

# NEWBORN AND PRE-SCHOOL HEARING SCREENING LEGISLATION IN NIGERIA; CONCEPT, ISSUES AND SUGGESTIONS.

Braimah OE<sup>1</sup>, Oseghale EE<sup>2</sup>, Ediale J<sup>3</sup>

---

<sup>1,2,3</sup>Department of Ear, Nose and Throat, Head and Neck Surgery University of Benin Teaching Hospital, Benin City, Edo State.

---

## ABSTRACT

Hearing loss is a significant disability that is common in our environment. Hearing loss may be congenital with significant deleterious effects on subsequent language, cognitive, and social skills development. WHO recommends universal neonatal hearing screening in all countries and communities with available rehabilitation services and extension to other countries as rehabilitation services are established.

While there are many impediments to establishing a neonatal hearing screening programme in Nigeria, they can be circumvented. Legislation may be an important first step in this journey.

**Key words:** Hearing loss, neonate, screening programmes, legislation

## INTRODUCTION

Hearing loss is a significant disability that may occur at any age, however up to a quarter of the current burden of hearing loss occurs in childhood.<sup>1</sup> Every year about 6 children in 1000 live births are born with permanent sensorineural hearing loss in developing countries compared with 2 in 1000 live births in developed countries. Data from WHO shows that of about 7.5 million children below the age of 5 who have disabling hearing loss globally at least 80% reside in developing countries.<sup>2,3,4</sup> In Nigeria, an alarming hearing loss prevalence of up to 28 per 1000 live births was reported in a pilot study of neonatal hearing screening representing one of the highest rates worldwide<sup>5</sup>

A study by Okhakhu in Benin in 2010, found a high crude prevalence rate of 6.5%.<sup>6</sup> Neonatal hearing loss therefore is a major, but sadly, under-

recognized problem in our environment.

When hearing loss is undetected, it results in lack of or poor speech and language acquisition as well as poor academic performance and negatively affects social and emotional development.<sup>4</sup>

Legislation is an important part of public health.<sup>7</sup> Legislation on newborn hearing screening in other countries has resulted in higher newborn screening rates than voluntary screening<sup>8</sup> with resultant early detection of hearing loss in affected children and timely intervention. Sadly, not enough has been done as regards legislation to protect hearing in Nigeria.<sup>4</sup>

Studies have shown that there is a critical neurodevelopmental period during which auditory interventions may be instituted to allow for optimal speech, language development and academic outcomes.<sup>3,6,9</sup> This critical period is adjudged to be at less than 6 months of age.<sup>10</sup> In a comparative study of children who were identified with hearing loss and treated before 6

All correspondence to:  
Braimah Oghogho Eloghosa  
Department of ENT, Head and Neck Surgery.  
University of Benin Teaching Hospital, Benin City.  
E-mail- og\_odes@yahoo.com.

## Newborn and Pre-School Hearing Screening Legislation in Nigeria

months of age and those treated after 6 months of age it was found that those treated before 6 months of age were 1-2 years ahead of their late identified and treated peers in language, cognitive, and social skills.<sup>11,12</sup>

In the light of the foregoing the World Health Organization at the 48<sup>th</sup> World Health Assembly urged all countries to take appropriate steps towards the prevention and control of major causes of avoidable hearing loss and for early detection in babies, toddlers and children within the framework of primary healthcare.<sup>13</sup>

In the past only children considered to be high risk were screened for hearing loss at birth, however it has been found that up to 50% of children born with hearing loss have no known risk factors.<sup>14</sup> Hence, the concept of Universal Newborn Hearing Screening (UNHS) was born.

In developed countries with established universal programmes the average age at diagnosis of hearing loss is less than 6 months of age. In Nigeria, the average age of detection is over two years of age and in some cases as late as 6 years of age.<sup>6</sup> This has significant implications for intervention and rehabilitation as outcomes tend to be sub-optimal at older ages even with the best of care. A study by Olusanya in Lagos found that the average age for school enrolment of deaf children in special schools was 10.3 years compared to 6 years for other children.<sup>15</sup> Hearing loss and the resultant difficulty in communication has a marked effect on the cognitive development and social interactions of the child which may lead to frustration, behavioral problems and depression if left untreated. Untreated hearing loss results in significant educational costs for the family and the country. It also results in unemployment/under-employment with deaf people often earning lower incomes than their hearing peers.<sup>16</sup>

WHO recommends that a policy of universal neonatal screening be adopted in all countries and communities with available rehabilitation services and that the policy be extended to other countries and communities as rehabilitation

services are established.<sup>9</sup> In Nigeria, as the scope of audiological and otorhinolaryngologic services are gradually expanding, now including cochlear implantation in selected centers, the time seems ripe for universal newborn hearing screening.

While universal newborn hearing screening programmes may be commenced without legislation, the uptake of these programmes will likely be poor and they may not be sustained.<sup>17</sup>

Within a few hours of birth neonates can be safely and easily tested for hearing loss. Babies as young as three months of age may have hearing aids fitted.<sup>10</sup> This has led to development of Early Hearing Detection and Intervention (EHDI) programmes worldwide which refers to the practice of screening every newborn for hearing loss at birth and babies who do not pass the screening being referred for diagnostic testing and, when necessary, enrolled in early intervention programs by six months of age.

The principles of screening activities are;

- A health problem with a latent stage;
- the availability of a suitable diagnostic test which is safe and acceptable
- the availability of treatment
- placing the cost of diagnosis and treatment in relation to expenditure on medical care as a whole.

Screening for hearing loss meets all the above criteria.

There are two tests used in newborn hearing screening; Otoacoustic Emissions (OAE) and Automated Auditory Brainstem Response (AABR). Both are easy to perform and reliable. As stated earlier children who fail the screening are referred to hospitals/audiologic centres for diagnostic testing and those who pass are eliminated from the programme. Those who fail are then enrolled into the intervention phase of the programme where they are treated either with hearing aids, cochlear implantation, assistive hearing devices or deaf education.<sup>18</sup>

## Newborn and Pre-School Hearing Screening Legislation in Nigeria

Beyond the newborn period, some children develop progressive or delayed-onset hearing loss in childhood. These children are often undetected especially if the hearing loss is mild to moderate or unilateral. These children will have difficulties in speech perception in social and educational settings with resultant difficulties with learning, attention and social interaction. This may also result in emotional and psychological stress for the child.<sup>19</sup>

For children in this category, school-based hearing screening is extremely useful. It allows identification of children with late-onset or progressive hearing impairments and is widely recommended; as the broad goal of hearing screening is to identify all children with a significant hearing loss so that appropriate interventions may commence.<sup>19</sup>

This has led to the concept of Educationally Significant Hearing Loss (ESHL) which refers to any hearing loss that interferes with a learner's academic performance.<sup>20,21</sup> A study in Lagos showed that 13.9% of school children had hearing loss of varying degrees some of which were easily treatable and this adversely affected their school performance.<sup>22</sup> A study on pre-school hearing screening for pre-kindergarten and Kindergarten 1 pupils in Ogbomosho showed that at initiation of the study, only 78.7% of pupils passed audiologic screening but after 6-8 weeks of treatment pass rates increased to 93.6%.<sup>23</sup> The pure tone audiometric sweep test is considered the gold standard for school-based hearing screening.<sup>20</sup>

### ISSUES AND SUGGESTIONS

#### Facilities for intervention

In countries where universal newborn hearing screening is done there are facilities to intervene for most of the babies found to have hearing loss.<sup>9</sup> The question has been raised as to how ethical the provision of hearing screening is, if the facilities for the required intervention are not available. In Nigeria, the facilities for intervention are available albeit grossly inadequate. There are 10 centres with facilities for diagnostic ABR in Nigeria and they are all privately owned.

Currently, only 3 centres in Nigeria have cochlear implant programmes. It is worthy of note however, that in many countries with these programmes, the commencement of the screening programme led to rapid expansion of audiological and otorhinolaryngological services.<sup>9</sup> While there is need for more government investment. It may encourage more private sector investments and opportunities for public-private partnership.<sup>24</sup>

It has been stated that regardless of the extent of intervention, universal neonatal hearing screening has the advantage of alerting parents to the special needs of the child early and so direct their developmental expectations.<sup>25</sup>

#### Cost

Another thorny issue in the planning of screening programmes is the question; "Who bears the cost?" It needs to be determined ab initio if this will be wholly paid for by government, subsidized by government or wholly paid for by the parents. In determining the cost of screening, the alternate cost of loss of potentially productive workforce should be considered.<sup>9</sup> In many countries universal newborn hearing screening has been found to be a cost effective way of dealing with hearing loss.<sup>9</sup> While many low income countries may not be able to bear the cost of funding these tests, methods for alternate financing including public-private partnerships and grants may be explored.<sup>9,14</sup> It is also necessary for testing to be covered by all insurance plans in the country especially, the National Health Insurance Scheme (NHIS). It is recommended that cost of tests be incorporated into delivery costs and not billed separately.<sup>14</sup> A pilot study in Lagos estimated cost of screening per baby to be about US\$ 8.0.<sup>26</sup> Another study by Okhakhu et al in Benin showed that most mothers (76%) were willing to pay out of pocket for screening of their newborn.<sup>27</sup>

#### Manpower

As at 2015 there were 140 ENT Surgeons, 13 Audiologists and 4 speech therapists in Nigeria.<sup>28</sup> This is undoubtedly a very small number to cater

## Newborn and Pre-School Hearing Screening Legislation in Nigeria

our large population, however all over the world significant manpower shortages exist and the use of non-specialists for hearing screening is common. Screening has variously been performed by nurses, technicians, audiologists and physicians.<sup>3</sup> In South Africa the Integrated School Health Policy requires that hearing screening be done by school health nurses.<sup>20</sup> Training programmes may be organized for such staff, with babies who fail being referred to audiologists for diagnostic evaluation. These training programmes have been delivered online in the United States.<sup>29</sup>

A study by Olusanya, et al in Lagos has confirmed the feasibility and effectiveness of using non-specialists for neonatal hearing screening in Nigeria.<sup>30</sup>

### Data Management and Tracking/Loss to follow up

Loss to follow-up is a major problem at all stages of the EHD process worldwide.<sup>3,14,31</sup> Therefore it has been suggested that coordinating EDHI with existing newborn programmes such as immunization may help ensure that babies are tracked throughout the programme.<sup>3</sup>

### Mandatory or Recommended?

Among countries with national programmes some have made testing mandatory while in others it is not compulsory but recommended. In Germany, all parents are given information on newborn hearing screening and those who refuse it have to give written documentation of that decision (opt out).<sup>3</sup> In England, the test is optional but 99.8% of parents take up the opportunity.<sup>3</sup> With the relatively high burden of hearing loss in our environment it would seem prudent to make testing mandatory as part of standard newborn care.

### Community based or Hospital based?

Classically hearing screening is done in hospital before discharge but in many developing countries including Nigeria, the majority of mothers have their babies outside the hospital without a skilled attendant at birth.<sup>3</sup> In Malawi

loss to follow up rates was up to 75% for hospital based screening as many mothers did not return to hospital for diagnostic testing.<sup>32</sup> Olusanya evaluated the cost effectiveness of hospital versus community-based infant hearing screening programs in Nigeria and found that cost of screening per child was higher in hospital based screening than community based screening. They therefore recommended that community based screening at immunization clinics was the most cost-effective model for low-income countries.<sup>33</sup> In countries with high birth rates such as China, a combination of community based and hospital based models has been used to ensure maximum coverage.<sup>3</sup> This sort of combination would seem ideal in our setting.

### Monitoring

There is need for adequate monitoring of the screening programme to ensure quality control, including certification of those trained to carry out the screening as well as ensuring that the programme stays on course to achieving set targets. To this end there may be need to set up a national screening commission which will comprise of all relevant professionals involved in the care of these children.

### Pre-School Screening- Universal or selective?

Pre-school hearing screening is indicated for children who passed at newborn hearing screening but have risk factors for late onset hearing loss such as prolonged assisted ventilation, administration of ototoxic medication, congenital Cytomegalovirus (CMV) infection, or hyperbilirubinemia.<sup>34</sup> In our environment, other causes of acquired deafness in childhood including severe malaria and its treatment, Lassa fever, bacterial meningitis and chemotherapy abound and may contribute to the burden of hearing loss.<sup>35</sup> In addition, a study in the United States of America on cochlear implant patients showed that up to 30% of children with hearing loss requiring cochlear implantation had no known risk factors or cause of hearing loss identifiable at birth and passed hearing screening.<sup>15</sup> Some congenital conditions may

## Newborn and Pre-School Hearing Screening Legislation in Nigeria

cause progressive hearing loss such as genetic hearing loss due to mutations of Connexin 26.<sup>15</sup> It would therefore seem ethical for all children of school age to have hearing screening.

### Conclusion

In view of the huge burden of childhood hearing loss in Nigeria, it is imperative that Nigeria develop and implement universal newborn and pre-school hearing screening for its citizens to ensure early intervention and rehabilitation. While there are many issues to be tackled, all of them are surmountable. Appropriate legislation is vital in helping this become a reality as soon as possible.

### REFERENCES

1. Primary Ear & Hearing Care Training Resource. Advanced Level. Geneva: WHO; 2006. Available at: [http://www.who.int/pbd/deafness/activities/hearing\\_care/advanced.pdf](http://www.who.int/pbd/deafness/activities/hearing_care/advanced.pdf)
2. Olusanya BO. Neonatal hearing screening and intervention in resource-limited settings: an overview. *Arch Dis Child*. 2012;97:654–659.
3. United Nations Children's Fund. The state of the world's children 2013: children with disabilities. New York, NY, USA; United Nations Children's Fund; 2013. Assessed at: [http://www.unicef.org/gambia/SOWC\\_Report\\_2013.pdf](http://www.unicef.org/gambia/SOWC_Report_2013.pdf)
4. Olusanya BO, Neumann KJ, Saunders JE. The global burden of disabling hearing impairment: a call to action. *Bull World Health Organ*. 2014;92:367–373.
5. Engelman D. "The Status of Neonatal Hearing Screening in Sub-Saharan Africa: A Systematic Review" (2014). *CUNY Academic Works*. Assessed at [https://academicworks.cuny.edu/gc\\_etds/650](https://academicworks.cuny.edu/gc_etds/650)
6. Okhakhu AL, Ibekwe TS, Sadoh AS, Ogisi FO. Neonatal hearing screening in Benin City. *Int J Pediatr Otorhinolaryngol*. 2010;74:1323-1326. doi: 10.1016/j.ijporl.2010.08.017.
7. Green DR, Gaffney M, Devine O, Grosse SD. Determining the Effect of Newborn Hearing Screening Legislation: An Analysis of State Hearing Screening Rates Public Health Rep. 2007; 122: 198–205.
8. Bubbico L. Implementation of universal newborn hearing screening program and health legislation Commun Disord Deaf Stud Hearing Aids 2015, 3:3
9. World Health Organisation. Newborn and Infant Hearing Screening Current Issues and Guiding Principles for Action. Outcome of a WHO Informal Consultation Held At WHO Headquarters GENEVA, 2009.
10. Scott RL. Newborn Hearing Screening University of Huston Law Centre Assessed at <https://www.law.uh.edu/healthlaw/perspectives/HealthPolicy/990308Newborn.html>
11. Yoshinaga-Itano C, Sedey A, Apuzzo M, Carey A, Day D, Coulter D. The effect of early identification on the development of deaf and hard-of-hearing infants and toddlers. 1996 Paper presented at the Joint Committee on Infant Hearing Meeting, Austin, TX.
12. Moeller MP. Early intervention of hearing loss in children. 1996 Paper presented at Fourth International Symposium on Childhood Deafness, Kiawah Island, South Carolina.
13. World Health Organization, Prevention of hearing impairment, Resolution of the 48th World Health Assembly; WHA 48.9, Geneva, 1995, Available at: [http://www.who.int/pbd/publications/wha\\_eb/wha48\\_9/en/](http://www.who.int/pbd/publications/wha_eb/wha48_9/en/)
14. DeLaney AM. Newborn Hearing Screening Assessed at <https://emedicine.medscape.com/article/836646-overview>
15. Olusanya BO, Luxon LM, Wirz SL. Childhood deafness poses problems in developing countries. *BMJ* 2005;330:480-481.
16. National Conference of state legislatures Newborn Hearing Screening Laws Assessed at <http://www.ncsl.org/research/health/newborn-hearing-screening-state-laws.aspx>
17. The American Speech-Language-Hearing Association Early Hearing Detection and Intervention (EHDI) Assessed at; <https://www.asha.org/Advocacy/federal/ehdi/>
18. Hearing Health Foundation Paediatric Statistics Assessed at

<https://hearinghealthfoundation.org/pediatric-hearing-loss/>

19. Mahomed-Asmail F, Swanepoel DW, Eikelboom RH Referral criteria for school-based hearing screening in South Africa: Considerations for resource-limited contexts health SA, *Gesondheid* 2016; 21: 96-102
20. American Academy of Audiology (AAA). Clinical practice guidelines childhood hearing screening. Specifications for audiometers. 2011 Assessed at: [http://www.cdc.gov/ncbddd/hearingloss/documents/aaa\\_childhood-hearingguidelines\\_2011.pdf](http://www.cdc.gov/ncbddd/hearingloss/documents/aaa_childhood-hearingguidelines_2011.pdf)
21. World Health Organisation. The global burden of disabling hearing impairment: A call to action, Geneva 2014; 92: 367-373.
22. Olusanya BO, Okolo A, Aljaduola GTA. The hearing profile of Nigerian school children *City Int J Pediatr Otorhinolaryngol.* 2000;55;173-179
23. Adebola SO, Ayodele SO, Oyelakin OA, Babarinde JA, Adebola OE Pre-school hearing screening: Profile of children from Ogbomoso, Nigeria. *Int J Pediatr Otorhinolaryngol* 2013;77: 1987-1991
24. Olusanya BO, Okhakhu AL, Somefun AO. Implementing the new WHO guidelines for the early detection of sensorineural hearing loss in newborns and infants in Nigeria. *Nigerian quarterly journal of hospital medicine.* 2012;22:69-71.
25. Olusanya BO. Universal newborn hearing screening: a global health perspective *ENT & Audiology News* 2017;26: 1-2.
26. Olusanya BO, Wirz SL, Luxon LM. Community-based infant hearing screening for early detection of permanent hearing loss in Lagos, Nigeria: a cross-sectional study. *Bull World Health Organ* 2008;86:956-963.
27. Okhakhu AL, Ntaji MI, Onyeagwara NC, Olusanya BO. Universal Neonatal Hearing Screening: Awareness and Attitude of Mothers Attending the Ante Natal Clinic in a Tertiary Health Facility in Benin City, Nigeria. *Annals of Biomedical Sciences.* 2014;13:61-67.
28. Mulwafu W, Ensink R, Kuper H, Fagan J. Survey of ENT services in sub-Saharan Africa: little progress between 2009 and 2015. *Global Health Action.* 2017;10:1-7.
29. Michigan Department of Health and Human Services. The Birth Hospital's Role in Newborn Hearing Screening 2018 assessed at [http://www.michigan.gov/mdhhs/0,5885,7-339-73971\\_4911\\_21429-57986--,00.html](http://www.michigan.gov/mdhhs/0,5885,7-339-73971_4911_21429-57986--,00.html)
30. Olusanya B, Wirz S, Luxon L. Hospital-based universal newborn hearing screening for early detection of permanent congenital hearing loss in Lagos, Nigeria. *City Int J Pediatr Otorhinolaryngol.* 2008;72: 991-1001.
31. Hunter LL, Meinzen-Derr J, Wiley S, et al. Influence of the WIC Program on Loss to Follow-up for Newborn Hearing Screening. *Pediatrics.* 2016;138:e20154301
32. Brough H. Setting up a Newborn Hearing Screening Programme in a Low-Income Country: Initial Findings from Malawi. *Int. J. Neonatal Screen.* 2017, 3, 33; doi:10.3390/ijns3040033
33. Olusanya B, Emokpae A, Renner J, Wirz S. Costs and performance of early hearing detection programmes in Lagos, Nigeria. *Transactions of the Royal Society of Tropical Medicine And Hygiene,* 2009;103: 179-186.
34. Winston-Gerson R, Roush J. Outsourcing Hospital-Based Newborn Hearing Screening: Key Questions and Considerations *Journal for Early hearing Detection and Intervention.* 2016; 1: 21-25
35. Young NM, Reilly BK, Burke L. Limitations of Universal Newborn Hearing Screening in Early Identification of Pediatric Cochlear Implant Candidates. *Arch Otolaryngol Head Neck Surg.* 2011;137:230-234.