

Noise Pollution

Introduction

Noise pollution is unwanted sound. Sound is caused by vibrations in the air. When the vibrations enter our ears, the brain interprets them as sounds. Sound makes it possible for us to communicate with one another through speech. Many sounds, such as music, provide pleasure.

Sound surrounds us all the time. The buzzing of an alarm clock wakes us in the morning. Throughout the day, we hear many kinds of sounds, such as the roar of traffic, and the voices of people. The sounds of radio and television broadcasts bring us entertainment and information. We are warned of danger by such sounds as car horns and fire alarms.

Natural events also create noise. The crash of thunder is produced by violent vibrations of air that has been heated by lightning.

Noises are unpleasant, annoying, and distracting sounds, such as the banging of dustbins, the barking of a dog, and the roar of a crowd. Many machines and devices, such as vacuum cleaners, and the engines of motor vehicles, produce noise.

Noise pollution can be defined as unwanted or offensive sounds that unreasonably intrude into our daily activities. Noise pollution does not dirty the air, water, or land, but it can cause discomfort, irritation and hearing loss in human beings.

There are many sources, most of which are associated with urban development. These include:

- Transport noise
 - road transport
 - air transport
 - rail transport
- Industry
- Social noise
 - neighbourhood noise
 - recreational noise.

Various factors contribute to the problems associated with high noise levels, including:

- increasing population, particularly in urban areas
- increasing volumes of road, rail and air traffic

Thus, most of the noise produced in the environment is of human origin. It comes from cars, lorries, buses, motor cycles, construction equipment, industrial equipment, lawn mowers, sirens, and unwanted loud music.

The effects of noise on human health

Although noise is a significant environmental problem, it is often difficult to quantify the associated costs. The World Health Organisation suggests that noise can affect human health in a number of ways, including :

- annoyance
- Sleep disturbance
- interference with communication
- effects on social behaviour
- hearing loss

People experiencing high noise levels, for example near airports or along road or rail corridors, suffer various effects, including:

- increased number of headaches
- greater susceptibility to minor accidents
- changes in blood pressure.

In addition, there is evidence of :

- increased attendance at GP's clinics
- problems with the digestive system
- increased use of sedatives / sleeping pills
- increased mental hospital admission rates.

Measuring noise pollution

Scientists use a unit called the decibel (dB) to measure the intensity (loudness) of a sound. The decibel scale is logarithmic; it increases as a power of 10.

This means that a 10 fold increase in the strength of a sound adds 10 dB units on the scale. An increase of 100 times would add 20 units. For example, 50 dB is 10 times louder than 40 dB and 100 times louder than 30 dB.

The threshold for human hearing is 0 dB; the weakest sound that the normal human ear can hear. Normal conversation is about 60 dB. A jet aircraft taking off can produce up to 120 dB.

Very loud noises (more than 140 dB) cause pain, and high levels cause permanent hearing loss. Human ears can take sounds up to about 60 dB without damage or hearing loss.

Any sound above 80 dB is potentially damaging. Many people have suffered some permanent hearing loss following exposure to loud rock music (110 dB).

There is consistent evidence that prolonged exposure to noise levels at or above 80 dB can cause deafness. The amount of deafness depends upon the degree of exposure.

Measuring noise pollution**Table 1 - examples of different sound levels.**

Sound source	Intensity of sound (dB)	Human perception
Threshold of hearing	0	Very quiet
Breathing	10	Very quiet
Whisper	20	Very quiet
Library	40	Quiet
Normal conversation	60	Quiet
Train 15 metres away	80	Loud
Jet flying over at 300 m	100	Very loud
Live rock music	110	Very loud
Thunderclap	120	Uncomfortably loud
Jet at takeoff 100 m away	140	Painfully loud

People exposed to loud noise for long periods may suffer temporary or permanent loss of hearing.

The noise of a motor cycle (80dB) will begin to damage hearing after about 8 hours of exposure. Loud rock music (110dB) can damage hearing after an exposure time of only half an hour.

Loud sounds of short duration, such as the noise of a gunshot, can also damage the ear. Constant noise, even if it is not extremely loud, can cause fatigue, headaches, hearing loss, nausea, and tension.

Transport Noise

There are few places in the United Kingdom where transport noise cannot be heard. An industrial society depends on mechanical transport for the effective distribution of people and goods between ports, distribution centres, factories, offices, shops, dwelling and many other places. Sources of transport noise include

- **Road Noise**

This comes from cars, buses, lorries, vans and motorbikes. Each of these makes noise in a various ways. These include engine starting, gear changing, car stereos, squealing brakes and screeching tyres.

A simple solution would be to make people park their cars a few minutes walk away from residential areas. However, it is found that people would prefer to be disturbed by noise occasionally, rather than have to walk to their car, or the nearest bus stop.

Highway authorities are required to publish details of any new road proposals. The public has a right to object on any grounds, including noise. Objections should be sent to the highway authority during the objection period. In some cases there will be a public inquiry.

- **Aircraft Noise**

This is a major problem to the people who live near a busy airports. However, for most people aircraft noise goes unnoticed. As the technology of aero engines has changed from pure jet engines to fan-jet engines, the amount of noise generated has decreased.

Unfortunately, as planes get quieter, airports get busier. This means that while the total number of people affected reduces, the people who can still hear the noise, hear more planes and are woken up more often at night.

- **Rail Noise**

Generally, people's reaction to rail noise is different from their reaction to road noise. The reason for this is unclear, but it could be that trains are seen as more useful, or that their noise is unavoidable. Whatever the reason, there is less pressure on rail operators to reduce their noise, than for road vehicles, and aircraft.

Factors which influence railway noise include :

- the design, quality and maintenance of rolling stock
- noise screening
- railway structures

Noise control of railways needs to be part of railway management contracts. This will include regular monitoring of the condition of both the track and rolling stock.

Industrial Noise

Industrial noise comes from factories or from construction works.

It is said that prevention is better than cure. Reducing noise at source is preferable to having to deal with noise once it becomes a problem. The planning system plays a major role in reducing noise at source.

For example, the location of factories should be planned to minimise the effect of noise on local inhabitants. The benefits of a new factory have to be weighed against the disturbance to the local inhabitants, and if necessary, compensation may be offered to those effected.

Social Noise

It is a fact of life that everyone makes noise. Talking to others, playing music, entertaining, driving cars all create noise. What is a noise to one person may be pleasant to another. Excessive noise can reduce the quality of life and sometimes even destroy it entirely.

According to Mediation UK, representing over 130 mediation services throughout Britain, neighbourhood noise is the greatest source of noise nuisance and complaints. A recent survey carried out in the UK estimated that :

- 14% of the adult population was bothered by neighbourhood noise
- 11% of the adult population was bothered by road traffic noise
- 7% of the adult population was bothered by aircraft noise.

Noise complaints to local authorities in England and Wales increased by 62% between 1984/5 and 1994/5. The largest increases were in complaints about :

- aircraft 85%
- domestic noise 66%
- construction sites 65%.

The sources of neighbourhood noise, in order of number of complaints, were:

- loud music
- dogs
- domestic activities
- loud voices
- DIY work
- car repairs

Controlling noise

There are basically four ways to control noise:

- Modify the way things are made or done so that they produce less noise
- Shield noise producing devices or processes
- Shield workers or other receivers from the noise
- Move noisy operations or things away from people.

For example, silencers help make car engines quieter. In buildings, thick, heavy walls and well sealed doors and windows may be used to block noise. Industrial workers exposed to intense noise should wear some form of ear protectors to help prevent hearing loss.

Sound insulation is used in buildings to reduce noise. Some kinds of such insulation block sound and thus prevent it from passing from one room to another. Other kinds absorb sound, and so reduce the noise level within a room.

Thick, heavy walls without cracks block sounds such as loud music and noisy conversation. But many modern buildings have thin, lightweight walls that sound can easily pass through.

In such cases, sound deadening boards made of wood fibres can be installed in the walls and ceilings. Such insulation must cover the entire surface because even a small gap allows much sound to pass through. Carpeting and other floor coverings help block the passage of sound to rooms below.

Noise in a room may be reduced by carpeting, curtains, and upholstered furniture, all of which absorb sound. Acoustical tiles, which absorb noise, may be installed on the ceilings and walls. These tiles have tiny holes that trap sound and prevent it from bouncing back into the room.

In industry, sound insulation reduces noise in factories and in machines used at construction sites. Some factories have sound barriers between the workers and the machines.

In others, sound absorption materials are moulded to the machines to lower their noise level. Insulation is also used to reduce noise in such construction machines as air compressors and pneumatic drills.

Site noisy household equipment such as washing machines, dish washers away from partition walls or place them on a carpet or rubber mat to reduce vibration. Reduce the effect of noise from your TV and stereo by moving them away from your neighbours' walls.

When doing DIY, try and make sure you carry out the noisiest jobs during the day. Keep the evening for quieter work such as painting and decorating. Warn your neighbours if you are going to make unavoidable noise - having a party or doing DIY for example.

Mow the lawn and use garden power tools at a reasonable time - not early morning or late evening when the noise could be most annoying.

Assessment

Noise Pollution

Questions 1 to 5 - Select the correct response for the following questions :

1. How many times louder than 40dB is 50dB ?
 - A 2 times
 - B 3 times
 - C 5 times
 - D 10 times

2. Above what decibel level does sound begin to be potentially dangerous ?
 - A 60dB
 - B 80dB
 - C 100dB
 - D 120dB

3. What is the approximate sound level of loud rock music ?
 - A 80dB
 - B 110dB
 - C 120dB
 - D 140dB

4. Which mode of transport gives rise to the least number of complaints in relation to noise ?
 - A road
 - B aircraft
 - C rail
 - D sea

5. What percentage of the adult population is bothered by neighbourhood noise ?
 - A 14%
 - B 11%
 - C 7%
 - D 4%

Questions 6 to 10 - Decide whether each of these statements is True (T) or False (F).

6. i) Noise pollution can be defined as unwanted or offensive sounds that unreasonably intrude into our daily activities.
ii) There is consistent evidence that prolonged exposure to noise levels at or above 80 dB can cause deafness.

Which option best describes the two statements?

- A i) T ii) T
B i) T ii) F
C ii) F ii) T
D ii) F ii) F

7. i) The noise of a motor cycle (80dB) will begin to damage hearing after about 8 hours of exposure.
ii) Loud sounds of short duration, such as the noise of a gunshot, do not damage the ear.

Which option best describes the two statements?

- A i) T ii) T
B i) T ii) F
C i) F ii) T
D i) F ii) F

8. i) There is more pressure on rail operators to reduce their noise than on road vehicles and aircraft.
ii) Improvements in aero engine technology has led to quieter aircraft.

Which option best describes the two statements?

- A i) T ii) T
B i) T ii) F
C i) F ii) T
D i) F ii) F

9. i) A recent survey carried out in the UK estimated that 11% of the adult population was bothered by aircraft noise.
ii) In relation to neighbourhood noise, the greatest cause for complaint was DIY activities.

Which option best describes the two statements?

- A i) T ii) T
B i) T ii) F
C i) F ii) T
D i) F ii) F

10. i) Sound insulation can be used on construction machinery to reduce noise levels.
ii) One method of controlling noise is move noisy operations away from people.

Which option best describes the two statements?

- A i) T ii) T
B i) T ii) F
C i) F ii) T
D i) F ii) F