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Teachers' Standpoint in Managing Noise Pollution in Basic Schools

Francis Acheampong Osei^{a*}

^a *Department of Environmental Science, College of Science, Kwame Nkrumah University of Science and Technology, Kumasi, Ghana.*

Author's contribution

Author FAO conceptualized the study, did data curation, formal analysis, performed methodology, wrote the original draft, reviewed and approved the final manuscript.

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ABSTRACT

Few studies have been done with little to no attention paid to how teachers perceive noise pollution and their management in the school environment in Ghana. This study sought to assess the awareness of basic school teachers on noise pollution, the sources of noise they encounter on the school environments as well as their suggestions on how to control or manage such noises. In order to evaluate the awareness, causes, and control of noise pollution in the basic schools, a set of questionnaires was used. Questionnaires were reviewed to make sure they were correctly filled out and to ensure internal consistency. The teachers were randomly selected for the study. Descriptive statistics was presented as frequencies and percentages for categorical variables. Data analysed was presented in figures and tables. Control measures were reported. Female teachers (n=147) greater than the males (n=129) participated in the study. Majority of the respondents (n=134, n=113) had taught for 0-5 years and fell within the age range of 30-39 years respectively. The teachers were aware of noise pollution with key sources of noise from students' activities (65.2%) and vehicles (56.2%). Primarily, the teachers asked for continuous education on noise pollution and its many challenges. Basic school teachers admit that noises are present on the school environment and require management to make their work safe.

*Corresponding author: Email: foasei@gmail.com;

Keywords: Environmental pollution; noise; schools.

1. INTRODUCTION

Noise pollution is a significant issue that has surfaced for developing countries due to urbanization, industrialization, and population growth and the phenomenon is characterized by rising noise levels that exceed permissible thresholds. Noise pollution in urban areas is third to air and water pollution [1].

The playtimes and after-school activities of students produce a variety of noise sources that are present on and around school grounds. Markets, truck stops, music stores, and bars produce high-voltage noise from the outside. Adding to the environmental noise at schools are nearby villages, railroads, airplanes, classroom computers, air-conditioners and automobiles [1,2]. According to Moses and Donovan [3], inadequate city planning, the location of industries, and construction methods contribute to noise pollution in residential neighbourhoods. People, machines, factories, commercial spaces, and houses all produce noise in metropolitan environments.

Studies have been done on noise pollution at social events like funerals, church services, and markets. The findings revealed significant noise levels that were beyond World Health Organization's threshold. Loud music from churches, vendors, drinking establishments, and mills caused a spike in noise nuisance in Ghana and Accra in particular. Even in the presence of regulatory guidelines set forth by the Environmental Protection Agency (EPA), Ghana, this noise remained and persists. However, few studies have been done with little to no attention paid to how basic school teachers perceive noise pollution and their management in the school environment [4,5]. Less investigations have been done in Ghana to support findings from earlier studies on noise pollution and its control or management in the school environments. The location of schools throughout the nation is one factor greatly contributing to this environmental issue. In Ghana, the majority of schools are located close to commercial and active locations, such as lorry parks, markets, motorways, community centers, and mechanic shops, among others. As a result, school teachers are frequently exposed to loud noises [4]. The expectation has been that, since the physical,

social, artistic, and intellectual development through effective teaching and learning takes place in schools, those environments must be free from excessive noise [6]. In spite of the regulatory guidelines by the EPA of Ghana on noise pollution in educational facilities, Ghanaian schools continue to deal with this environmental problem. The current study is crucial because it will be used to establish more realistic noise control and management plans in the basic school environments.

Therefore, this study sought to assess the awareness of basic school teachers on noise pollution, the sources of noise they encounter on the school environments as well as their suggestions on how to control or manage such noises.

2. MATERIALS AND METHODS

2.1 Study Area

The study was carried out at Ghana's centrally located Ashanti Region's Old Tafo Municipality. It shares boundaries with Kumasi Metropolitan Assembly, Suame Municipal Assembly, Afigya Kwabre North and Kwabre East Municipality on the East, West, South and North respectively. The Municipality covers 31.13 square kilometre of land area, situated between Longitude and Latitude of 1.35° W and 1.37° W; 6.42° N and 6.45° N respectively. It is elevated 250 to 300 meters above sea level and nearly 270 km north of the national capital, Accra [7].

2.2 Study Design

The design was cross-sectional and of a descriptive type. The responses from the questionnaires /survey were defined by frequencies and percentages.

2.3 Study Population and Sampling

Basic schools have average of fifteen (15) teachers. For 77 schools within the Old Tafo Municipal branch of the Ghana Education Service (GES), the study population was estimated at approximately One Thousand, One Hundred and Sixty teachers (1,160). Basic school teachers were randomly selected for the study.

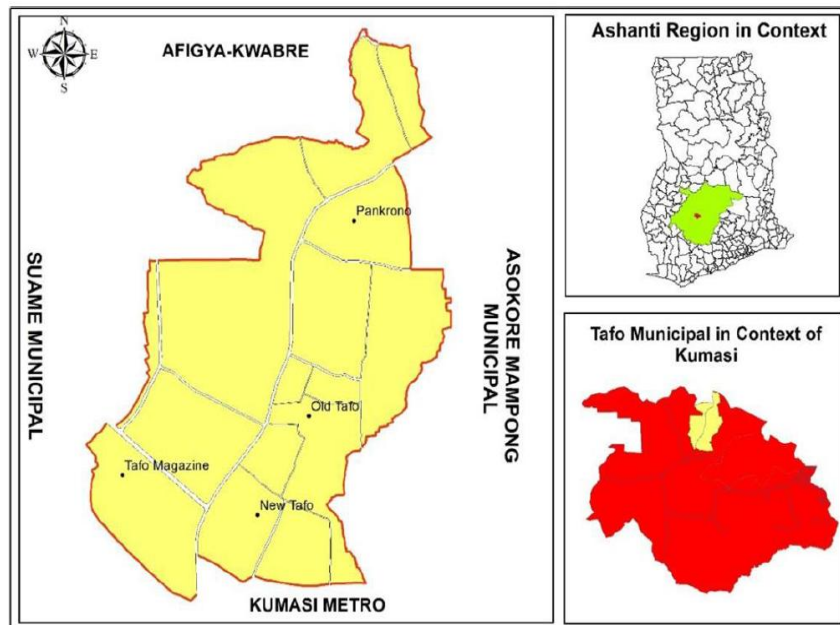


Fig. 1. Map showing the Old Tafo Municipality [7]

2.4 Bias

In this study, the schools were purposively selected based on their proximity to busy or noisy environments such as markets, traffic areas, musical shops etc. The basic school teachers were randomly selected from the population though all teachers had equal chances of selection. The Yamane sample size estimator was used to estimate the sample size and by that, the possibility of selection bias was minimised and the sample size which was large is a true representation of the total population of basic school teachers. Therefore, there is no reason to doubt the representativeness of the sampled teachers. Again, the study collected information using a set of questionnaire which are prone to recall and social bias. The content of the questionnaire did not require much thinking as the information collected were straightforward and easy to recall. To reduce this, the tool was validated and the internal consistencies of the sections were assessed using Cronbach's alpha. The outputs were reliable, therefore, the study results were presumed to be valid.

2.5 Sample Size Determination

Yamane simplified formula [8] for sample size was used. The assumed confidence level is 95%, P (estimated standard deviation of the scale) = 0.50 and $\pm 5\%$ precision level. Equation below is used:

$$n = \frac{N}{1 + N(e)^2}$$

'N' represents population size, 'e' is the precision level and 'n' is the sample size [8].

2.6 Data Collection

A set of questionnaire was used to assess the awareness, sources and management of noise pollution in the basic schools. Basic school teachers responded to the survey with the assistance of research personnel.

2.7 Statistical Analysis

Questionnaires were evaluated whether they were filled well and also for the internal consistency. A three-point scale was used and Cronbach's alpha was determined (Awareness-0.6, Sources of noise - 0.7). Descriptive statistics was presented as frequencies and percentages for categorical variables. Data analysed was presented in figures and tables. Data was analyzed in IBM SPSS Statistics 25.

3. RESULTS AND DISCUSSION

3.1 Results

A survey was completed by 276 basic school teachers, or 92.9% of the convenient sample size (297 teachers, or 100%). The responses were

then processed to determine the percentage frequencies of responses to each question. Due to misplacement, extended absences, and respondents who refused to answer questions, the remaining 7.1% could not be located. Table 1 and Figs. 2 and 3, give the findings of the demographic features of the study population, the percentage replies on the perception of basic school teachers in relation to awareness of noise pollution and the sources or causes. The final section reports on control and management measures.

3.1.1 Demographic characteristics of respondents

The demographic features of basic school teachers who responded to the questionnaire are depicted in Table 1. A total of 114 and 162 public and private basic school teachers respectively participated in the study with the female population (n=147) greater than the male population (n=129). Majority of the respondents (n=134, n=113) had taught for 0-5 years and fell within the age range of 30-39 years respectively.

The least age range involved in the study was staff \geq 60years.

3.1.2 Basic school teachers' awareness of noise pollution

The percentage frequencies of responses on basic school teachers' awareness of noise pollution are shown in Fig. 2. Eight (8) of the eleven (11) items answered by the respondents in this section received high percentages of "yes" replies, demonstrating a high level of their awareness of noise pollution. In particular, "Do you know what noise pollution is?" 98.6% of the study participants responded "yes" to the question. The question "do you utilize an ear protection device while in a noisy environment?" had the fewest "yes" responses (5%) though. The figure below indicates that although basic school teachers are highly aware of noise pollution, most are unaware of the EPA permitted noise level for educational institutions, do not report noise concerns related to their schools, and do not wear earplugs when in noisy environments.

Table 1. Demographic characteristics of basic school teachers

Categories	Frequency	Percent
Type of school		
public school	114	41.3
private school	162	58.7
Total	276	100.0
Gender		
male	129	46.7
female	147	53.3
Total	276	100.0
Years of teaching		
0-5 years	134	48.6
6-10years	61	22.1
11-15years	40	14.5
16-20years	19	6.9
>20years	22	8.0
Total	276	100.0
Age range		
18-29years	97	35.1
30-39years	113	40.9
40-49years	43	15.6
50-59years	17	6.2
\geq 60years	6	2.2
Total	276	100.0
Mean (Age range):		
30- 39years		

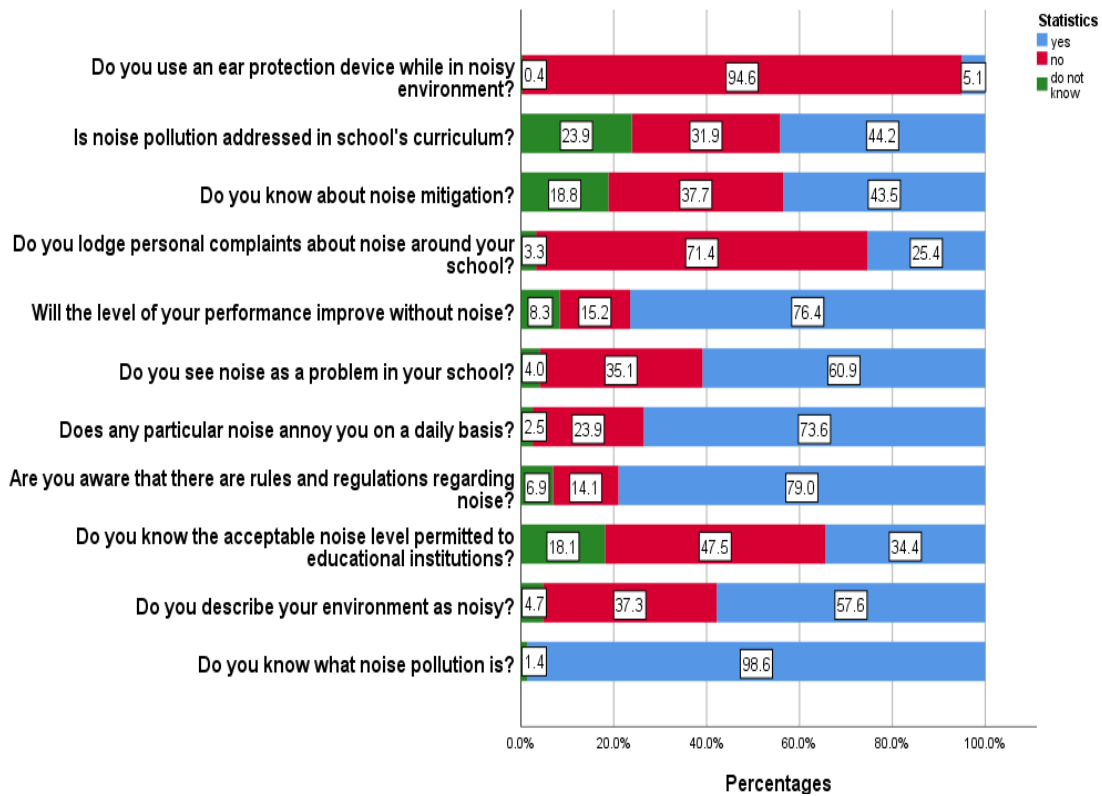


Fig. 2. Percentage frequencies of responses on teachers' awareness of noise pollution

3.1.3 Sources of noise pollution in the basic schools

The percentage frequencies of responses on the sources of noise pollution in the basic schools are depicted in Fig. 3. The key sources of noise pollution reported by the respondents were students' activities, vehicles, and people at 65.2%, 56.2%, and 51.1% respectively. While there were some "yes" replies from other sources, including loud music and speakers, traffic horns, religious activities, commercial areas and marketplaces, and auto repair businesses, their relatively "no" responses outweighed them in terms of percentage frequency. Therefore, those sources are not considered to be major noise pollution sources in the basic schools. The least source of noise pollution in the basic schools was commercial areas and marketplaces (18.8%).

3.1.4 Teachers' perceptions on managing noise pollution in the basic schools

A hundred and forty-one (141) of the total respondents representing 51.1% of the basic school teachers suggested various ways of managing the noise pollution in their schools.

Primarily, the basic school teachers asked for continuous education and awareness creation on noise pollution and its many challenges. This was followed by making rules and regulations on noise pollution to safeguard the school environment. Most of the basic school teachers suggested that the Assemblies strictly enforce by-laws and put measures to ensure compliance by all people even to the point of sanctioning/punishing offenders. Other ways of managing noise pollution in the basic schools were the use of sound-proof materials on the walls of the school buildings, shutting of the windows to block noise penetrating, fencing and providing walls around schools. Some basic school teachers were of the view that noise sources which are very close to basic schools should be eliminated by relocating such sources. They further advised that future structures should not be sited around such noise sources but rather at isolated or serene environments. Additionally, basic school teachers who suffered disturbances from the noise from religious activities around their environments suggested that church services should be done after the school or learning hours of the day. In some basic schools, nearby schools break times disturbed teaching and learning. Therefore, basic

school teachers advised that all such schools should run the same break times harmoniously. They added that in order to manage noise pollution around the school environments, it is

needful to regulate and control students' activities which generate noise in the schools. Finally, tree planting around the school environment should be encouraged.

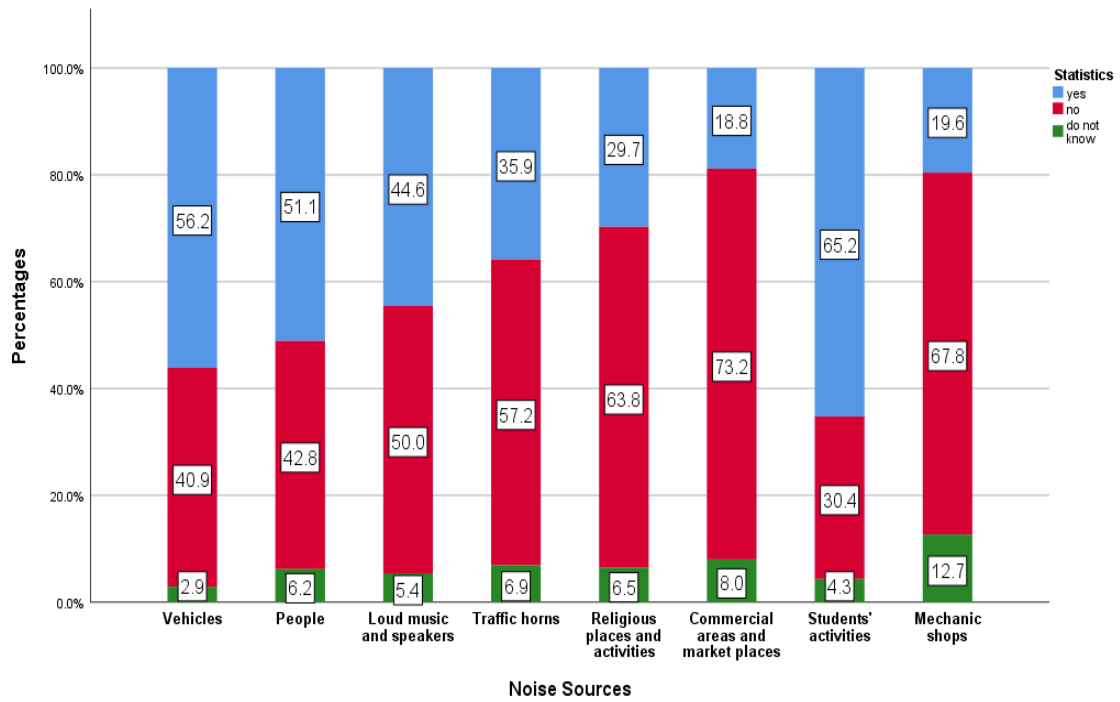


Fig. 3. Percentage frequencies of responses on sources of noise pollution

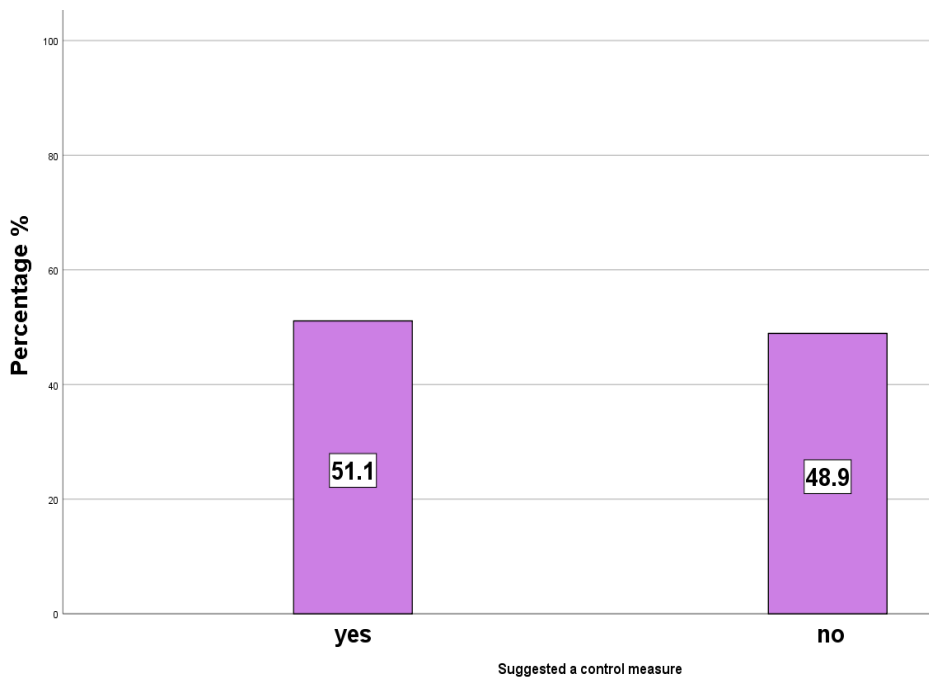


Fig. 4. Percentage frequencies of teachers that suggested a control measure

3.2 Discussion

The study findings focused on the awareness, sources and management of noise pollution in basic schools in Old Tafo Municipality of Ghana. The World Health Organization claims that because there are so many different variables, it is challenging to quantify how noise affects quality of life. Nevertheless, there is a need to research on noise pollution because this issue has a significant impact on the world's population [9]. Majority of the basic school teachers were aware of noise pollution in their environment. However, only a few knew the acceptable noise limit set by the Environmental Protection Agency (EPA) of Ghana. Majority of them did not lodge complaints, neither did they use ear protection devices. The main sources of noise pollution were from students' activities and vehicles which corroborate with the findings of Phadke et al. [10] and Bulunuz et al. [11]. According to the basic school teachers, much education on noise pollution and its consequences is needed to improve its management strategies. The control measure deemed a priority by the majority of respondents on the other hand seems to be a weaker option as compared to eliminating the sources of the noise suggested by few respondents. On the hierarchy of hazard control and prevention, eliminating the source/hazard is most preferred option as compared to educating the respondents on noise pollution which represents an administrative control. Therefore, the study further suggests that education should be done but should be more focused on eliminating the sources of the noise hazard itself than focusing on administrative controls meant to change the way people work.

The study on the other hand presents some limitations such as the use of a subjective approach, such as surveys for data collection. Although surveys may provide some useful data and provide insights into research questions, there is always a risk of bias. The knowledge levels of respondents on noise pollution and how they interpret questions on the self-reports could have an impact on the information gathered, evaluated, and interpreted. Also, not all respondents suggested a control measure to the situation in their school's environment. Only 51% of the convenient sample size responded. Therefore, the results on control measures could only be limited to this fraction and could have probably been altered if all respondents had suggested a control measure. Furthermore, there was less chance that these findings could be

generalized if only basic school teachers and not teachers in other levels such as high schools and tertiary ones in Old Tafo Municipality were included in the survey. The educational levels of respondents which was not evaluated as part of this study could be a contributing factor for the lack of knowledge on the permissible noise level by the EPA of Ghana.

Despite these drawbacks, this study provides empirical evidence and useful contributions to knowledge on noise pollution and management options in basic schools. The analysis also shed light on some issues that needs to be attended to in order to safeguard the work of the basic school teachers

4. CONCLUSION

According to the findings of this study, basic school teachers admit that noises are present on the school environment and require management to make their work safe. One key management approach that should be adopted is the elimination of the sources of the noises if that is possible. Therefore, education should concentrate on informing all policy makers and stakeholders on elimination than just the administrative controls which changes the way workers work.

The study further recommends investigations into the health impacts of the noise exposure of the basic school teachers and other awareness and prevention campaigns to curb the impacts of this environmental menace in basic schools.

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COMPETING INTERESTS

Author has declared that no competing interests exist.

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