



## Investigation of Noise Pollution in Restaurants in Morogoro Municipality, Tanzania, East Africa

DAFROZAH SAMAGWA, STELYUS L. MKOMA\*, CLAVERY TUNGARAZA

Department of Physical Sciences, Faculty of Science, Sokoine University of Agriculture (SUA), P.O. Box 3038, Morogoro, Tanzania. Tel: +255 23 260 3404; Fax: +255 23 260 3404. [stelyusm@gmail.com](mailto:stelyusm@gmail.com) (S.L. Mkoma)

**ABSTRACT:** The assessment of the present status of sound levels in seven restaurants at Morogoro municipality was studied. The indoor and outdoor ambient noise levels were measured twice a day, thrice a week for a period of two months by using digital sound level meter. In addition, questionnaires survey was used to assess sources of noise pollution in restaurants environment. The results show that the measured noise level in all studied restaurants ranged from 61dBA to 64dBA. The measured indoor noise levels were higher than outdoor in B-One, High Classic and Vyakula vya Asili restaurants and vice versa in Saddiq, Princes and Malindi dishes restaurants. The correlation coefficients between the indoors and outdoors locations in all the restaurants were either negative or less than 0.3 thus suggesting little or no impact of the indoor environment on the outdoor environment's noise level. In comparison with permissible Tanzania Bureau of Standards the measured indoor ambient noise levels in the restaurants were higher than the maximum permissible standard limit of 55dBA for mixed residential zones. As for sources of noise pollution at Morogoro municipality, the study shows that people who visit restaurants to have a meal encounter three kinds of noise pollution: the noise created by other customers, the noise from outside (the street), and the noise provided by the music systems which are run in most restaurants. Therefore, proper planning for restaurants areas and other use zones is recommended @ JASEM

Morogoro municipality is one of the most important commercial centers in Morogoro region in Tanzania. This leads to the requirement of expansion of social services, transport services and business activities. The inhabitants of Morogoro municipality are mainly employee in the government or private sectors, or engaged in business and urban agriculture (Tanzania Government, 2007). The presence of offices and business centers in the municipality has made many people who visit or work in those areas depend on restaurants for their meals. The noise from various sources does not only interrupt conversation or create stress and annoyance in the general population, but it also reduces the efficiency and output of workers (Nagi et al., 1999). The excessive noise or sudden exposures to noise could have adverse effects on noise sensitive receptors (Minja et al., 2003). In Morogoro, and presumably in most regions in Tanzania limited measurements on noise pollution have been done. This paper report an investigation of the ambient noise levels and identifies the major potential sources type of noise pollution in the restaurants at Morogoro municipality, Tanzania.

### MATERIALS AND METHODS

The noise level was measured in Morogoro municipality (287,000 inhabitants, 2007 estimate) located about 200 km west from Dar es Salaam. Data were collected through interview and onsite field measurement. The ambient noise levels were measured for 3 days per week (two weekdays and one weekend) for a period of two months in the seven restaurants namely Princes, Saddiq fast food, B-One,

Vyakula vya asili, Blue room, Malindi dishes and High classic. During each day the indoor and outdoor noise level measurements were taken using a digital sound level meter which had A weighting and 0.1 dB resolution. To measure the noise levels in the indoor environment, the sound level meter was placed at a distance of at least 1 m from walls, 1.5 m above the floor, and about 1.5 m from the windows. In the outdoor environment, the sound level meter was placed at 1.0 to 1.5 m above ground level and at least 2 m away from the walls, buildings, or other sound reflecting sources.

### RESULTS AND DISCUSSION

The ambient noise level measured in studied restaurants exhibited different pattern between indoor and outdoor environment. The Saddiq, Malindi dishes and Princes restaurants restaurant located respectively at Msamvu road, Madaraka road and municipal main bus stand have shown to have higher outdoor noise levels than the indoor noise level (see Figures 1, 2 and 3). In the three restaurants the measured indoor noise levels ranged from 58dBA to 68dBA and from 60dBA to 73dBA for outdoor environment. However, their average measured indoor noise levels were respectively 61dBA, 63dBA and 62dBA for Saddiq, Princes and Malindi dishes restaurants. The main sources for the higher outdoor noise levels at these restaurants which are located near busy roads include traffic, loud sound music systems from shops that sell music systems and garage activities.

\* Corresponding author: Stelyus L. Mkoma

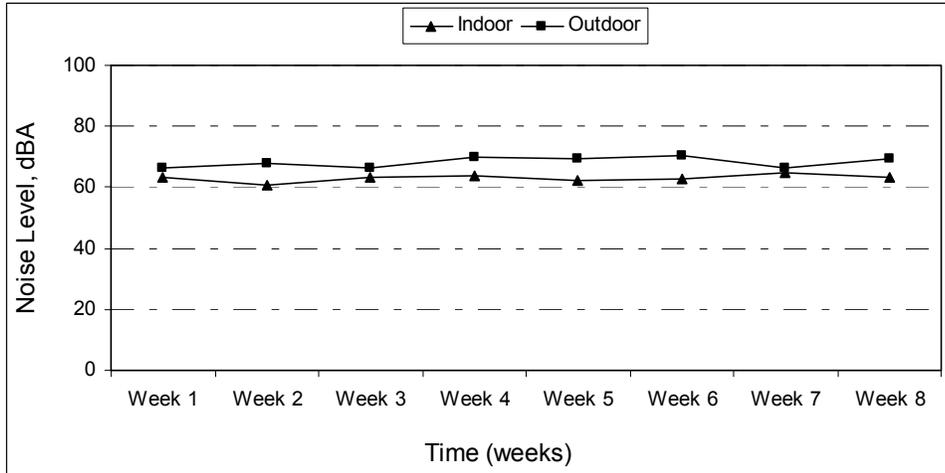


Figure 1: Ambient noise level in Princes restaurant

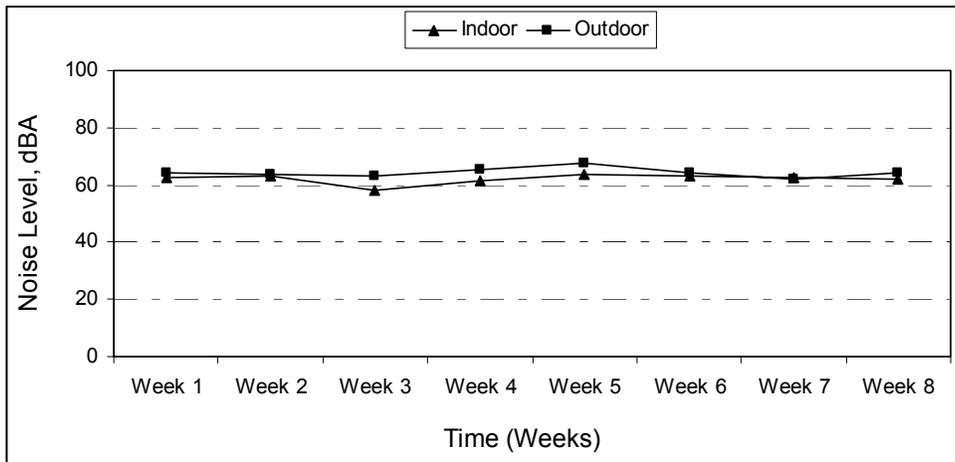


Figure 2: Ambient noise levels in Malindi dishes restaurant

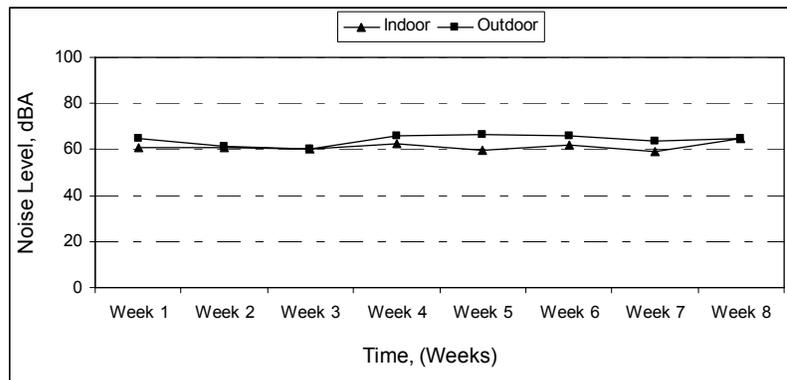


Figure 3: Ambient noise levels in Saddiq fast food, at Msamvu road

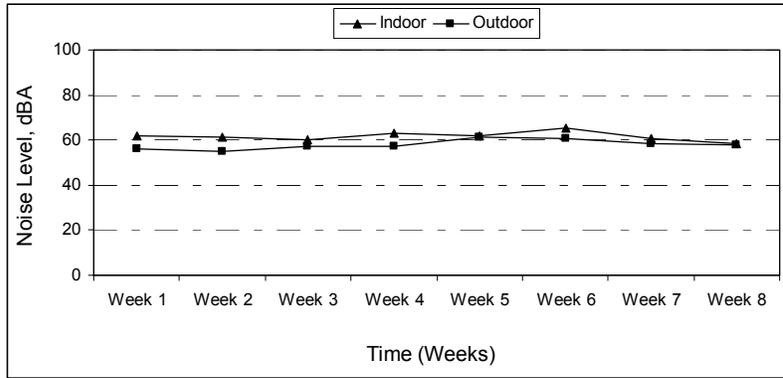


Figure 4: Ambient noise levels in B-One restaurant.

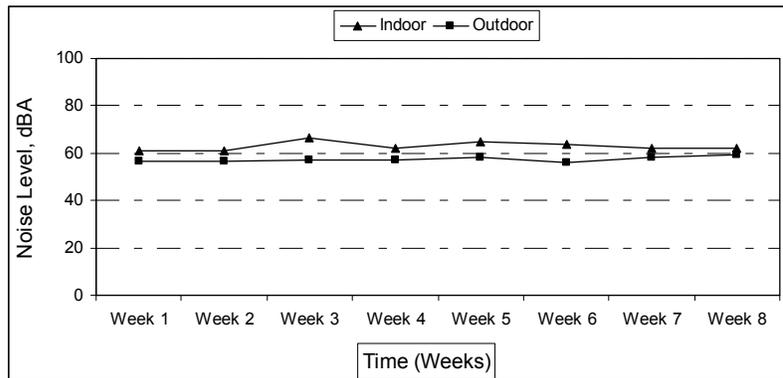


Figure 5: Ambient noise levels in High Classic restaurant.

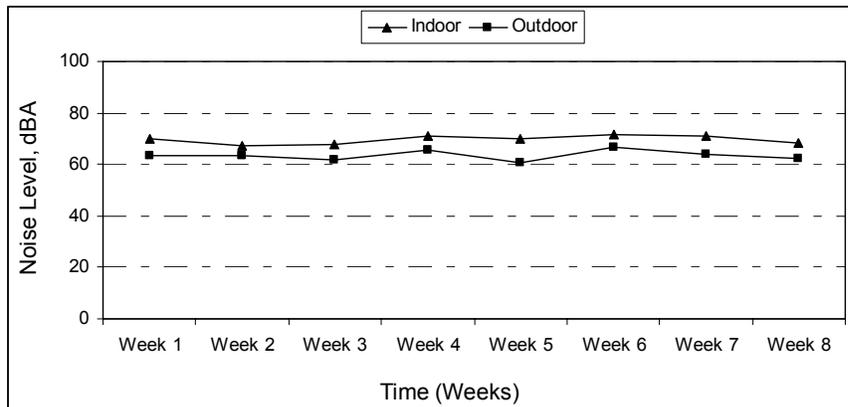


Figure 6: Ambient noise levels in Vyakula vya Asili restaurant.

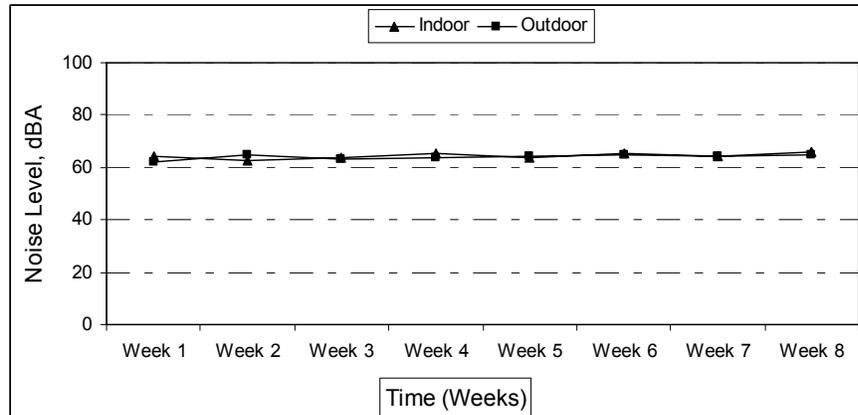


Figure 7: Ambient noise levels in Blue room restaurant.

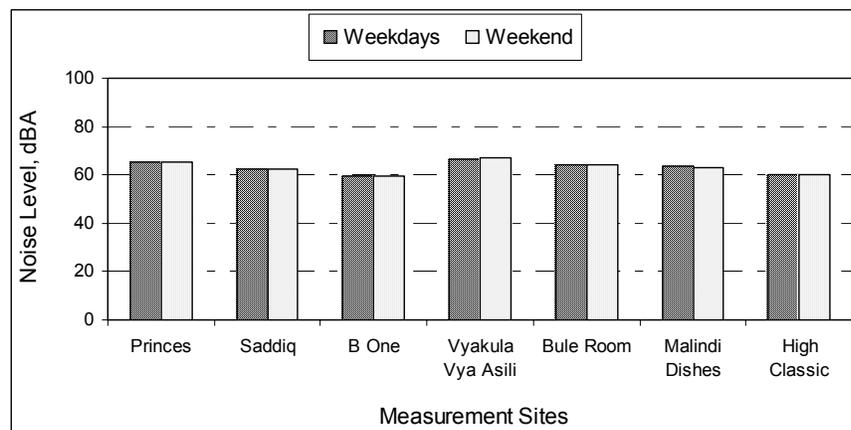


Figure 8: Ambient noise levels in restaurants during weekdays and weekends

The measured ambient noise levels at B-One, High Classic, and Vyakula Vya Asili restaurants located at Ngoto street, Masika and Madaraka road respectively are higher indoor than outdoor ambient noise levels. For the indoor environment the noise levels ranged from 51 dBA to 74 dBA while the outdoor noise levels ranged from 55 dBA to 67 dBA. The average measured indoor noise levels for the three restaurants (B-One, High Classic, and Vyakula Vya Asili) were 61 dBA, 63 dBA and 69 dBA respectively. These restaurants are located at the busiest road or in streets with commercial activities. However, the measured indoor noise levels are higher than outdoor levels. The reasons for higher indoor noise levels are: (1) small in size of the restaurants with more customers than they can accommodate at anytime, (2) conversation between customers, (3) loud sound levels provided by the music systems inside the restaurant, and (4) air conditioning systems.

The Blue room restaurant located at Makongoro street shows relatively similar measured ambient noise levels for indoor and outdoor environment which ranged from 62dBA to 67dBA with an average of 64dBA. The reason the observed trend is because

of poor restaurant design where the noise created outside the restaurants (street) reaches inside the restaurant and the other way round. The measured noise levels between weekdays and weekends for all restaurants were similar and this was for both indoor and outdoor environment. The reason for the observed trend is because many shops and other outdoor sources of noise operate in weekends as in weekdays. Many customers work in weekends too that is why they visit restaurants for their meals. The measured noise levels for most restaurants are higher when compared with the Tanzania Bureau of Standards maximum permissible level of 55 dBA which is recommended for mixed residential environment. In contrast, the customers and workers in restaurants are safe according to World Health Organization (WHO) occupational standards whose noise limit value is 85 dBA. On the other hand, when compared our results to other studies done in Textile Mill, wood and metal works industries in Dar es Salaam as reported by Yhdego, (1991) and Mbuligwe (2004) the noise levels in the studied restaurants are lower than in those sites.

The results of the study indicated that 95% of the interviewed people were aware of the presence of environmental pollution, about 55% of the people were aware of the noise pollution in the restaurants and reported that they were disturbed by noise. People having higher education and income level were much aware of the health impact due to restaurants noise. On the other hand, about 45% of interviewed people were not aware of the noise pollution and declared that there is no problem with the noise in the restaurants.

*Conclusion:* The measurement of noise levels in restaurants at Morogoro municipality has been carried out for two months between March and May 2009. The results show that customers who visit restaurants to have a meal are at risk of developing effects of noise pollution such as hearing loss in a long term. The study concludes that the observed sources of noise pollution in most restaurants at Morogoro municipality resulted from lack of proper planning for restaurants areas and other use zones. Those sources include noise from customers who visit the restaurants, the street (outside), and the noise provided by the music systems which are run in most restaurants.

*Acknowledgements:* This work was supported by the Tanzania Government through Special Research Fund of Sokoine University of Agriculture. The authors would like to thank Dr. Ibrahimu C. Mjemah, the Head, Department of Physical Sciences for providing us with a digital sound level meter and help in logistics.

## REFERENCES

- Lawson, FR (1994). Restaurants, Clubs and bars: Planning design and investment for food service facilities. Architectural Press, Ed. 2, pp. 129.
- Mbuligwe, ES (2004). Levels and Influencing Factors of Noise Pollution from Small-Scale Industries (SSIs) in a Developing Country. *Environmental Management*, 33: pp. 830-839.
- Minja, BM; Moshi, NH; Riwa, P (2003). Noise induced hearing loss among industrial workers in Dar es Salaam. *East African medical journal*, 80: pp. 298-302.
- Nagi, GK; Dhillon, MK; Dhaliwal, GS (1999). Noise Pollution. Coomonwealth Publishers, New Delhi. pp. 5 - 22
- Tanzania Government (2007). Municipal Planning Department Report, Morogoro, Tanzania.
- Tanzania Bureau of Standards (TBS) (2005). National Environmental Standards Compendium EMDC 6 (1733). General Tolerance Limits for Environmental Noise.
- Word Health Organization WHO (1995). A Draft Document of Community Noise. Word Health Organization, Environmental Health Criteria 12, Geneva.
- Yhdego, M (1991). Assessment of noise pollution in friendship textile mill limited, Ubongo —Dar es Salaam. *Environ. International*, 17: 479-485