced, causes established and further actions taken. The global NNT elimination aims to enshrine these three primary strategies in the primary healthcare systems of countries<sup>1-3,7</sup>:

- Vaccination of pregnant women with Tetanus toxoid
- Hygienic delivery of the newborn
- Identifying high-risk areas to implement corrective action in the form of immunization of women of childbearing-age.

The prevalence of NNT in the developing countries is higher in the underserved communities that have lower social status, lack educational background, have low per capita income, and lack access to quality healthcare. Additionally, health inequity, poverty, illiteracy, cultural barriers, and beliefs, results in unhygienic birth practices. The resultant effect of these is the exposure of the umbilical cord to the tetanus bacteria<sup>4,5,21,22</sup>. Thus, an increase in prevalence of NNT among the poorest and least developed countries of the world clearly indicates the growing health inequity and equality. As progress continues to be made globally, there are 24 countries, all of which are underdeveloped, that have not reached the MNT elimination status. Furthermore, 16 out of the 24 countries with NNT are from the African continent: Angola, Burkina Faso, Cameroon, Chad, Cote d'Ivoire, the Democratic Republic of Congo, Ethiopia, Guinea-Bissau, Liberia, Mali, Mauritania, Mozambique, Niger, Nigeria, Senegal, and South Sudan. These 16 countries account for 90% of the global NNT cases<sup>1-3,7</sup>.

#### 4. Nigeria's Health System

Nigeria, a secular country that gained independence on October 1, 1960 from Great Britain, is the most populous country in Africa. The country has an estimated population of 180,049,322<sup>23</sup>. It is interesting to mention that Nigeria has great cultural diversity with 374 identifiable ethnic groups<sup>24,25</sup>. With English as the country's official language, there are other languages that are widely spoken; these languages include Hausa, Yoruba, Igbo (Ibo), and Fulani. The country has a birth rate of 38.03 births/1,000 population, which makes it 12th in the world. Additionally, Nigeria has a death rate of 13.16 deaths/1,000 population, positioning it as 19th in the world (2014 est.). The country's Maternal Mortality Rate (MMR) is 630 deaths/100,000 live births (2010) occupying 11th position in the world and the Infant Mortality Rate (IMR) 74.09 deaths/1,000 placing it 10th in the world. The health expenditure of Nigeria as at 2011 was 5.3% of GDP, which is 127th in the world, with 0.4 physicians/1,000 population (2008), and hospital bed of 0.53 beds /1000 population<sup>25</sup>.

Although Nigeria was misruled by the military for 22 years before its return to civilian rule in 1999, the country

sustained damages to the social, political, ethnic and geographic lines during the political and economic crises and conflict early in the 20th century<sup>26</sup>. The misrule, which undermined the authority and legitimacy of the state apparatus, resulted in decay of the health care infrastructure posing threat to the public health sector, with enormous social and economic challenges<sup>26</sup>. In spite the rebasing of the Nigeria's economy in April 2014 that placed the country as Africa's largest economy because of its 2013 GDP estimated at US\$ 502 billion, the economic diversification and strong growth recorded have not translated into a meaningful decline in poverty levels; this is because over 62% of the population live in extreme poverty<sup>25</sup>. Among other factors, bad governance and increasing corruption in all sectors poses an additional challenge to the country's development; the resultant effect of these is the widening gap between the rich and poor leaving the citizenry to run a distressing life. This is more pronounced in the northeast region of the country where there is a rising level of illiteracy and increasing insecurity in the region.

Although Nigeria plays a strategic role on the African continent, the Nigerian government has failed to uphold the goals of the universal basic primary health care; this made the healthcare system operating below the minimum expected standard. The health care sector in Nigeria has suffered gross neglect for decades, the resultant effect of which is a lack of functional health facilities, lack of qualified personnel, lack of diagnostic medical equipments to mention but a few; these problems are even worse in the rural areas<sup>27</sup>. However, the problems are more pronounced in the public health sector where there is a lack of timely information to combat infectious and communicable diseases, inadequate tracking of disease outbreaks to adequately treat and preventive further spread, poor surveillance and infectious disease tracking procedures; the adverse of all these would be health insecurity potentially endangering our security as a nation<sup>27</sup>.

#### 5. The Missing Link

Although successive governments have embarked on several reforms towards addressing the wide range of issues in the epileptic health sector, much of these are yet to be implemented especially at the state and the local governments. The government has failed to create a health care system that would information-rich and patient-focused to reliably deliver high-quality care to its citizenry<sup>27</sup>.

The Nigerian government, in its effort to save the deteriorating health sector from total collapse, held a national health conference in 2009. The outcome of the conference underscored the fact that the health care system is decaying, and the quality of care is sub-standard. Factors to this include lack of coordination on how health care programmes are executed, disintegration of the services, scarcity of resources, stock-out of vaccines, essential drugs and other hospital consumables, inadequate infrastructure, imbalance on allocation of resource, and non-functioning primary health

care in the rural areas. The causes to these problems include corruption in a top-bottom manner, and lack of clarity on roles and responsibilities at different levels of government<sup>27</sup>.

The Nigeria's health sector, despite decentralization of activities as part of the health reforms, is not serving the populace especially those down the social ladder. Some of the reasons for this include competing health priorities, insecurity, and deterioration in the socioeconomic aspect of life across Nigeria. The resultant effect of this is high attrition rates of health personnel because of poor motivation, and lack of capacity building especially in immunization. In line with the EPI objectives of eliminating VPDs in Nigeria through building up of population immunity, there is a need to strengthen capacities of health workers that will support quality immunization service delivery at the various health facilities. The capacity building should be targeted at ensuring strengthening of capacity to cope up with the immunization challenges, accelerated disease control and the introduction of new vaccines amongst other innovations. Furthermore, there is a need to recruit additional health workers at the various health facilities to serve the hard-to-reach areas who need the immunization service most and where cases of NNT are seen especially<sup>28</sup>.

In an attempt to improve on the sensitivity of the NNT surveillance system, the WHO recommended the use of NNT case-based investigation as part of strategies for countries to achieve the NNT elimination target. The NNT case-based surveillance, in addition to improving the sensitivity of the NNT surveillance system also aims to ensure that all suspected NNT cases are fully investigated<sup>1,2</sup>.

In 1997, the effort of the Nigerian government towards addressing the problem of inadequate vaccine coverage among pregnant women and women of childbearing age, and towards achieving the elimination strategy was the replacement of expanded programme on immunization with the national programme on immunization<sup>29</sup>. It was observed also that this change did not yield significant differences in the prevalence and case fatality rates of NNT<sup>30</sup>. The NNT case-based surveillance established by the WHO is aimed at investigating individual records of suspected NNT cases. In its effort to strengthen its NNT surveillance and ensure that no NNT is missed, the Nigerian government commenced the NNT case-based surveillance in 2007.

As part of measures by the Nigerian government to achieve the NNT elimination, the government adopted phased elimination of NNT focusing on the Southeast and Southwest in 2013-2014 then followed by the other remaining four zones<sup>13</sup>.

In spite the strategies put in place by the Nigerian government towards NNT elimination, the strategies in Nigeria could arguably be said that it has not yielded appreciable results. The missing link to this include lack of political commitment on the part of the Nigerian government, widening disparity in accessing healthcare services especially between those in the rural and urban centres, increasing health inequity and inequality, non-functioning health systems especially in the rural areas, underreporting of NNT

by health facilities especially those in the rural centres, lack of sensitivity of NNT surveillance system to detect NNT cases, lack of proper understanding of NNT case definitions by the disease surveillance and notification officers (DSNOs), lack of community awareness of NNT, and cultural barriers from utilizing antenatal care services by pregnant mothers where available.

### 5.1. Neonatal Tetanus Surveillance System

This is the process of systematic collection and evaluation of relevant data with timely communication of the results to relevant authorities for prompt action. NNT surveillance is an important tool in the global NNT elimination game plan. Although the surveillance for NNT cases operates in various ways, the ones in use include active surveillance, passive surveillance, case-based surveillance, community surveillance, and epidemiological surveillance<sup>31</sup>.

The case-based surveillance, which Nigeria started in 2007, is done through collection of specific data on each suspected NNT case reported. Other recommended NNT surveillance in the current global elimination strategy include active surveillance conducted in major health facilities on a regular basis (and at least once a year); community surveillance conducted in silent areas when routine reporting is not functional but where based on other indicators NNT poses a problem); passive surveillance is conducted by looking for NNT cases from records of health facilities, and epidemiological surveillance in which high-risk areas are identified so as to monitor the impact of interventions. Furthermore, all hospital-reported NNT cases are considered as a confirmed case since diagnosis is purely clinical and do not depend upon laboratory or bacteriological confirmation. Still, as part of the surveillance, the number of confirmed NNT cases which must be routinely reported in the monthly surveillance reports of all countries must be separated from other non-neonatal tetanus cases. As part of the strategy, it is paramount also to underscore the fact that zero reporting of NNT cases is required at all levels. However, in low risk geographical areas (incidence < 1/1,000 live births with effective surveillance), any suspected case should be investigated to confirm the case and identify the cause<sup>31</sup>.

### 5.2. Vaccine Stock-Out

Although the issue of vaccine stock-out could arguably be said that it is no longer an issue in Nigeria since there are availabilities of vaccines at all times, there are occasions when mothers attend ANC centres without getting vaccinated; this is due to either lack of a functional refrigerator because of faulty solar systems or lack of stable electricity to store viable vaccines, or lack of adequate health care worker to attend to these mothers who often came on foot and from far areas to access these services<sup>28</sup>.

The cold chain and logistics are key towards ensuring that vaccines, cold chain equipment, and other supplies meet the needs of the targeted group at all levels. Although there are adequate quantities of in-date potent vaccines at all levels in

Nigeria, some of the reasons for mothers not accessing the tetanus toxoid vaccination include faulty solar refrigerators and lack of stable electricity supply to power the cold chain equipment to preserve vaccines and have a session running. The two elements considered essential to EPI operations are cold chain and logistics; these elements effectively addresses the issues of vaccine stock-out and shortages of other supplies that include syringes and cold chain equipment. It has been shown that there is an estimated over 130 million doses of vaccine that are delivered annually; these supplies could only reach 50-80% of the 25 million under-one children in the 46 countries<sup>28</sup>.

The WHO, in its effort to address the issue of logistical supplies, started conducting training sessions for logisticians beginning 1999 from each of the 36 countries with Nigeria in attendance. It is overwhelming to note that the trained staff are rarely given the task of the entire logistics function. Often the national logisticians performed less than half of the 15 essential tasks of a logistics manager. Furthermore, the failure to routinely manage logistics operations is as a result of lack of coordination thus crippling distribution and handling of the vaccines, transportation as well as the safe administration of the vaccines<sup>28</sup>. Although there are some improvements in Nigeria in recent times, still much needs to be done.

The other important element is the quality of the cold chain system. It is on record that the cold chain equipment has reached their aging lifetime and hence the need for replacement with new functional equipment. Several studies indicated that one of the main reasons for the low coverage seen in several areas is as a result of lack of transportation; this adversely affects achieving the minimum coverage as well as disease reduction targets. These problems are more commonly seen in the northern Nigeria and especially the northeast region because of the terrain and a large number of hard-to-reach settlements<sup>28</sup>.

The EPI program requirements include timely delivery of supplies of heat labile vaccines for the conduct of outreach immunization sessions in the rural areas and active surveillance of vaccine preventable diseases such as the NNT. These factors contribute to the repeated vaccine stock-out in the health facilities in the rural areas, discouraging mothers from accessing the antenatal service that is provided once or twice in a week. The negative effect of this is that mothers would not get the minimum required tetanus toxoid vaccination that protects them and their unborn children against the tetanus bacteria; this puts the mother and the unborn child at the risk of developing MNT<sup>28</sup>.

## 6. Conclusions

In an attempt to address these issues, there are suggestions on the need for Nigerian government to make basic obstetric care available and accessible to all irrespective of geographical location; to strengthen routine immunization in all healthcare centres; to make compulsory TT immunization to women of childbearing age; to improve health care delivery as measures that ensure NNT elimination and reduce

the associated NNT high case fatality rate<sup>32</sup>.

Furthermore, there is need to increase awareness among women to understand more about NNT and the benefit of tetanus toxoid vaccination, and to promote clean delivery services and hygienic caring of the cord<sup>16</sup>. Thus, achieving these require the political will and commitment on the part of the Nigerian government. The Nigerian government must put a framework that would reduce health inequity and equality by ensuring that pregnant women in the rural hard-to-reach underserved areas get equal access to quality antenatal care services. The cold chain system must be made functional in the rural areas to preserve the vaccines especially through the provision of adequate solar refrigerators. There is a need for at-risk mothers to be identified for this as well as to ensure that their newborn babies also receive good post-natal care<sup>33</sup>. The wake-up call is for Nigerian government and policy-makers to show increase commitment towards this noble goal to improve on the country's health indicators.

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