

Assessment of Noise Levels in Primary and Secondary Schools in Nnewi, Anambra State

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Citation: Ochiabuto, O. M. T. B., Abonyi, I. C., Ofili, R. N., Obiagwu, O. S., Ede, A. O., Okeke, M. and Eze, P. M. (2021). Assessment of Noise Levels in Primary and Secondary Schools in Nnewi, Anambra State. *European Journal of Environment and Public Health*, 5(1), em0054. <https://doi.org/10.29333/ejeph/8425>

ARTICLE INFO

Received: 12 May 2020

Accepted: 27 Jun. 2020

ABSTRACT

This study was conducted basically to evaluate the noise dB(A) levels in primary and secondary schools within Otolu area of Nnewi, Anambra State, Nigeria. A total of eight (8) randomly selected schools (four primary and four secondary schools) were assessed. Noise levels in the classrooms and school playgrounds of the schools were measured using a factory-calibrated sound level meter. Results of this study revealed that the noise levels of classrooms and playgrounds of the schools selected for this study were in the range of 78-92 dB(A) and 61-97 dB(A) respectively. These levels were significantly above the World Health Organization's recommended classroom and outdoor/playground noise levels. This study creates awareness on the implications of noise in schools and learning centers, and also promotes a simple method for regular assessment of the noise levels in these environments.

Keywords: noise, school, Nnewi, Anambra State

INTRODUCTION

The school is important for the cognitive, creative, and social development of children, and is therefore expected to ensure the best possible conditions for a child's physical and intellectual development, including control of excess environmental noise (Ana *et al.*, 2009).

Children are however exposed to many different types of noise while at school. A wide range of noise levels have been measured inside schools, with levels varying significantly between different types of space and different classroom activities (Bridget and Julie, 2003). For much of the day in a primary school classroom, young children are exposed to the noise of other children producing "classroom babble" at levels typically of around 65 decibels [dB(A)] level, while the typical overall exposure level of a child at primary school has been estimated at around 72 dB(A) (Shield and Dockrell, 2004, 2008).

Generally, noise has adverse impact on the physical, social and psychological wellbeing (Ibekwe *et al.*, 2016). High noise levels in the school environment pose a real public health problem. Exposure for more than six hours a day to sound in excess of 85 dB(A) is potentially hazardous to health (Ana *et*

al., 2009). It is also generally accepted that all types of noise exposure at school affect children's learning and academic performance (Shield and Dockrell, 2004, 2008).

To be able to hear and understand spoken messages in classrooms, the World Health Organization (WHO) recommends that in school classrooms and pre-schools, the background sound level should not exceed 35 dB(A) during teaching sessions. Also, school outdoor/playground noise level should not exceed 55 dB(A), the same value given for outdoor residential areas in daytime (Berglund *et al.*, 1999).

There are several national and international guidelines relating to the acoustics of classrooms. These mainly take the form of recommended values for reverberation time and background noise levels in teaching spaces, together with sound insulation requirements for schools (Bridget and Julie, 2003). For example, the United States American National Standards Institute (ANSI) sets out guideline values for noise levels, reverberation times, and sound insulation in schools. Also, in England and Wales, school buildings must comply with the Building Regulations (Shield and Dockrell, 2004, 2008).

In Nigeria, for example, the National Environmental Standards and Regulations Enforcement Agency's (NESREA) maximum permissible noise level specification for the general

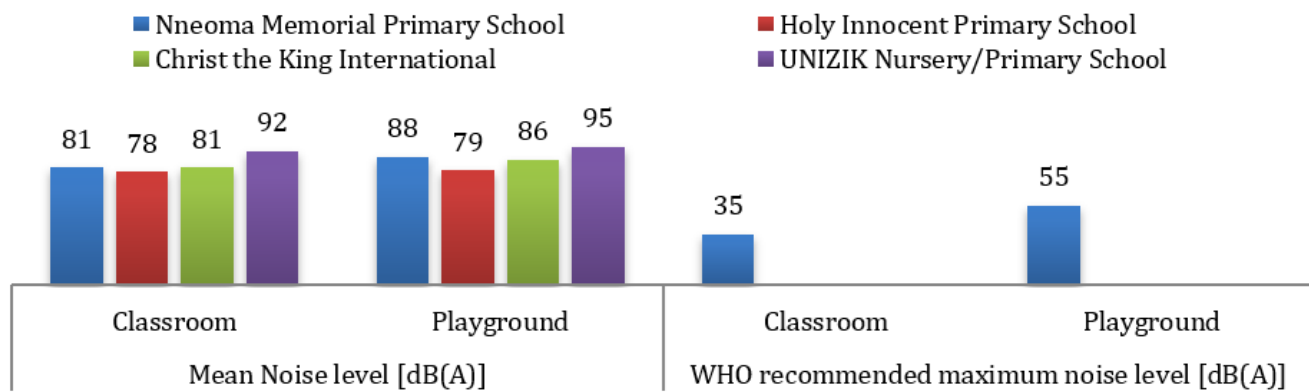


Figure 1. Mean Noise levels [(db)A] of classrooms and playgrounds of the selected primary schools in Otolo-Nnewi

environment such as buildings used as hospital, convalescence home, home for the aged, sanatorium, institutes of higher learning, conference rooms, public library, environmental or recreational sites is 45 dB(A) (NESREA, 2009). Despite these specifications, many children in Nigeria do not have access to ideal or serene learning environments (Ana *et al.*, 2009). Despite the proven significance of noise exposure at school, the number of schools affected by noise from diverse sources is unknown and there is relatively little data available on typical noise levels inside and outside schools (Shield and Dockrell, 2004). Therefore, this study was conducted basically to determine the noise dB(A) levels in primary and secondary schools within Otolo area of Nnewi, Anambra State, Nigeria.

MATERIALS AND METHODS

Study Area

This study was carried out in selected primary and secondary schools located in Otolo, Nnewi, Anambra State. Nnewi is a metropolitan city in Nnewi-North Local Government Area (LGA) and is the second largest city in Anambra State in southeastern Nigeria. It comprises four autonomous villages: Otolo, Uruagu, Umudim, and Nnewichi (Elufioye, 2017). Nnewi is a one town LGA that has an area dimension of 72 km² and an approximate total population of 391,222 people with a sex ratio of 1:2 male: female (Nnebue *et al.*, 2016).

Study Location, Sample Size and Sampling Technique

A total of eight (8) randomly selected schools (four primary and four secondary schools) in the Otolo-Nnewi area were assessed. The primary schools include: Nneoma Memorial Primary School, Holy Innocent Primary School, Christ the King International, and UNIZIK Nursery/Primary School. The secondary schools were: Good Shepherd Secondary School, Maria Regina Comprehensive Secondary School, St. Joseph's Secondary School, and St. Philip's Anglican Grammar School.

Measurement of Noise Levels

Noise levels in the schools were measured using a factory-calibrated BENETECH Model GM 1357 series sound level meter (SLM) set at the slow response mode with A-weighted decibels [dB(A)]. Noise measurements were conducted between 1:00-2:00 pm which is the break period for children to play, and a

classroom in each of the schools was randomly selected for the study. Measurements were conducted at two points in both the classrooms and school playgrounds and data is presented as mean noise level [dB(A)].

RESULTS

The noise levels of classrooms and playgrounds of the schools selected for this study were in the range of 78-92 dB(A) and 61-97 dB(A) respectively (Figures 1 and 2).

Of the primary schools investigated, the highest noise levels were reported for UNIZIK Nursery/Primary School with values of 92 dB(A) and 95 dB(A) respectively for the classroom and playground. Whereas, lowest noise levels were recorded for Holy Innocent Primary School with values of 78 dB(A) and 79 dB(A) respectively for the classroom and playground (Figure 1).

In Secondary School category, Maria Regina Comprehensive Secondary School presented the highest noise levels of 89 and 97 dB(A) respectively for the classroom and playground. While lowest noise levels of 83 and 61 dB(A) respectively for the classroom and playground respectively was recorded for St. Philip's Anglican Grammar School (Figure 2).

DISCUSSIONS

Noise levels are measured in decibels (dB) which is a logarithmic mode of quantifying sound loudness, intensity and pressure. One decibel is the threshold of hearing. Approximately 60 dB is the level of normal talking. The A-weighted variety of sound wave measurement is used for the quantification of the environmental noise in dB(A) units. The sound level meter or sound meter, an instrument that measures sound pressure level, is commonly used in noise pollution studies for the quantification of different classes of noise (Ana *et al.*, 2009; Ibekwe *et al.*, 2016).

The classroom environments are usually filled with factors which does not only disrupt the child's ability to listen and learn but also subject the children to emotional and behavioral stress (Owojori *et al.*, 2017). For much of the day in a primary school classroom, young children are exposed to the noise of other children producing "classroom babble" at levels typically of around 65 dB(A), while the typical overall exposure level of

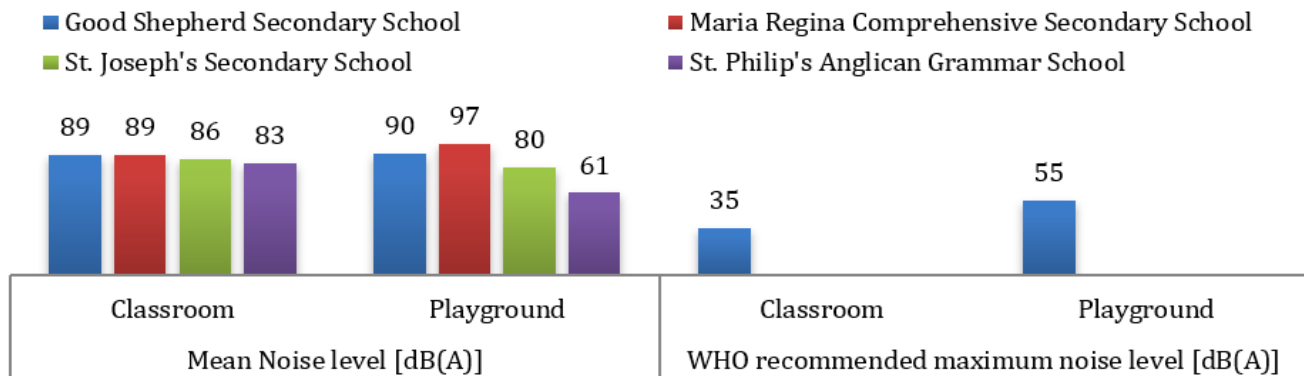


Figure 2. Mean Noise levels [(dB)A] of classrooms and playgrounds of the selected secondary schools in Otolo-Nnewi

a child at primary school has been estimated at around 72 dB(A). Also, schools may be exposed to high levels of environmental noise, particularly in urban areas from sources such as road traffic, trains, aircraft, and construction noise (Shield and Dockrell, 2008; Shield and Dockrell, 2004).

Results of our study reveal that the noise levels of classrooms and playgrounds in the selected schools in Nnewi were significantly above the WHO's recommended maximum noise levels which are 35 and 55 dB(A) for classrooms and playgrounds respectively (Amir *et al.*, 2017; Berglund *et al.*, 1999). Of the various factors that may be responsible for these schools' high classroom noise levels, as well as most other Nigerian schools and learning institutions, lack of or poor acoustics in the classroom contributes significantly to this issue. According to Chan *et al.* (2015), the reduction of classroom background noises including external noise (like traffic noise) and internal noise (for example, noise resulting from students running in corridors or talking in the classroom or adjacent classrooms) can be achieved by implementing acoustic modifications to the classrooms. These modifications include installation of double-glazing and solid concrete barriers to eliminate external noise, as well as the installation of carpets, ceiling tiles, acoustically treated furniture and/or curtains to reduce internal noises (Chan *et al.*, 2015).

According to the WHO, the critical health effects of noise pollution in schools include speech interference, disturbance of information extraction (e.g. comprehension and reading acquisition), message communication and annoyance (Berglund *et al.*, 1999). Also, it has been shown that there is significant drop in children's performance, particularly in learning to read, when the background noise level interferes with speech (Shield and Dockrell, 2004, 2008).

In less developed countries (LDCs) where urban laws and proper land use conditions either do not exist or are not always monitored and enforced, few locale-specific data exist to help improve the situation (Ana *et al.*, 2009). According to Ibekwe *et al.* (2016), many of these countries do not have regulations/legislation on noise pollution due to lack of the political will or the insight into the deleterious effect on environmental life and the ecosystem. The associated difficulty in defining, evaluating and devising control measures for environmental noise has been highlighted as a strong militating factor towards an effective control of noise pollution (Ibekwe *et al.*, 2016; Osagie *et al.*, 2018).

In Nigeria, the National Environmental Standards and Regulations Enforcement Agency's (NESREA) published a document specifying the maximum permissible noise levels for the Nigerian environment including buildings used academic learning (NESREA, 2009). However, the proliferation of noise pollution in schools and the general environment reflects the lack of political will or no legal framework upon which these regulations are enforced towards the control of noise pollution. Majority of the public/environmental health officers whose duty includes ensuring public health and safety by routinely monitoring noise levels and other hazards in the environment, including the school environment, tend to be unaware of their roles in schools and learning institutions. According to Owojori *et al.* (2017) noise has not been considered by Nigerian people as an insidious pollutant or being attributed to any physiological impacts. Also, Olayinka (2013) stated that the Nigerian Government and her citizenry appear not to be conscious of the present and future impacts of noise induced health hazards in their environment.

CONCLUSION

This study reveals the high noise levels in primary and secondary schools in Otolo-Nnewi, Anambra State Nigeria. These noise levels were significantly above the World Health Organization's recommended classroom and outdoor/playground noise levels. This study highlights the negative health and academic implications of noise in schools and institutions of learning and such public health implications of noise as observed in this study could contribute to psychological dysfunctions (noise annoyance) followed by sleep disturbances and dementia.

Recommendations

Therefore, it is important for the school management to reduce the noise level by controlling the activities of school children during break period in both classroom and playground.

Also, periodic auditory and general health examination should be carried out for individuals in the studied schools within the state and beyond.

ACKNOWLEDGEMENTS

We wish to acknowledge the Head of Primary Schools in Otolo-Nnewi, Anambra State, Nigeria for the immense support.

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