

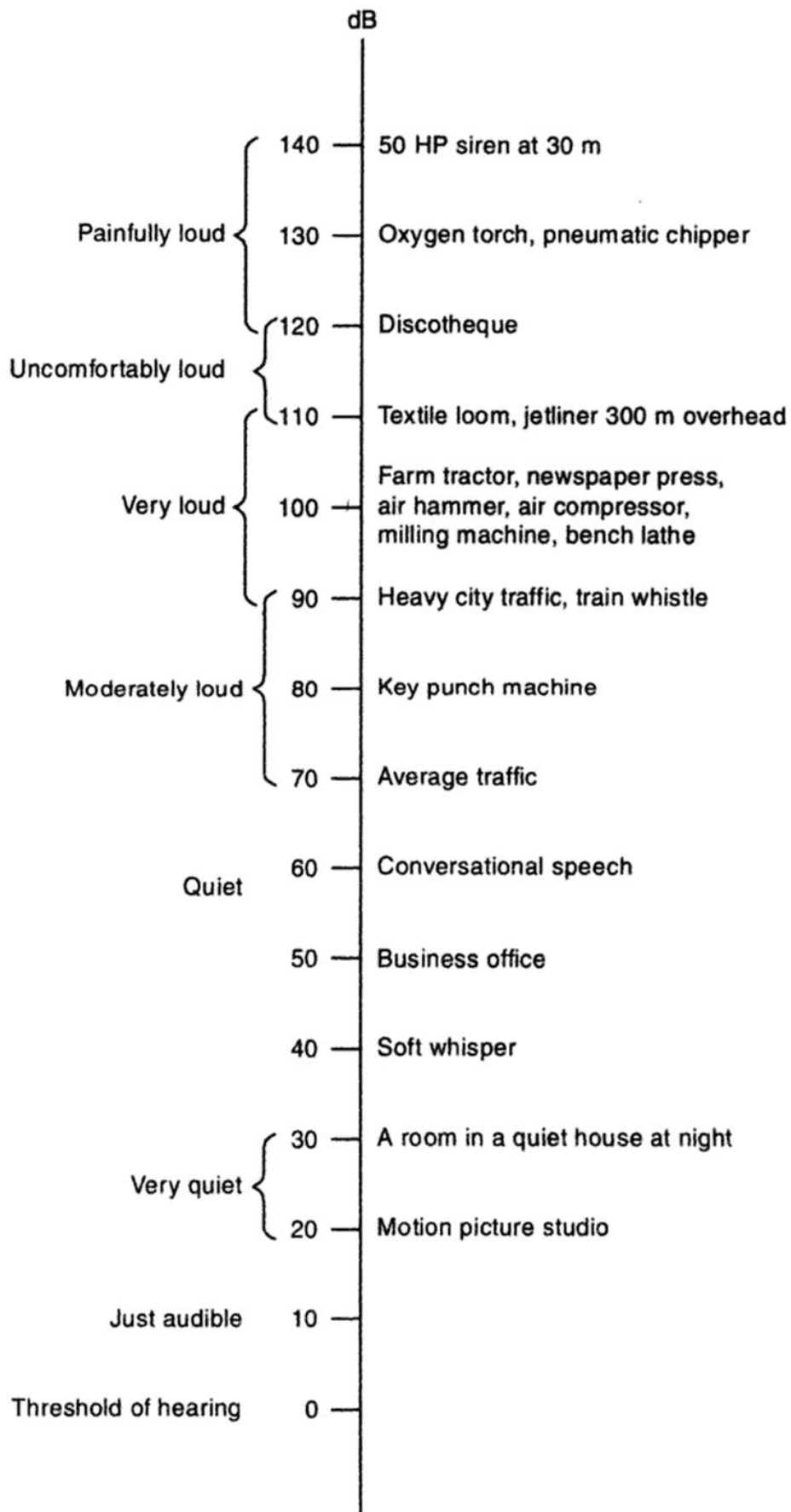
Noise pollution

Noise pollution has become a serious problem for human health. The noisy atmosphere in which we are living is an obstacle in securing good health. Noise pollution and environmental noise are hurting human and other organisms. Noise beyond a limit produces many diseases, such as hypertension (high blood pressure), stress, making people vulnerable to forgetfulness, depression, insomnia (sleep disorder), and many other serious ailments (minor illness). Noise is also very dangerous for nature as a whole because it disturbs the tranquility (a state of calm) of all creatures and increases death rate in them.

Noise pollution means an unwanted or undesirable sound that leads to physical and mental problems. Noise pollution is dependent on the loudness and frequency of the sound. In fact, when the sound exceeds its limit, it becomes fatal for human and other organisms. The noise intensity is measured in decibels or dB. A person can bear the noise up to 80 to 90 dB, after which his hearing power can be damaged

Measurement

The intensity or loudness of sound is measured on a scale called decibel scale or dB-scale, as shown in figure on the next page. It measures the loudness of sound in terms of relative units of energy or power on logarithmic scale according to the response of human ear. The scale starts from 0 dB which is considered as the threshold of hearing and is the faintest sound which human ear can hear. Calling a sound to be 10 dB means it is 10 times louder than 0 dB. Likewise, a sound of 20 dB is 10×10 or 1000 times louder, of 30 dB is $10 \times 10 \times 10$ or 1000 times louder, 40 dB is $10 \times 10 \times 10 \times 10$ or 10,000 times louder, while a sound of 50 dB is $10 \times 10 \times 10 \times 10 \times 10$ or 100,000 times louder than the threshold of human hearing.



. Measurement of intensity of sound or noise in decibel (dB)

Source of Noise Pollution

Noise pollution like other pollutants is also a by-product of industrialization, urbanizations and modern civilization. Broadly speaking, the noise pollution has two sources, i.e. industrial and non-industrial. The industrial source includes the noise from various industries and big machines working at a very high speed and high noise intensity. Non-industrial source of noise includes the noise created by transport/vehicular traffic and the neighborhood. Noise pollution can also be divided in the categories, namely, natural (like thunderstorm) and manmade. Most leading noise sources will fall into the following categories: roads traffic, aircraft, railroads, construction, industry, noise in buildings, and consumer products.

- a. **Road Traffic Noise:** In the city, the main sources of traffic noise are the engines and exhaust system of cars, smaller trucks, buses, and motorcycles. This type of noise can be increased by narrow streets and tall buildings, which produce a canyon (narrow valley) in which traffic noise reverberates (resound).
- b. **Air Craft Noise:** Now-a-days, the problem of low flying military aircraft has added a new dimension to community annoyance, as the nation seeks to improve its map of the earth aircraft operations over national parks, wilderness areas, and other areas previously unaffected by aircraft noise has claimed national attention over recent years.
- c. **Noise from railroads:** The noise from locomotive engines, horns and whistles, and switching and shunting operation in rail yards can impact neighboring communities and railroad workers. For example, rail car retarders can produce a high frequency, high level screech that can reach peak levels of 120 dB at a distance of 100 feet, which translates to levels as high as 138, or 140 dB at the railroad worker's ear.
- d. **Construction Noise:** The noise from the construction of highways, city streets, and buildings is a major contributor to the urban scene. Construction noise sources include pneumatic hammers, air compressors, bulldozers, loaders, dump trucks and pavement breakers.
- e. **Noise in Industry:** Although industrial noise is one of the less prevalent community noise problems, neighbors of noisy manufacturing plants can be disturbed by sources such as fans, motors, and compressors mounted on the outside of buildings. Interior noise can also be transmitted to the community through open windows and doors, and even through building walls. These interior noise sources have significant impacts on industrial workers; among who noise induced hearing loss is unfortunately common.
- f. **Noise in building:** Apartment inhabitants are often annoyed by noise in their homes, especially when the building is not well designed and constructed. In this case, internal building noise from plumbing, boilers, generators, air conditioners, and fans, can be audible and annoying. Improperly insulated walls and ceilings can reveal the sound of amplified music, voices, footfalls and noisy activities from neighboring units. External noises from emergency vehicles, traffic, wastage collection, and other city noises can be a problem for urban residents, especially when windows are open.
- g. **Noise from Consumer products:** Certain household equipment, such as vacuum cleaners and some kitchen appliances have been and continue to be noisemakers, although their contribution to the daily noise pollution is usually not very large.

Effects of Noise Pollution

Some of the important effects of noise pollution are given below:

- a. Noise pollution affects human health, comfort and efficiency. It causes contraction of blood vessels, makes the skin pale, and leads to excessive secretion of adrenalin hormone into blood stream which is responsible for high blood pressure.
- b. It causes muscles to contract leading to nervous breakdown, tension and even insanity (relatively permanent disorder of the mind).
- c. Noise effects are anxiety (feeling of nervousness), stress reactions and fright (sudden intense fear). These adverse reactions are coupled with a change in hormone content of blood, which in turn produces increased rate of heart beat, constriction of blood vessels, digestive spasms and dilation of pupil of eye.

- d. It affects health efficiency and behavior. It may cause damage to heart, brain, kidneys and liver and may also produce emotional disturbances.
- e. The most immediate and acute effect of noise is the impairment of hearing which diminishes by the damage of some part of auditory system. When exposed to very loud and sudden noise acute damage occurs to the ear drum. Prolonged exposure to noise of certain frequency pattern will lead to chronic damage to the hair cells in the inner ear.
- f. In addition to serious loss of hearing due to excessive noise, impulsive noise also causes psychological and pathological disorders.
- g. Physiological disorders are also developed due to imbalance in functioning of body systems and due to continuous exposure to noise. These are neurosis, insomnia, hypertension, increase in sweating, hepatic diseases and behavioral and emotional stress.
- h. It causes frustrations and is associated with difficulty in concentration, disturbance of rest, physical and mental fatigue. Low frequency noise of 50 to 60 dB affects the higher centers of brain and causes an alteration in the normal sleep pattern and prevents sound sleep.
- i. Noise mainly interferes with man's communication. It prevents us from what we want to hear and enjoy. It is easy to visualize that a conversation can be carried on in whisper in a still place, while one has to shout to make sense in a noisy factory.
- j. Brain is also adversely affected by loud and sudden noise such as that of jet and aero plane noise etc. People are subjected to psychiatric illness.
- k. Recently it has been reported that blood is also thickened by excessive noises. Changes in breathing amplitude have also been reported due to impulsive noise.
- l. The startling reaction which is produced by a sudden and high intensity pulse of sound has its worst effect on the nervous system and also affects psychomotor performance.
- m. Noise is responsible for disturbing the whole biological system. The internal damage caused by shriek of siren or the roar of a jet engine includes gastric ulcers and thymus gland atrophy.
- n. Noise, which is an annoyance also causes irritation, dis-satisfaction, dis-interest and affects work performance. Noise has been reported both to improve and to decrease work efficiency, depending on its intensity, duration and frequency distribution etc.

Control measures

- a. **Source control:** this includes source modification such as acoustic treatment to machine surface, design changes, limiting operational timings, etc.
- b. **Transmission path intervention:** this includes containing the source inside a sound insulating enclosure, constructing a noise barrier or provision of sound absorbing materials along the path.
- c. **Receptor control:** this includes protection of the receiver by altering the work schedule or provision of personal protection devices such as ear plugs for operating noisy machinery.
- d. **Oiling:** proper oiling will reduce noise from the machine.

Preventive measures

- a. Prescribing noise limits for vehicular traffic
- b. Ban on honking (usage of horns) in certain areas
- c. Creation of silence zones near schools and hospitals
- d. Redesigning buildings to make them noise proof
- e. Reduction of traffic density in residential areas
- f. Giving preference to public transport system.