

Comparing Occupational Noise Levels of Building Restoration Construction Sites with Different Noise Management Guidelines

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Introduction

Excessive occupational noise exposure is a serious concern in the construction industry, where noise levels consistently exceed allowable regulatory limits^(1,4,6). Hearing protection devices (HPD) are used to protect construction workers from noise exposure; however, regular use of HPDs in construction remains low⁽⁵⁾.

Noise management programs are not typically present at construction sites⁽⁵⁾. The purpose of this research is to determine if noise management programs reduce noise levels at construction sites. In this study, the noise levels of two construction sites were compared: one site with a client noise management program, and another site without. The hypothesis was that Site 1, due to its noise management program, would have lower noise levels than Site 2, which did not have such a program.

Methods

Noise Sampling

Eight site visits were conducted in October and November 2016 in Toronto: four at Site 1 and four at Site 2. Site 1 had a noise management program that included weekly personal and area sampling. Three personal samples and two area samples were collected each visit using noise dosimeters. These dosimeters were set to slow response, A-weighting, 85 dBA criterion level, 3-dB exchange rate and no threshold. The researcher completed an activity card recording the participants' tasks and tool use. Data was downloaded from the dosimeters after each visit and exported as Excel files for analysis.

Questionnaire

The questionnaire focused on demographic information and knowledge of noise hazards in the workplace. Questions were adapted from Edelson et al's 2009 study "Predictors of Hearing Protection Use in Construction Workers". Participants were asked to complete a questionnaire via interview. Data from the questionnaires were recorded onto an Excel spreadsheet.

Results

Noise Sampling

24 full shift personal samples were collected from 9 construction workers, and 14 full shift area samples were collected.

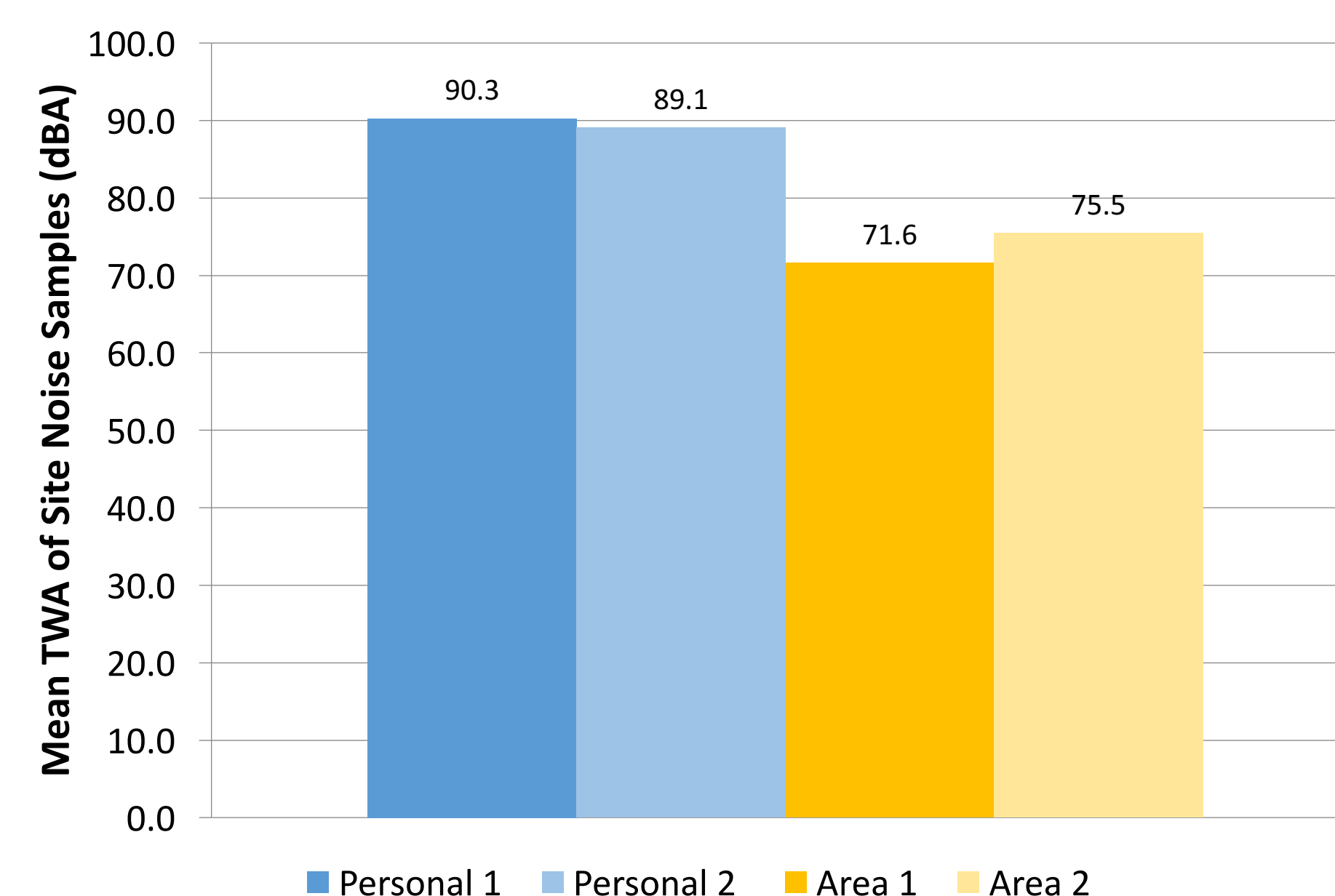


Figure 1. Mean noise time-weighted average (TWA) of personal samples and area samples at Sites 1 and 2.

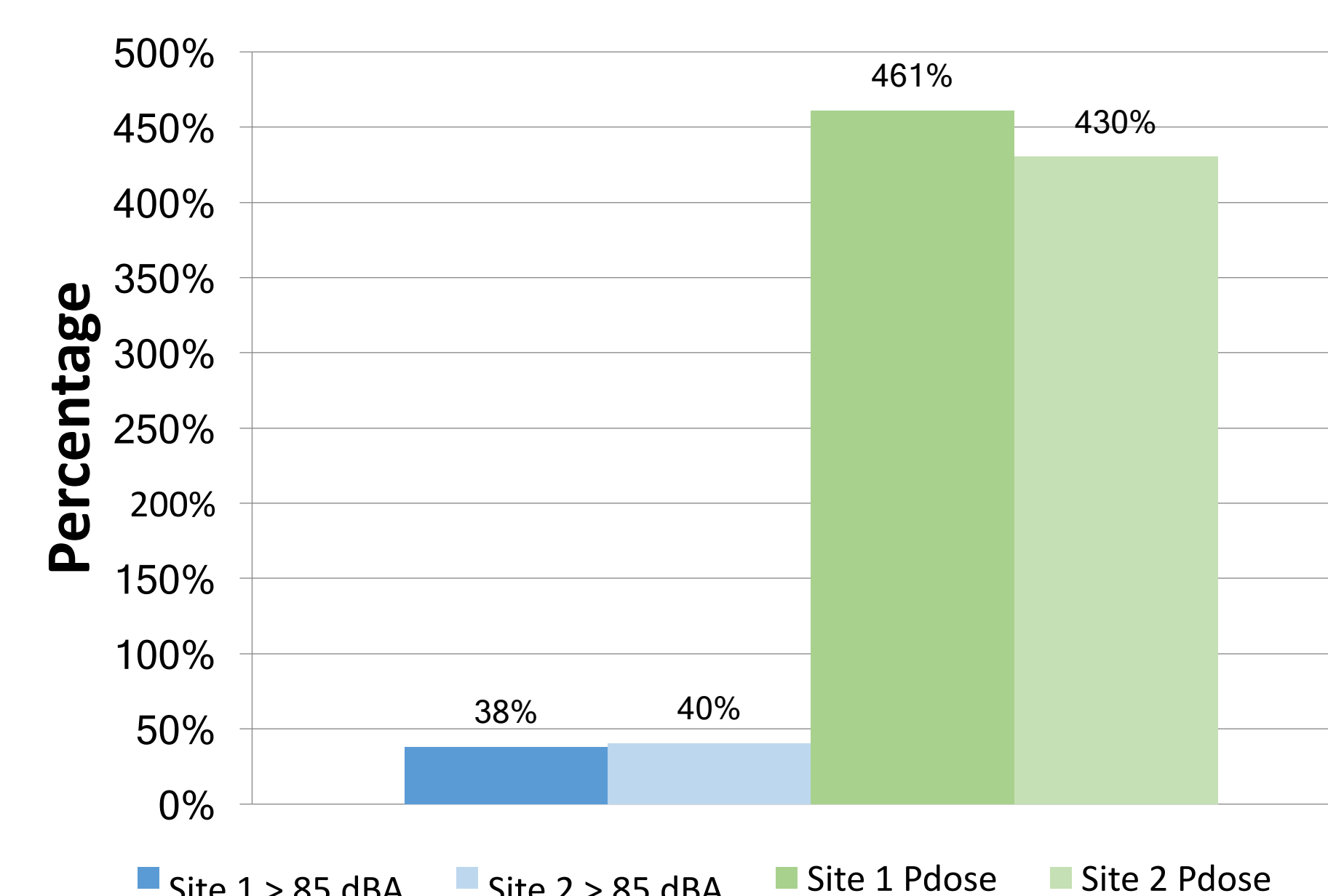


Figure 2. Mean percentage of construction workers' shift noise exposure above 85 dBA, and mean P_{dose} percentage of noise exposure at Sites 1 and 2.

Questionnaire

7 of the 9 noise sampling participants completed a questionnaire. 6 of the 7 respondents indicated that it was noisy at their workplace most or all of the time. Pneumatic equipment, and vehicles were identified as loud tools. All respondents indicated using company provided HPD.

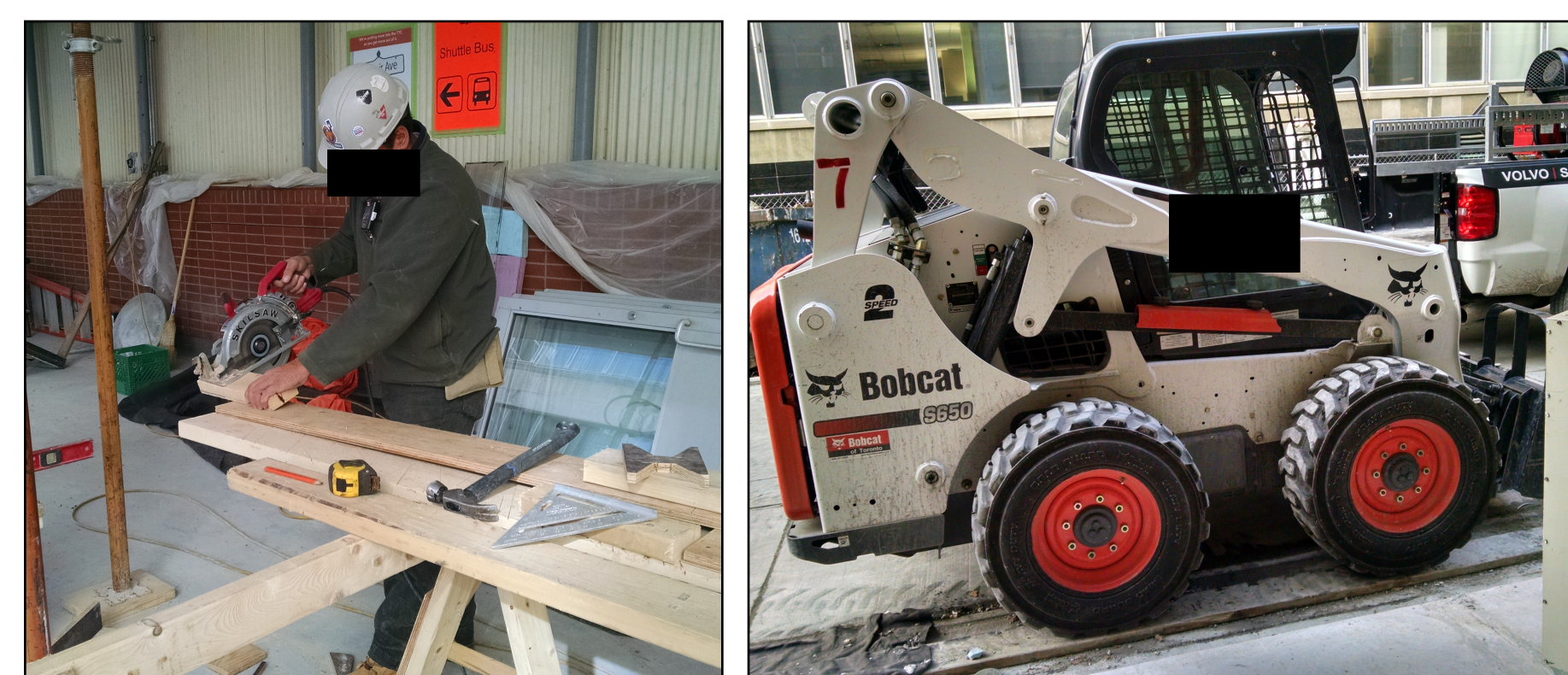


Figure 3. Photos from the construction sites. Left photo shows a concrete mason using a handsaw. Right photo shows a Bobcat. Photos courtesy of Laura Hodges.

Table 1. Selected responses from the participant questionnaire.

Variable	All	
	n	%
All	7	100
Gender		
Male	6	86
Female	1	14
Trade		
Concrete Mason	1	14
Foreman	2	29
Inspector	1	14
Labourer	3	43
Age in Years		
< 45	3	43
45 – 54	3	43
55 – 65	1	14
Years in Construction		
0 – 19	2	28
> 20	5	72
How often wear HPD		
All the time	5	72
Most of the time	1	14
Sometimes	1	14
Why wear HPD		
Mandatory	4	57
Others remind me	2	28
Prevent hearing loss	1	14
Noise Awareness Training		
Yes	7	100
High School Completed		
Yes	7	100

References

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Discussion

There is no statistically significant difference between the mean TWA, percentage of shift above 85 dBA, or P_{dose} between Sites 1 and 2. Based on these results, the noise management program stipulated for Site 1 did not have any effect on noise exposure levels.

The mean TWA personal samples were above 85 dBA, the shift percentage above 85 dBA ranged from 38 – 40%, and the P_{dose} of noise exposure exceeded 100%, which is consistent with research on noise exposure of construction workers^(1,2).

6 of the 7 questionnaire respondents indicated they wear HPD most of the time or all the time. All respondents had completed high school, received noise exposure awareness training and HPDs were available on the site, which is positively associated with HPD use⁽¹⁾. However, self-reported HPD use is often exaggerated^(3,5).

Conclusion

The noise management program at Site 1 did not have an effect on the noise exposure of construction workers. The noise exposure and questionnaire results of this research is consistent with the literature. As construction workers are consistently overexposed, effective controls are needed to mitigate noise exposure. More research is needed to determine the feasibility and effectiveness of noise management programs in construction.

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