Summary of Adverse Health Effects of Noise Pollution

Prepared by Louis Hagler, MD

Based on the World Health Organization Guideline for Community Noise

(See: http://www.who.int/docstore/peh/noise/guidelines2.html for complete report)

As the population grows, there is increasing exposure to noise pollution, which has profound public health implications. Noise pollution creates a need for action at the local level, as well as for improved legislation and management. Urban noise pollution produces direct and cumulative adverse health effects by degrading residential, social, working, and learning environments with corresponding real (economic) and intangible (well-being) losses. The World Health Organization has documented seven categories of adverse health effects of noise pollution on humans.

1. Hearing Impairment: Hearing damage is related to duration and intensity of noise exposure and occurs at levels of 80 dB or greater, which is equivalent to the noise of heavy truck traffic. Children seem to be more vulnerable than adults.

2. Interference with Spoken Communication: Noise pollution interferes with the ability to comprehend normal speech and may lead to a number of personal disabilities, handicaps, and behavioral changes. These include problems with concentration, fatigue, uncertainty, lack of self confidence, irritation, misunderstandings, decreased working capacity, disturbed interpersonal relationships, and stress reactions.

3. Sleep Disturbances: Uninterrupted sleep is known to be a prerequisite for good physiological and mental functioning in healthy persons. Noise pollution is a major cause of sleep disturbances. Apart from various effects on sleep itself, noise pollution during sleep causes increased blood pressure, increased heart rate, increased pulse amplitude, vasoconstriction, cardiac arrhythmias, and increased body movement. These effects do not decrease over time. Secondary effects include fatigue, depressed mood and well-being, and decreased performance. Combinations of noise and vibration have a significant detrimental effect on health, even at low sound pressure levels.

4. Cardiovascular Disturbances: A growing body of evidence suggests that noise pollution may be a risk factor for cardiovascular disease. Acute exposure to noise activates nervous and hormonal responses, leading to increased blood pressure and heart rate and to vasoconstriction. If the exposure is of sufficient intensity, there is an increase in heart rate and peripheral resistance; an increase in blood pressure, and increased levels of stress hormones (epinephrine, norepinephrine, and cortisol).

5. Disturbances in Mental Health: Noise pollution is not believed to be a cause of mental illness, but it is assumed to accelerate and intensify the development of latent mental disorders. Noise pollution may cause or contribute to the following adverse effects: anxiety, stress, nervousness, nausea, headache, emotional instability, argumentativeness, sexual impotence, changes in mood, increase in social conflicts, neurosis, hysteria, and

psychosis. Children, the elderly, and those with underlying depression are particularly susceptible to these effects.

6. Impaired Task Performance: The effects of noise pollution on task performance have been well-studied. Noise pollution impairs task performance, increases errors, and decreases motivation. Reading attention, problem solving, and memory are most strongly affected by noise. Noise produces negative after-effects on performance, particularly in children; it appears that the longer the exposure, the greater the damage.

7. Negative Social Behavior and Annoyance Reactions: Annoyance is defined as a feeling of displeasure associated with any agent or condition believed by an individual to adversely affect him or her. Annoyance increases significantly when noise is accompanied by vibration or by low frequency components. The term annoyance does not begin to cover the wide range of negative reactions associated with noise pollution; these include anger, disappointment, dissatisfaction, withdrawal, helplessness, depression, anxiety, distraction, agitation, or exhaustion. Social and behavioral effects are complex, subtle, and indirect. These effects include changes in everyday behavior (closing windows and doors to eliminate outside noises), changes in social behavior (aggressiveness or disengagement), and changes in social indicators (residential mobility, hospital admissions, drug consumption, and accident rates), and changes in mood (increased reports of depression). Noise above 80 dB is consistently associated with decreased helping behavior and increased aggressiveness.

Effects of Multiple Sources of Noise Pollution: Most environments contain a combination of sounds from more than one source (e.g., trains, boom-box cars, car horns and alarms, and heavy trucks). Adverse health effects are related to total noise exposure from all sources. In residential populations, combined sources of noise pollution will lead to a combination of adverse effects, such as sleep disturbances; cardiovascular disturbances; interference at work, school, and home; and annoyance; among others.

Groups Vulnerable to the Effects of Noise Pollution: Although everyone may be adversely affected by noise pollution, groups that are particularly vulnerable include infants, children, those with mental or physical illnesses, and the elderly. Because children are particularly vulnerable to noise induced abnormalities, they need special protection.

Conclusions and Recommendations: The adverse health effects of noise pollution are numerous, pervasive, persistent, and medically and socially significant. These adverse effects represent a significant public health problem that can lead to social handicaps, reduced productivity, impaired learning, absenteeism, increased drug use, and accidents. The aim of enlightened governmental controls should be to protect the population from these adverse effects of noise.