

## In the Name of God the Most Merciful the Most Kind Noise Pollution

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In this very world, where the new is overcoming the old and the balances of its primary components have changed, man is proud with his new inventions and evolutions but under-estimating their effects on his environment and so greatly jeopardizing the future of the life on earth.

Hopefully, a worldwide serious quest in the field of environment is encountered to protect life on earth.

Many conferences, commissions and researches have been held previously.

The first studies about the effect of noise on hearing started the year 1830 these were about black smith and those who work in railway jobs.

So far, I think it is convenient to talk about the sound, an environmental element that may pollute it.

Noise the most ubiquitous pollutant.

Albert P.W [1]

### Sound: Noise

If the silence is considered as a one of the sound grades that surround the man arising from the different living and non-living creatures, the other grades increase gradually till a noise grade is reached, thence increase to a lethal level.

The noise: means the shouting and loudness of the people voices in the war as mentioned in the Al Waseet dictionary. In the Webster's dictionary, it means any annoying sound.

### The sources of the noise

Man and his inventions pollute the environment as follows:

- The automobile noises and their klaxon. It is shown that the large automobiles cause 70% of the noises.
- The factories
- The loud speakers and audio's in the streets and markets in Iraq because of shortage in electricity, generators are widely used so in crowded streets the level of noise is high.
- Entertainment instruments in the public places and streets.
- The war weapons in different types.

### The noise has many senses

#### Physical sense

Noise [2] is a complex sound having little or no periodicity, which can be measured, or its characteristics can be analyzed. These can be repetitive, pulsatile, or explosive.

The sound intensity is measured by "decible" units similar to the meter or gram in measurement of the height and weight. Most of the people cannot hear the sound of less than 0-desible intensity, though some of them can.

The human can tolerate 60-desible sound intensity without disturbance.

The human voice is of 30-decible during conversation and may reach up to 60-decible in shouting.

The noise of the automobiles in the busy streets reaches to 70-decible, while the airplanes have 120-decible sound.

The canon bombs have 130-decible and the pave lithotripter has 110-decible sounds.

The spaceship compeller rocket gives a very loud sound of 175-decible.

### Effects of sound (and noise) stimulation on the ear [2]

Adaptation/Temporary threshold shift (fatigue)/Permanent threshold shift Adaptation or per-stimulatory fatigue, is an immediate phenomenon, which occurs when a sound is presented to the ear somewhat elevating the threshold the recovery is exponential in nature, and for fatiguing sound of up to 70dB occurs fully within 0.5 second. while temporary threshold shift is a post stimulatory fatigue which increases progressively with stimulus duration and intensity, the higher the frequency of the stimulating tone, the greater the temporary threshold shift, irrespective of the exposure frequency.

Physiological fatigue should be limited to temporary threshold shift that lasts for more than 2 minutes, but that has completely recovered in less than 16 hours.

Temporary threshold shift for impulse noise grows linearly with time instead of exponentially, as found with steady noise. But in case of permanent threshold shift there is an irreversible elevation of the auditory threshold produced by noise exposure, associated with permanent pathological changes in the cochlea.

The scientific bases for the equal energy concept: which proposed that equal amount of acoustic energy, between a level which is totally safe and one which is totally injurious produce equal amount of hearing loss, the led to the term (noise immission level) as an index of the total noise energy incident on the ear over a period of time.

### The anatomical correlates of sound/noise injury

Acoustic injury to the ear has a dynamic and a static phase. The former starts during acoustic stimulation during which the cellular elements in the cochlea undergo structural and functional change, which may be lethal or may initiate repair.

After cessation of sound trauma, the degenerative and reparative processes compete leading to full recovery, partial recovery and scarring or destruction, and then the static phase in which hearing is stable is entered.

The current view is that different patterns of over-stimulation leave unique footprints of hair cell injury and this may be related to peripheral features such as the middle ear muscle response to sound.

Drugs like ototoxic and noxious agents that damage the ear as well as vibration, degree of melanization all may have synergistic effect with a noise -induced damage

It has been shown that after damage to the cochlea by noise, the most sensitive frequency of individual auditory neurons was lowered by half an octave and that the sensitive tip was lost.

Central changes in noise induced permanent threshold shift are similar to those that occur with any acquired sensorineural hearing loss.

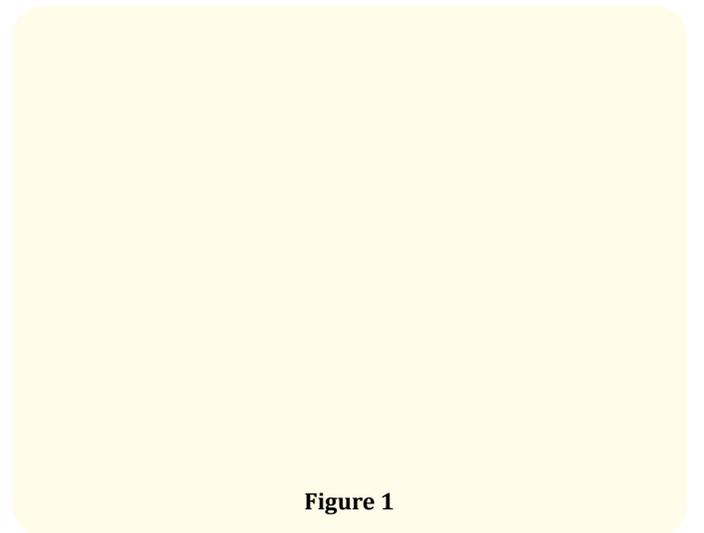


Figure 1

Most of the range of human audibility categorized with respect to the risk of injury and hearing loss [2].

### The physiologic and pathologic senses:

The noises are meaningless sounds to hear, but may lead to simple physiologic changes at high levels and even may lead to a temporary or permanent hearing loss.

The sound has other harmful physiologic effects according to its intensity as follows: in a region of 70-decible, the human being will have a high blood pressure and nervousness.

Hearing loss and tinnitus will develop in the region of 90-decibels.

If 120-decibel sound intensity is encountered, eardrum damage with its accompanying clinical features will be the worse results.

Can you now imagine the effect of 140-decibel! Bleeding in the inner ear and a permanent deafness with vertigo and tinnitus.

If the high intensity sound continues, its effects will increase as well and leads to arterial contraction that leads to hypertension and heart failure.

The lethal level that damages the thoracic cavity and the lungs with rapid death is in the region of 170-decibel., this is the cause of death in areas of explosion even regardless the shell injuries.

This explains the death of the old peoples of Aad, Thamoud and Lout as mentioned in the holly Kuran by a yell, "al sayha" in 11 verses, e.g. "when our order came, we save Shuaib and his good followers with our mercy and bad people have been takes by the yell, "Al sayha" their dead bodies are found in their homes, Hud 94.

The high sound is mentioned as a sign of the doomsday in other 17 verses [3].

### Noise effect on Hearing

It was found that noise is one of the important causes of hearing loss in the world.

It is suggested that perhaps 12% or more of global population is at risk for hearing loss i.e. over 600 millions people.

### Noise-induced hearing loss [2]

#### Noise induced temporary threshold shift

Together with the permanent threshold shift, imply a prior prolonged exposure to noise, which may be steady-state, impact or a mixture of the two.

The usual initial change following hazardous noise exposure is a high frequency threshold shift. Classically this appears as a steep isolated audiometric dip, the acoustic notch at 3,4 (usually), or 6 KHz.

Gloric noted that individuals with normal hearing whose ears have never previously undergone prolonged noise exposure (green

ears) demonstrate greater temporary threshold shift than those whose ears have been exposed for long periods of time (ripe ears).

There is an acquired resistance to the auto traumatic effect of noise a (toughening up) of the ear.

A low intensity sound, priming the ear prior to a subsequent high intensity sound reduces the temporary threshold shift produced.

Most recovery occurs in the first two days except for explosions for here significant recovery continues for some weeks.

### Noise induced permanent threshold shift.

This is the most commonly encountered hearing loss caused by noise. Synonymous are occupational hearing loss, industrial, chronic acoustic trauma etc.

Two points of practical importance are the quiet uneven levels in industry and the great individual variability in susceptibility to the effect of noise, acoustic reflex may play a part as a protecting agent, (which is a reflex contraction of stapedius muscle in response to a loud sound) as it is almost unfatiguable for impulse noise, but quickly extinguished with steady-state noise.

Subjects with permanent threshold experience difficulty in discriminating speech.

Noise -induced permanent threshold shift usually commences between 3 and 6 KHz, often around 4, and gradually worsens at that frequency and spreads into neighboring frequencies so people affected have difficulty with sounds being too quiet.

The rate of progression depends upon the type of noise and individual susceptibility. Acoustic emissions might make a sensitive screen for susceptibility to noise damage.

It is said that if a whole population could be kept alive to age 86 it would make no difference what the exposure history of the members of that population has been. It is know suggested that presbycusis and noise are additive.

### Impact noise

- It is a hearing loss caused by single intense sound sources as for example a rifle shot or worse blast trauma from an explosion. It is dangerous as in rifle shots and riveting shot the characteristics of it varies enormously rise and decay

times range from abrupt to a gently sloping and reverberation varies, all of which may alter the effect on the ear. For a given exposure impulse noise is more harmful than steady state noise.

- Tinnitus is a constant feature of an acute blast injury and is a fairly constant concomitant of noise-induced permanent threshold shift it presents for some hours and may disappear, but it may become permanent if the exposure last for years.
- It is found usually to be tonal sometimes relieved by a hearing aid, and of a greater prevalence of those exposed to impact noise.
- In acute acoustic trauma there may also be damage to the tympanic membrane and ossicles with a variable degree of injury to the cochlea.

#### Otitic blast injury

- In this form of trauma external, middle and inner ear structures can all be damaged?
- Blast is the sudden explosive force generated by bursting shells, bombs or other explosives.
- Usually the tympanic membrane perforates which face the bombe. Different shapes and edges of these perforations can be seen.
- The inner ear damage is variable, most of the affected people will have certain degree of sensory hearing loss which may clear quickly and completely, but some may have permanent deaf. Tinnitus usually accompanies these injuries and also may clear up.

#### Worsening of hearing after cessation of noise exposure

Continuing damage to the cochlea may occur in the presence of an apparent asymptomatic threshold shift i.e. hair cell damage continues even so the audiogram remains static, but it is shown that subjects with hearing loss from a single traumatic episode found with no evidence of progression from the accident.

#### The psychological sense

- Here the noise is considered as the unwanted and unpleasant sound.
- It is good to mention the delightful effect of the voice of the wholly Kuran recited in the early morning in the mosque by a melodious voice that has a good psychological effect on the audience and a feeling of calmness and faith.

- God behave us not to rise our voices high like the most unacceptable donkeys sounds: Lukman verse 19.
- The far shout of the coq early in the morning leads to awakening but the repetitive one of the neighbors' is very annoying.
- The melodious voice of Fairouz singing soft songs on the way to work is refreshing one only to be disturbed by the noise of the automobiles and the bad songs.
- The soft and quiet sound has a nice effect that an old doctor said that it is the ear the best route to deliver the treatment to a sick man.
- The quiescence has good effect on the patient.
- It was found that there is a selective elevation of blood pressure monitoring alarms an effect on noise pollution in intensive care units [4], as well as another study showed that noise is a stressful eliciting changes in the autonomic nervous system, impairing mental facilities and producing masking that could effect the staff leading to decreased work performance and anxiety respectively [5,6].

#### Noise pollution and community

Physicians of the medieval medical school of Salerno noted: [2]

'Our hearing is a choice and dainty sense'

'And hard to mend, yet soon it may be marred,

'Blows, falls, and noise ...all these...

'Breed tingling in the ears, and hurt our hearing.

It is one type of environmental pollution, noise can be high to such a level that affects the man till a stage of nuisance or harm.

The people can respond differently to the noises, and the children are more susceptible to its danger as showed the studies.

#### Children and noise

- Children are a high risk group [7], they are vulnerable to the adverse effects of noise exposure, especially the effects on cognitive performance, motivation and annoyance.
- A study showed that there is an effect of long-term exposure to road traffic emissions on the respiratory and dermatological diseases in children.

- Noise signal [8] (as lorry noise) associated with danger can trigger stress reaction mostly during night which may lead to adjuvant effect on the pathogenesis of asthma, chronic bronchitis and neurodermitities.
- Also the studies showed that the students' performance and learning are affected greatly in the schools in the noisy areas [9].

#### Urban population and different acoustic areas

- City noises level in all parts of the world is rising and sound levels in excess of 100 dB are common in Asia city centers, unfortunately I did not met a study about the level of noise in our cities centers with the uncountable generators in the streets!
- A comparative analysis [10] among 357 inhabitants, who live in two areas, Noise above 70 dB/A and moderate below 57 dB/A; it shows noise disturb realization of many important daily activities, evoke emotional irritation, mental pressure, throat and eye irritation, disturbance of rest, speech etc., it may lead to pills intake to sleep.
- Relative risk of appearance of disturbance mentioned or mental and emotional reaction in group of people who are exposed to high noise from 3-6 times bigger in comparison with people from quiet areas.
- As well as most of the symptoms due to intensification neurotic character are connected with cardiovascular symptoms; palpitation, constrictions in the chest, hot flush, the relative risk of appearance of the mentioned above unfavorably health symptoms in group of people from noisy areas is about 1.5 times higher than in areas blow 57 dB/A.
- In additionally the escalation of troubles probably connected with bigger air pollution (frequent dry cough, sneezing, and nasal stuffing) is observed in areas of intensive traffic noise.
- People from low socio -economic status [11] suffering more noise pollution as they live in busy roads and effected by traffic pollution, this was shown in a study by German Federal Health Survey to show a social inequality and noise pollution.
- And also the public impact of large airports [12] on the near by inhabitants which showed a high effect of noise on them.
- Climate also show difference in noise exposure effect as in hot climate areas the peoples are obliged to open their windows are more susceptible to the noises in their homes [13].

- It is interesting what was shown in a study [14] that noise and communal dinning facilities have effect on the psycho-physical well being of the dinners.

#### Legislation and noise

- If we consider noise as it is anything disturbs the physical comfort or even the existence and not only the state of luxury and calmness of the normal life that could be a legal article in legislation for this reason.
- Noise and other polices and practice in many sectors affect health so a Health Impact Assessment [15] is one of the ways to predict these health impacts, and in order to recommended improvements in policies to improve health.
- The general draft (Health for All) [16], for the European region of WHO, describes 21 objectives for a new global health policy in the 21<sup>st</sup> century.
- This policy aims at promoting and protecting public health from the cradle to grave.
- The public health services, responsible for the control and co-ordination of the entire system, have their own scope of procedure.

#### Objective 10

- It mentions that noise pollution is one of the health hazards and to be reduced considerably. German Federal State adopted Laws on health care upon which the public health services are based.
- The public health department acting as public authority, should make available the expert medical knowledge and experience of their staff and contribute comprehensively to regional and development planning procedures in addition to focus on health compatibility testing of projects to ensure efficient preventive health protection and the German National Association NHS physicians stipulated that health compatibility testing should be included in the text of the Law.
- Finnish [17] authority recommended a level of 85 dB/A of sound to be accepted in common places.
- The British law secures the right of quiet listening. The records of the British courts [2] present examples of noise cases. Those legitimate even the barking.

- One of cases of a teacher prosecuted his neighbor for the noises that obliged him to raise his voice on giving private lessons at his home that led to have cancer of the vocal cords [18].

#### Control of the noise [19]

- Identification and control of the sources by laws and legislation
- Treatment of the cause. The industrialists and the researchers developed silent engines and compressors of air conditioners that lessen the noise.
- Use of individual hearing protective devices.
- Education programs beginning with school-age children.
- Consumer guidance
- Increasing product noise - labeling
- Hearing conservative programs for occupational settings
- Designing Green belts on scientific base to serve as wind and dust and as well as a noise control [20].
- Establishing a department of noise in general hospitals [21] as of the surveys of recent researches on the effect of noise and music in health care - orthopedic operations - dentist clinics and other high level noise areas.

The most recent meeting organised by the PDH programme at WHO, in the series on strategies for prevention, was on the prevention of noise-induced hearing loss, held in Geneva in October 1997. The participants concluded that exposure to excessive noise is the major avoidable cause of permanent hearing impairment worldwide.

Noise-induced hearing loss is the most prevalent irreversible industrial disease, and the biggest compensatable occupational hazard. In developing countries, occupational noise and urban, environmental noise are increasing risk factors for hearing impairment.

The meeting recommended that all countries should implement National Programmes for the Prevention of noise-induced hearing loss, integrated with Primary Health Care, and including elements on health promotion, and measures to reduce noise sources and introduce legislation and effective hearing conservation. There is an urgent need to obtain more, accurate epidemiological data on the problem, especially in developing countries. More research is needed on basic mechanisms and means of prevention [22].

A Europeans project [23] to coordinate by the national institute health, Denmark. The project is (children and noise - prevention of adverse effect) partly financed by the European commission program on pollution - related diseases. It is directed towards preventing noise effect children development and health

#### Summary

This short account shows the negative effect of the noise on the peoples and this is the right time to control the noise by the specialists and the researchers.

The legislator has a great role in this problem.

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