Gas-Powered Leaf Blower Sound and Impact on Children

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Abstract

BACKGROUND: The burgeoning use of gasoline-powered leaf blowers (GLBs) and other landscape maintenance equipment has brought loud chronic noise to neighborhoods, schools, parks and playgrounds. Chronic loud noise is known to cause not only hearing disorders (high frequency) but other non-auditory adverse health effects (low frequency) and disruptions in learning and cognitive performance in children. The sound from GLBs and its potential impacts on children and communities are not well characterized. GOALS: To characterize loudness and frequency of sound from GLBs and related equipment over distance and discuss potential impacts on children's health. METHODS: A pilot study evaluated sound from two commercial-grade 2-stroke GLBs and a hose vacuum. Time-averaged LAEQ, un-weighted LEQ, and low (LF), mid (MF), and high frequency (HF) GLB sound components were measured from the origin out to 800'. RESULTS: The sound from the 2 GLBs and hose vacuum exceeded 100 decibels for LEQ and LAEQ at the centroid. At all distances from the centroid, LEQ was 11.2-12.5 decibels higher than LAEQ. Excepting HF dB, all metrics exceeded safe levels defined by the US EPA and WHO up to 800 feet away. The dominance of a LF component explains the ability of this sound to penetrate walls and windows and travel long distances. CONCLUSIONS: The ability of GLB sound to travel long distances and penetrate walls and windows puts the health and cognitive functioning of children at risk in outdoor and indoor settings. Manufacturers should provide sound metrics that properly represent the LF component of GLB sound. School administrators, municipal officials, and departments of health should be aware of these risks to children's health and public health, and take steps to promote quieter, healthier maintenance methods.

Introduction

The growing use of gas-powered leaf blowers (GLB) in school, playground, park, and neighborhood settings is a source of concern for children's health and well-being and have been noted by organizations including the US Centers for Disease Control, Harvard Medical School, and the Medical Society of the State of New York.

Loud environmental noise is known to cause hearing loss, a variety of adverse psychological and physiological effects, cognitive impairment, and reduced productivity [1, 2]. Children and autistic children are especially vulnerable [3, 4]. Low frequency sound is a particular concern because of its adverse health effects [5], but is underweighted by "A-weighted" decibels (dB[A]) used in manufacturer ratings [6].

Environmental noise guidelines to protect children [3, 4] recommend background noise limits of 35 decibels (dB) in classroom settings and 55 dB from external sources in playground and daytime outdoor settings.

Goals

This pilot study was conducted to explore the characteristics of the gas leaf blower sound (loudness and frequency) over distance and discuss potential impacts on children's health.

Methods

Sound from a commonly used combination of commercial grade backpack leaf blowers (Husqvarna, Sweden) and a hose vacuum (Scag Giant-Vac, WI) used by a municipal DPW were measured.

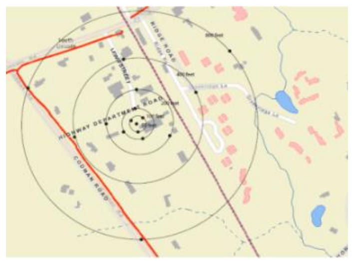


Figure 1. Study Map

Machines were run at full throttle on the ground. Sound was measured from distance 0 (the "centroid") and extended to a 800' radius, encompassing 46 acres of mixed use property (**Fig 1**). Time-averaged A-weighted dB (LAEQ), un-weighted dB and low (LF), mid (MF), and high frequency (HF) sound components were measured at the centroid at 50', 100', 200,' 400', and 800' with a Optimus Red Octave Band Analyzer CR-162C (UK). Three sound measurements (1 minute each) were taken at each distance. The mean, standard deviation, and range were calculated for each distance using an average of three sound measurements. All analyses were conducted using SAS (v 9.4; SAS Institute Inc., Cary, NC) and results expressed as descriptive statistics.

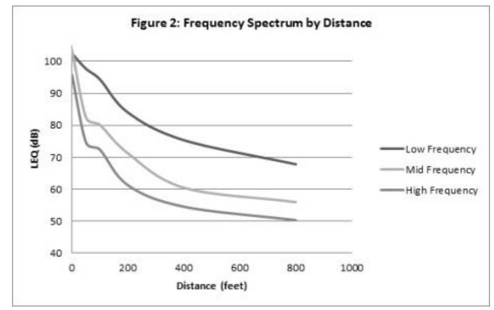
Results

The highest sound levels occurred at the centroid and decreased with distance (**Table 1**). The difference between the LAEQ and LEQ ranged from 11.2–12.5 dB at all distances. Excepting HF sound, all metrics exceeded WHO outdoor daytime noise limits to 800'.

Table 1. GLB Sound Metrics

Metric	Distance from Centroid (Feet)					
	0	50	100	200	400	800
Background	64.2	59.7	49.7	47.6	58.3	54.7
LEQ	106.4	97.6	94.3	85.2	75.8	68.5
LAEQ	102.4	85.5	82.8	72.9	63.3	57.3
LF	102.4	97.6	94.3	84.0	75.4	67.9
MF	103.6	82.5	80.1	71.2	60.4	55.9
HF	95.7	74.7	72.4	61.3	54.6	50.4

LF and MF sound dominated at all distances (**Figure 2).** HF and MF components dropped sharply ≤ 100 ' from the centroid; LF sound persisted at high levels over distance. From the centroid to 800' sound level decreased 45 dB for HF, 51 dB for MF, 35 dB for LF components.



Conclusions

The ability of GLB sound to travel long distances and penetrate walls and windows puts health and cognitive functioning of children at risk. GLB rating metrics should properly represent the LF sound. School administrators, municipal officials, and departments of health should be aware of these risks to children's health and take steps to reduce noise from maintenance activities.

References

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QUIET COMMUNITIES

2017 Children's Environmental Health Network Research Conference, Arlington, VA, April 5-7, 2017