UNIT IV-INDOOR AIR QUALITY MANAGEMENT

Introduction

According to the EPA, scientific evidence indicates that indoor air can be more seriously polluted than the outdoor air in even the largest and most industrialized cities. Other studies indicate that people spend approximately 90 percent of their time indoors. The math isn't so great—for many people health risks may be greater due to indoor air pollution rather than outdoor pollution.

Effects may arise after just a single exposure as well as repeated exposure, and can run the range from irritation of the eyes, nose, and throat, to headaches, dizziness, and fatigue. These effects are usually short-term and treatable; sometimes simply eliminating the exposure to the source of the pollution is treatment enough. Other health effects can show up years after a single exposure as well as long or repeated periods of exposure. These effects, which include some respiratory diseases, heart disease, and cancer, can be severely debilitating or fatal. It is important to try to improve the indoor air quality in your home, even if symptoms are not noticeable.

There are a number sources of air pollution that are more commonly known as others many already know about the, dangers of cleaning products and air fresheners.

Common examples of VOCs that may be present in our daily lives are: benzene, ethylene glycol, formaldehyde, methylene chloride, tetrachloroethylene, toluene, xylene, and 1,3-butadiene

Seven Sources of Air Pollution

- New carpet
- Broken compact fluorescent lights
- New electronics and other plastic products
- Glues and adhesives
- Heating equipment (stoves, heaters, fireplaces, chimneys)
- Paints and strippers
- Upholstered furniture and pressed-wood products (hardwood plywood, wall paneling, particleboard, fiberboard)

1. New carpet

Carpet materials can emit a volatile Organic Compounds (VOCs). If you have carpet installed, ask for low-VOC, formaldehyde-free adhesives. Air out new carpeting for a few days before installing it. After it's laid, keep windows open in the room and run a fan for two or three days. Broken compact fluorescent lights. If they break, CFLs can emit mercury, a neurotoxin, in small amounts into the air. Carpets cannot be fully cleaned of mercury and vacuums should not be used to pick it up.

2. Broken compact fluorescent lights

If they break, CFLs can emit mercury, a neurotoxin, in small amounts into the air. Carpets cannot be fully cleaned of mercury and vacuums should not be used to pick it up.

Don't use CFLs in lamps that could easily tip, especially in homes with children or pregnant women. If a CFL breaks, open a window, shut of central air, clear the room for 15 minutes, and follow the EPA clean nun guide.

3. *New* electronics and other plastic products

Products made with polyvinyl chloride cam emit phthalates, which have been linked to hormonal abnormalities and reproductive problems. Plastics can also release flame retardant chemicals, such as poly brominated biphenyl ethers, which have been linked to neurobehavioural changes in animal studies

Ventilate space until the chemical odor dissipates. Vacuum around computers, printers, and televisions regularly.

4. Glues and adhesives

They can emit VOCs, such as acetone or methyl ethyl ketone, that can irritate the eyes and affect the nervous system.

* Rubber cement can contain n-hexane, a neurotoxin. Adhesives can emit toxic formaldehyde.

Look for water-based, formaldehyde-free glue. Work in a well-ventilated space and don't get too close to your work.

5.Heating equipment (stoves heaters, fireplaces, chimneys)

Heating equipment, especially gas stoves, can produce carbon monoxide, which

can cause headaches, dizziness, fatigue, and even death if not ventilated properly. It can also emit nitrogen dioxide and particulates, which can cause respiratory

problems and eye, nose, and throat inflammation.

Hire a professional to check that your boiler or furnace is working properly every year and keep chimneys and other heating equipment well-maintained. Install

Carbon-monoxide alarms and use a hood over kitchen stoves.

6.Paints and strippers

Latex paints are a big improvement over oil-based paints because they emit fewer chemical fumes.

But as they dry, all paints can emit VOCs, which can cause headaches, nausea,or dizziness. Paint strippers, adhesive removers, and aerosol spray paints can also contain methylene chloride, which is known to cause cancer in animals.

Use low-VOC paints. When applying paint, open windows or doors, ventilate the space with fans, and wear a respirator or mask. Pregnant women should avoid using paint strippers with methlyene chloride.

7.Upholstered furniture and pressed-wood products (hardwood plywood, wall paneling, particleboard, fiberboard)

When new, many furniture and wood products can emit formaldehyde. A probable carcinogen that can also cause eye, nose, and throat irritation; wheezing and coughing; fatigue; skin rash; and severe allergic reactions.

Increase ventilation, particularly after bringing new sources of formaldehyde into your home. Use exterior-grade pressed-wood products (they're lower-emitting because they contain phenol resins, not urea resins). Look for formaldehyde-free furniture and wood products.

TYPES AND CONTROL OF INDOOR AIR POLLUTANTS

1. **Radon**

- Radon is a highly radioactive gas that can be introduced into the home through the ground beneath it, well water, and the building materials that constitute your house or apartment.

- Part of what makes radon so dangerous is the fact that it is colorless, tasteless, and odorless, and that it produces no immediate symptoms, which means that.you will, normally be completely unaware that you are inhaling it.

- According to the Consumer Product Safety Commission CPSC, one study of residential radon levels has indicated that radon is over three times as prevalent in homes as in the outdoors.

- Inhalation of radon is linked to lung cancer, and the CPSC estimates that it causes between 7,000 and 30,000 lung cancer deaths every year.

- For smokers, radon exposure increases the risk of cancer even further, as radon can attach itself to the smoke and lodge itself in the lungs.
- Testing for radon is relatively inexpensive and easy to do using readily available radon testing kits.

- It is a good idea to test your home, and if radon levels are higher than 4 pci/L, take steps to reduce it. Contact a professional to help you.

Air Purifier Effectiveness for Radon Removal -None

Radon must be vented to the outdoors.

2. Environmental Tobacco Smoke (Secondhand Smoke)

Air Purifier Effectiveness for Biological Source Removal - Minimal

Some airborne mold particles may be captured, but mold must be removed at th$_e$ source where it grows.

4. Carbon Monoxide

- Like radon, carbon monoxide is colorless, tasteless, and odorless, and therefore particularly insidious.
- Environmental tobacco smoke is one source of CO, but there are many others, including gas stoves and heaters, wood stoves, chimneys, and furnaces.
- Automobiles also produce CO, so attached garages increase the risk as well.
- CO attacks, among other things, your bloodstream and central nervous system.
- Exposure to low-level doses of carbon monoxide will leave you feeling sluggish, which means an inexplicable lethargy is a good early warning sign.
- Heavier levels of ingestion can cause nausea, dizziness, headaches, and a lack of coordination.
- Carbon monoxide is fatal when you come into contact with too much of it.
- Keeping the CO sources listed above in proper working order and well ventilated will reduce the risk of CO poisoning.
- Install CO detectors in your house or apartment; they are cheap and easy to find and should be a standard accessory in every home.

Air Purifier Effectiveness for CO_2 Removal - None

5. Nitrogen Dioxide

Nitrogen dioxide (NO_2) comes from many of the same sources as carbon monoxide and carries with it similar health risks.

- It can also help produce very dangerous chemical, ozone.

- Unlike CO, however, NO, possesses a sharp and easily detectable smell and a reddish-brown color.
- Reducing NO can be done using the same methods recommended to reduce CO.
- It is more easily detectable than radon or carbon monoxide, even without the aid of any equipment.
- It poses less of a threat, but you should never take anything for granted when it comes to a deadly chemical like this one.

Purifier Effectiveness for Nitrogen Dioxide Removal - None.

Sources must be eliminated or reduced to safe levels.

5. Organic Gases

Organic gases," or "Volatile Organic Compounds" (VOCs), is something of a catch-all term for gases that are emitted from many different sources.
Among the common sources of VOCs identified by the EPA are

- Paint
- Cleaning supplies
- Pesticides
- Glue
- Printers and photocopiers
- Permanent markers
- Certain building materials

➢ As you can see, your home probably has many VOC sources, so being aware of them is important.

- The effects of organic gases are likewise various, and range from irritation of the eyes, nose, and throat to dizziness and nausea to even more serious problems, including cancer and damage to the central nervous system.

Different gases have different levels of toxicity.

One way to limit the concentration of VOCs in your home is to store VOC producing material outside when possible. Do not buy unnecessarily large quantities of things like cleaning supplies, so that they are not sitting unused in your home giving off gases.

Air purifier Effectiveness for VOC particles- Varies by Product

Some air purifiers can trap VOC Particles, but they must have the filtration system to accommodate.

Respirable Particles

- Respirable particles are simply small bits of matter that can easily he inhaled ("respire" is another word for "breathe").
- Environmental tobacco smoke contributes to their presence, as do fireplaces, kerosene heaters, and wood stoves.
- Respirable particles, like many other indoor air pollutants, can irritate the eyes, nose, and throat, and they can also cause ailments such as bronchitis. They are a cause of cancer as well.
- Reducing their presence can be accomplished by proper maintenance of the devicesthat cause them, by ensuring good ventilation, and by not smoking indoors.
- Homes without the sources listed above rarely have significant levels of repairable particles, so long as they are well ventilated.

Air Purifier Effectiveness for Respirable Particles - Medium-High

Depending on the model, some air purifiers are quite effective at removing particles from the air.

8. **Formaldehyde**

- Formaldehyde, or CH_20, is an organic compound that exists as a gas at room temperature.
- Formaldehyde is invisible, but has a distinctive pungent smell.
- Common sources of formaldehyde in the home include:
    - Glues
    - Environmental tobacco smoke
    - Textiles such as durable press drapes

The top source of formaldehyde in most people's homes is the presence of pressed wood containing urea-formaldehyde resins in building materials and furniture: this category includes:

- Particle board
- Hardwood plywood paneling
- Above all, medium-density fiberboard

- Homes built in the 1970s were sometimes insulated with Urea Formaldehyde Foam
  Insulation (UFFI), which is a major source of indoor formaldehyde pollution.
- In high enough concentrations, formaldehyde can cause irritation of the eyes, nose, and throat, coughing, rashes, and fatigue.
- It may also be a cause of cancer and other serious health problems.

To keep formaldehyde at a minimum, reduce the humidity and moderate the temperature in your home. In the future, use exterior-grade pressed wood products, which release less formaldehyde because they have different resins.

Air Purifier Effectiveness for Formaldehyde Removal - Minimal-None

Some air purifiers can remove a small amount gases, but sources of formaldehyde pollution must be removed.

9. Pesticides

- The pesticides' very purpose is to kill, so clearly, you do not want to be continuously inhaling them at home.
- Pesticides release a variety of chemicals into the air.
- pesticide **containers in the home are the primary source of this pollutant, but** outside
- pesticide can also be unwittingly tracked in from the yard by those who use them pesticides can irritate the eyes, nose, and throat, and the central nervous system and the kidneys.
- They are also associated with an increased risk of cancer.
- To reduce the pesticides **in** your indoor environment, avoid using chemical pesticides when possible.

If you do need to use them, follow instructions on the label:

  - Do not use excessive amounts, and make sure you keep the area wen ventilated after use.
  - Do not purchase more than you need, so that you don't have extra pesticides resting unused in your home giving off fumes.
- It is best to store pesticides outside rather than inside.
- If you need the services of a pest-control company, check its credentials before you allow it to spray harmful chemicals in your house.

Air Purifier Effectiveness for Pesticide Removal - Minimal-None

Pesticide sources should be stored outside the home.

Asbestos

- Asbestos is a type of magnesium silicate fiber that was once commonly used in home construction for its ability to insulate the home and resist fire.
- Asbestos fibers are so small that they can easily be inhaled by someone without the person knowing it.

Today, many forms of asbestos are banned by the federal government, and even those that are rarely used. Therefore, asbestos is a major risk in older homes rather than new ones.

- Asbestos produces no immediate symptoms, so there are no early-warning signs.
- In the long term, it can contribute to abdominal cancer, lung cancer, and mesothelioma.
- There is even a condition known as asbestosis, which occurs when the fibers cause scarring in the lungs.
- If your home has asbestos, this does not necessarily mean that you are in danger.
- If the asbestos is of good quality and left undisturbed, it will not release fibers into the air to be inhaled.
- If some operation needs to be performed on your home that might lead to the asbestos being disturbed, it is best to use professionals.
- If you are worried about asbestos levels in your home, the wise action may be to seal the asbestos off rather than try to remove it, which may just lead to more asbestos being released into the air.

Air Purifier Effectiveness for Asbestos Removal - Varies

Many air purifiers can filter asbestos particles suspended in the air column down to 0.3 microns. However, asbestos sources should be removed by experts and surfaces cleaned if asbestos contamination is suspected. Should never rely on an air purifier alone to deal with asbestos pollution.

SICK BUILDING SYNDROME AND BUILDING RELATED ILLNESS

The term "sick building syndrome" (SBS) is used to describe situations in which building occupants experience acute health comfort effects that appear to be linked to ₜime spent in a building, but no specific illness or cause can be identified.

The complaints may be localized in a particular room or zone, or may be widespread throughout the building. In contrast, the term "building related illness" (BR!) is used when symptoms of diagnosable illness are identified and can be attributed directly to airborne building contaminants.

Indicators of Sick Building Syndrome

- Building occupants complain of symptoms associated with acute discomfort, e.g., headache; eye, nose, or throat irritation; dry cough; dry or itchy skin; dizziness and nausea; difficulty in concentrating; fatigue; and sensitivity to odors.
- The cause of the symptoms is not known.
- Most of the complainants report relief soon after leaving the building.

Indicators of Building Related Illness

- Building occupants complain of symptoms such as cough; chest tightness; fever, chills; and muscle aches.
- The symptoms can be clinically defined and have clearly identifiable causes.

- Complainants may require prolonged recovery times after leaving the building. It is important to note that complaints may result from other causes.

These may include an illness contracted outside the building, acute sensitivity (e.g., allergies), job related stress or dissatisfaction, and other psychosocial factors. Nevertheless, studies show that symptoms may be caused or exacerbated by indoor air quality problems.

Causes of Sick Building Syndrome

The following have been cited causes of contributing factors to sick building syndrome:

1. Inadequate ventilation

In the early and mid-1900's, building ventilation standards called for approximately 15 cubic feet per minute (cfm) of outside air for each building occupant, primarily to diluteand remove body odors. As a result of the 1973 oil embargo, however, national energy conservation measures called for a reduction in the amount of outdoor air provided for ventilation to 5 cfm per occupant. In many cases these reduced outdoor air ventilation rates were found to be inadequate to maintain the health and comfort of building occupants.

- Inadequate ventilation, which may also occur if Heating, Ventilating, and Air Conditioning (HVAC) systems do not effectively distribute air to people in the building, is thought to be an important factor in SBS.
- In an effort to achieve acceptable IAQ while minimizing energy consumption, the American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE) recently revised its ventilation standard to provide a minimum of 15 cfm of outdoor air per person (20 cfm/person in office spaces).
- Up to 60 cfm/person may be required in some spaces (such as smoking lounges) depending on the activities that normally occur in that space (ASHRAE Standard 62-1989).

2. Chemical contaminants from indoor sources

The most indoor air pollution comes from sources inside the building.

Example:

Adhesives, carpeting, upholstery, manufactured wood products, copy machines, pesticides, and cleaning agents may emit Volatile Organic Compounds (VOCs), including formaldehyde.

Environmental tobacco smoke contributes high levels of VOCs, other toxic compounds, and respirable particulate matter. Research shows that some VOCs can cause chronic and acute health effects at high concentrations, and some are known carcinogens.

Low to moderate levels of multiple VOCs may also produce acute reactions.combustion products such as carbon monoxide, nitrogen dioxide, as well as respirable particles, can come from unvented kerosene and gas space heaters. woodstoves, fireplaces and gas stoves.

3. Chemical contaminants from outdoor sources

The outdoor air that enters a building can be a source of indoor air pollution.

Example

Pollutants from motor vehicle exhausts; pluinbing vents, and building exhausts (e.g., bathrooms and kitchens) can enter the building through poorly located air intake vents, windows, and other openings. In addition, combustion products can enter a building from a nearby garage.

4. Biological contaminants

- Bacteria, molds, pollen, and viruses are types of biological contaminants.
- These contaminants may breed in stagnant water that has accumulated in ducts, humidifiers and drain pans, or where water has collected on ceiling tiles, carpeting, or insulation.
- Sometimes insects or bird droppings can be a source of biological contaminants.
    - The physical symptoms related to biological contamination include cough, chest tightness, fever, chills, muscle aches.
    - Allergic responses such as mucous membrane irritation and upper respiratory congestion.
    - One indoor bacterium, Legionella, has caused both Legionnaire's Disease and Pontiac Fever.
- These elements may act in combination, and may supplement other complaints such as inadequate temperature, humidity, or lighting.
- After a building investigation, however, the specific causes of the complaints may remain unknown.

Building Investigation Procedures

- The goal of a building investigation is to identify and solve indoor air quality complaints in a way that prevents them from recurring and avoids the creation of other problems.
- To achieve this goal, it is necessary for the investigator(s) to discover, whether a complaint is actually related to indoor air quality, identify the cause of the complaint, and determine the most appropriate corrective actions.
- An indoor air quality investigation procedure is best characterized as a cycle of information gathering, hypothesis formation, and hypothesis testing.
- It generally begins with a walk-through inspection of the problem area to provide information about the four basic factors that influence indoor air quality:

    - The occupants
    - The HVAC system
    - Possible pollutant pathways
    - Possible contaminant sources

Solutions to Sick Building Syndrome

Solutions to sick building syndrome usually include combinations of the following:

- Pollutant source removal or modification
- Increasing ventilation rates
- Air cleaning
- Education and communication

1. Pollutant source removal or modification

Pollutant source removal or modification is an effective approach to resolving an IAQ problem when sources are known and control is feasible.

- Include routine maintenance of HVAC systems. periodic cleaning or replacement of filters
- Replacement of water-stained ceiling tile
- carpeting
- Institution of smoking restrictions
- Venting contaminant source emissions to the outdoors
- Storage and use of paints
- Adhesives
- Solvents
- Pesticides in well ventilated areas
- Use of these pollutant sources during periods of non-occupancy.

Allowing time for building materials in new or remodeled areas to off-gas pollutants before occupancy.

Several of these options may be exercised at one time.

Increasing ventilation rates

- Increasing ventilation rates and air distribution often can be a cost effective means of reducing indoor pollutant levels.
- HVAC systems should be designed, at a minimum, to meet ventilation standards in local building codes.
- Many systems are not operated or maintained to ensure that these design ventilation rates are provided.
- In many buildings, IAQ can be improved by operating the HVAC system to at least its design standard, and to ASHRAE Standard 62-1989 if possible.
- When there are pollutant sources, local exhaust ventilation may be appropriate to exhaust contaminated air directly from the building.
- Local exhaust ventilation is particularly recommended to remove pollutants that accumulate in specific areas such as rest rooms, copy rooms, and printing facilities

3. Air cleaning

- Air cleaning can be a useful adjunct to source control and ventilation but has certain limitation certain limitations.
- Particle control devices such as:

- ❖ The typical furnace filters are inexpensive but do not effectively capture small particles.
- ❖ High performance air filters capture the smaller.
- ❖ Respirable particles but are relatively expensive to install and operate.
- ❖ Mechanical filters do not remove gaseous pollutants.

Some specific gaseous pollutants may be removed by adsorbent beds, but these devices can be expensive and require frequent replacement of the adsorbent material. In sum, air cleaners can be useful, but have limited application.

4. **Education and communication**

Education and communication are important elements in both remedial and preventive indoor air quality management programs.

When building occupants, management, and maintenance personnel fully communicate and understand the causes and consequences of IAQ problems, they can work more effectively together to prevent problems from occurring, or to solve them if they do.

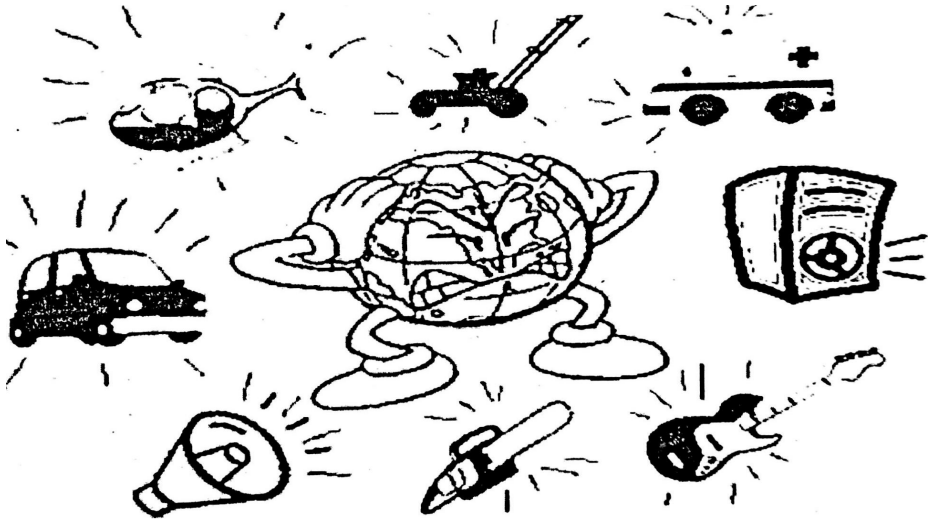
NOISE POLLUTION

The term noise is derived from the Latin word Nausea referring to the feeling of sickness in the stomach with an urge to vomit. Any unpleasant and unwanted sound is considered as noise. It is one form of pollution. Noise pollution can be defined as unwanted or offensive sounds that unreasonably intrude into our daily activities. It is responsible for various adverse effects. In recent years noise is recognized as a major pollutant on par with other chemical pollutants of air, water and biosphere. Noise has many harmful effects on man and the damage incurred is irreversible.

Sound is measured by several complex systems. The best known unit of measurement is the measurement of sound in decibel which is named after Sir Alfred

Bell. The industrial noise survey of India recognized noise levels from 81 dB to 120dB as permissible levels.

Loud noises (above 130 dB) can cause immediate and permanent damage to the muscles in the middle ear, altering the stiffness of the ossicles, damaging the hair cells of the cochlea and causing the rupture of ear drum thereby reducing the efficiency of hearing.



Definition

Noise pollution is generally defined as regular exposure to elevated sound levels that may lead to adverse effects in humans or other living organisms.

According to the World Health Organization, sound levels less than 70 dB are not damaging to living organisms, regardless of how long or consistent the exposure is.

- Exposure for more than 8 hours to constant noise beyond 85 dI3 may he hazardous.
- Da- If you work for 8 hours daily in close proximity to a busy road or highway, you are very likely exposed to traffic noise pollution around 85dB.

Zone	Day time
Silent zone	50
Residential zone	55
Commercial zone	65

SOURCES OF NOISE POLLUTION

- Industrialization
- Poor Urban planning
- Social Events
- Transportation

- Construction Activities
- Householdchores

1. Industrialization

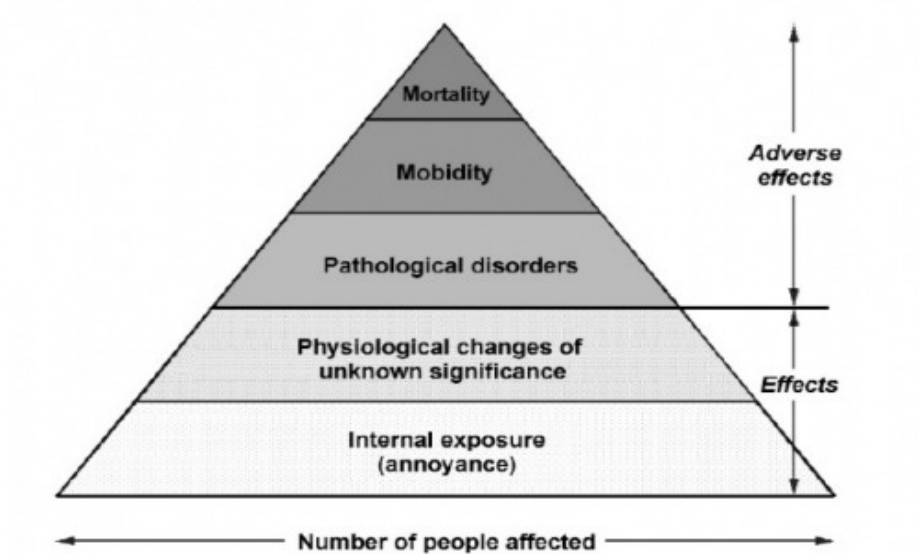
- Most of the industries use big machines which are capable of producing a **large** amount of noise.
- Apart from that, various equipments like compressors, generators, exhaust **fans,** grinding mills also participate in producing big noise.
- Therefore, you must have seen employees in these Workshops and **industries** wearing ear plugs to minimize the noise.

2. Poor Urban Planning

- In most of the developing countries, poor urban planning also plays a vital role.
- Congested house, large families sharing small space, fight over parking. and frequent fights over basic amenities leads to noise pollution which may disrupt **the** environment of the society.
- This form of pollution may seem harmless, it in fact has far reaching consequences.
- The adverse effects on the health of the environment are quite severe.
- Not only is the local wildlife affected by the pollution, humans also facing a number of problems due to it.

EFFECTS OF NOISE POLLUTION

- **Whether we realize we are subjected to it or not, noise pollution can be hazardous to our health in various ways.**
- **According to the USEPA, there are direct links between noise and health. 04- Noise pollution adversely affects the lives of millions of people.**
- **Noise pollution can damage physiological and psychological health.**
- **High blood pressure, stress related illness, sleep disruption, hearing loss, and productivity loss are the problems related to noise pollution.**
- **It *can* also cause memory loss, severe depression, and panic attacks.**

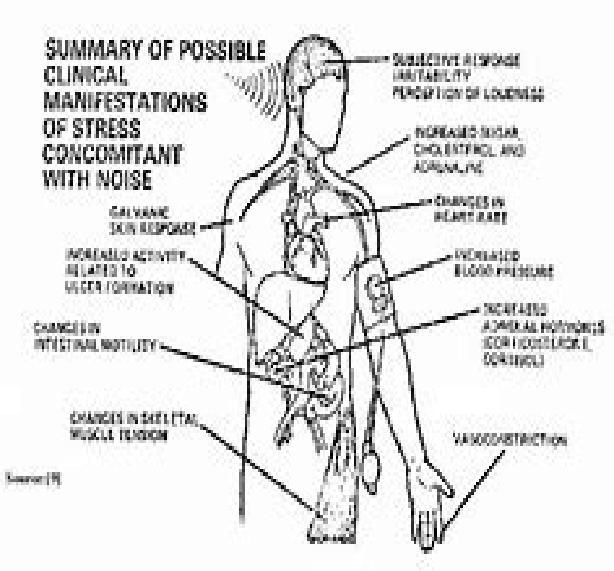


Effect of Noise pollution on human health

- Hearing Problem
- Health Issues
- Sleeping Disorders
- Cardiovascular Issue',
- Psychological dysfunction
- Child development
- Trouble Communicating

Hearing Problems

Any unwanted sound that our ears have not been built to filter can cause problems within the body.



- Our ears can take in a certain range of sounds without getting damaged.
- Man made noises such as jackhammers, horns, machinery, airplanes and even vehicles can be too loud for our hearing range.
- Constant exposure to loud levels of noise can easily result in the damage of our ear drums and loss of hearing.
- It also reduces our sensitivity to sounds that our ears pick up unconsciously to regulate our body's rhythm.

Health Issues

- Excessive noise pollution in working areas such as offices, construction sites, bars and even in our homes can influence psychological health.
- Studies show that the occurrence of aggressive behavior, disturbance of sleep constant stress, fatigue and hypertension can be linked to excessive noise levels.
- These in turn can cause more severe and chronic health issues later in life.

3. Sleeping Disorders

- Loud noise can certainly hamper your sleeping pattern and may lead to irritation and uncomfortable situations.
- Without a good night sleep, it may lead to problems related to fatigue and your performance may go down in office as well as at home.
- It is therefore recommended to take a sound sleep to give your body proper rest.

4. Cardiovascular Issues

- Blood pressure levels, cardio-vascular disease and stress related heart problems are on the rise.
- Studies suggest that high intensity noise causes high blood pressure and increases heart beat rate as it disrupts the normal blood flow.
- Bringing them to a manageable level depends on our understanding noise pollution and how we tackle it.

5. Psychological dysfunctions

- Psychological dysfunctions and noise annoyance. Noise annoyance is, in fact, a recognized name for an emotional reaction that can have an immediate impact.

6. Child development

- Children appear to be more sensitive to noise pollution, and a number of noise-pollution-related diseases- dysfunctions are known to affect children, from hearing impairment to psychological and physical effects.
- Children who regularly use music players at high volumes are at risk of developing hearing dysfunctions.
- In 2001, it was estimated that 12.5% of American children between the ages of 6 to 19 years had impaired hearing in one or both ears.

7. Trouble Communicating

- High decibel noise can put trouble and may not allow two people to communicate freely.
- This may lead to misunderstanding and you may get difficult understanding the other person.
- Constant sharp noise can give you severe headache and disturb your emotional balance.

Effects of Noise Pollution on Wild Life

- Wildlife faces far more problems than humans because noise pollution since they are more dependent on sound. Animals develop a better sense of hearing than us since their survival depends on it.
- The ill effects of excessive noise begin at home.
- Pets react more aggressively in households where there is constant noise.
- The animals are also affected by noise pollution in the form of traffic, firecrackers etc., and birds are especially affected by the increased air traffic.

Effects of Noise Pollution on Marine Life

Our oceans are no longer quiet.

- Thousands of oil drills, sonar, seismic survey devices, coastal recreation$_{a}$l watercraft and shipping vessels are now populating our waters, and that is a serious ca$_{use}$

- of noise pollution for marine life.

- Whales are among the most affected, as their hearing helps them ^{orient} themselve$_{s}$, feed and communicate.

- Noise pollution thus interferes with cetaceans' (whales and dolphins) feedi$_{ng}$ habits, reproductive patterns and migration routes, and can even cause hemorrhage and death.

Solution for Air Pollution

- Planting bushes and trees in and around sound generating sources is an effective solution for noise pollution.
- Regular servicing and tuning of automobiles can effectively reduce the noise pollution.
- Buildings can be designed with suitable noise absorbing material for the walls, windows, and ceilings.
- Workers should be provided with equipments such as ear plugs and earmuff's for hearing protection.
- Similar to automobiles, lubrication of the machinery and servicing should be done to minimize noise generation.
- Soundproof doors and windows can be installed to block unwanted noise from outside.
- Regulations should be imposed to restrict the usage of play loudspeakers in crowded areas and public 'places.
- Factories and industries should be located far from the residential areas.
- Community development or urban management should be done' with long-term planning, along With an aim to reduce noise pollution.
- Social awareness programs should be taken up to educate the public about the causes and effects of noise pollution.

MEASUREMENT OF NOISE POLLUTION

Noise assessment is an examination of the nature and characteristics of a noise. It involve verifying aural factors such as:

- The location of the noise source
- Its audibility at certain locations
- The time the noise is made and its duration
- Its characteristics
- The reported effect it has on people A.
- For building intruder alarms, the assessment needs to be made inside a habitable room in a neighbor’s residence. For vehicle intruder alarms the assessment can be made anywhere.
- The times of use or duration of the noise automatically make the noise offensive.
- In other cases it will be necessary to consider a range of factors to determine whether the noise is offensive, in the following:
- ✓ The loudness of the noise, especially compared with other noise in the area

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