Buildings and Human Habitation, Department of Environmental Health September 2016, 4th Year

Noise and Health

Structure

1) Noise Pollution
2) Annoyance
3) Sleep Problem
4) Day and Night Noise Level
5) Sources of Noise
6) Noise Pollution and its effects on Health

Noise Pollution

The noise pollution is defined as the unwanted sound which is released into the environment. It disturbs the human being and cause an adverse effect on the mental and psychological wellbeing. It is measured in the units of decibels and is denoted by the dB.

Noise has the potential to affect health in a variety of ways; some of the effects can be defined as “auditory” and occur as a direct impact of the noise on the auditory hearing mechanism.

There are also a wide range of non-auditory health effects that may be associated with exposure to environmental noise, although the pathways, strength of association, and possible causal mechanisms pathways for these are not fully understood.

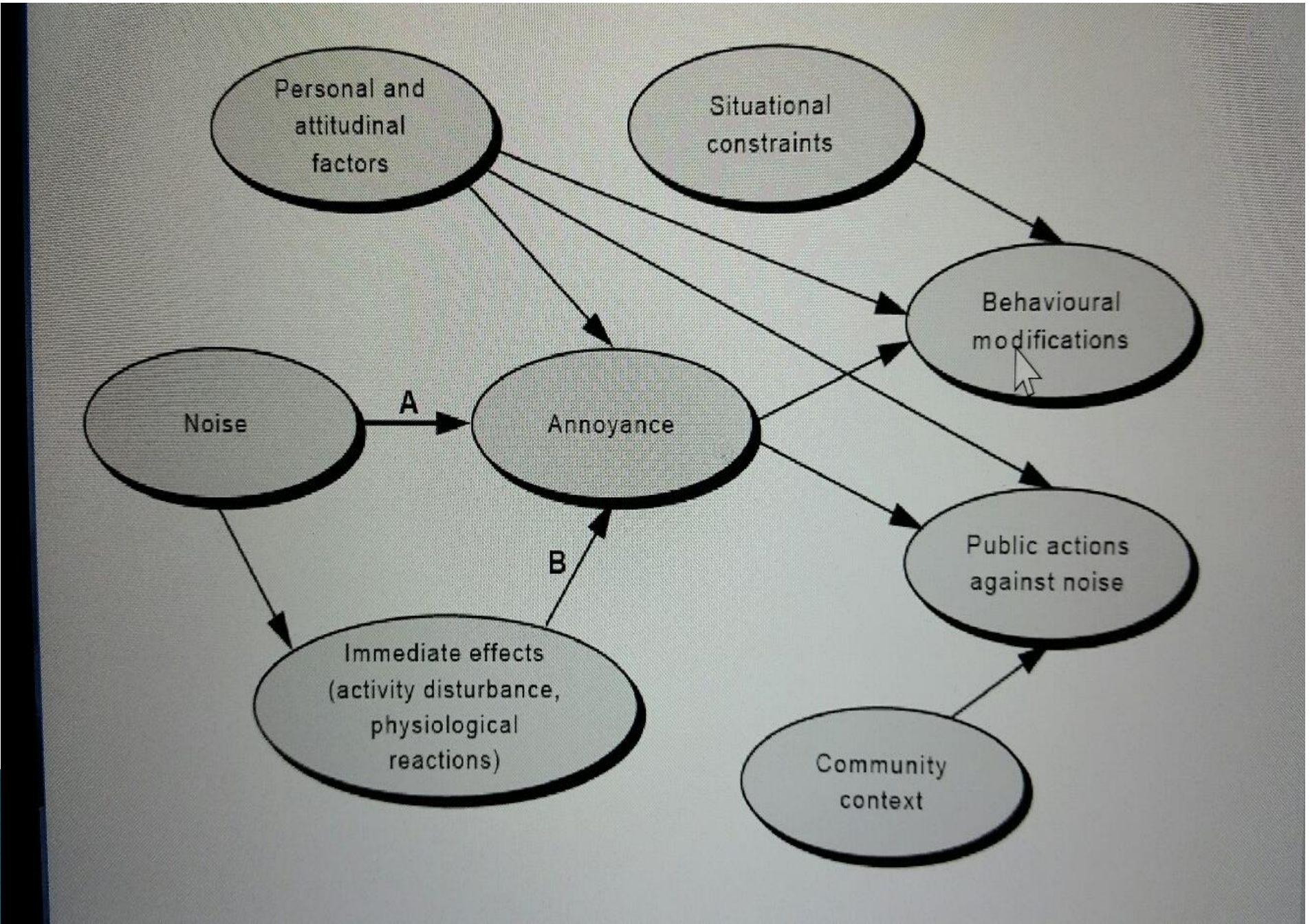
Examples of non-auditory health effects, sometimes referred to as “endpoints” or “outcomes”, which have been linked to environmental noise, include:

- Annoyance;
- Mental Health effects;
- Cardiovascular and physiological effects;
- Night time effects, sleep disturbance;
- Cognitive effects of noise on children;

Annoyance

The various underlying relationships, see Figure-1, between noise and reported annoyance showing both direct and indirect routes from stimulus [noise] to effect. It also indicates some of the "moderating factors" which can be "personal, attitudinal etc", as well as what we might call the "consequences" – behavioural modifications and public action etc

Figure 1–


Personal and attitudinal factors
Situational constraints
Behavioural modifications
Noise
A
Annoyance
Public actions against noise
B
Immediate effects (activity disturbance, physiological reactions)
Community context

Sleep Problem

Another “single health effect illustrating in Figure – 2, the complex links between “night time noise” and the various “components” of the effects of noise on sleep i.e.

1- Acute response – awakening

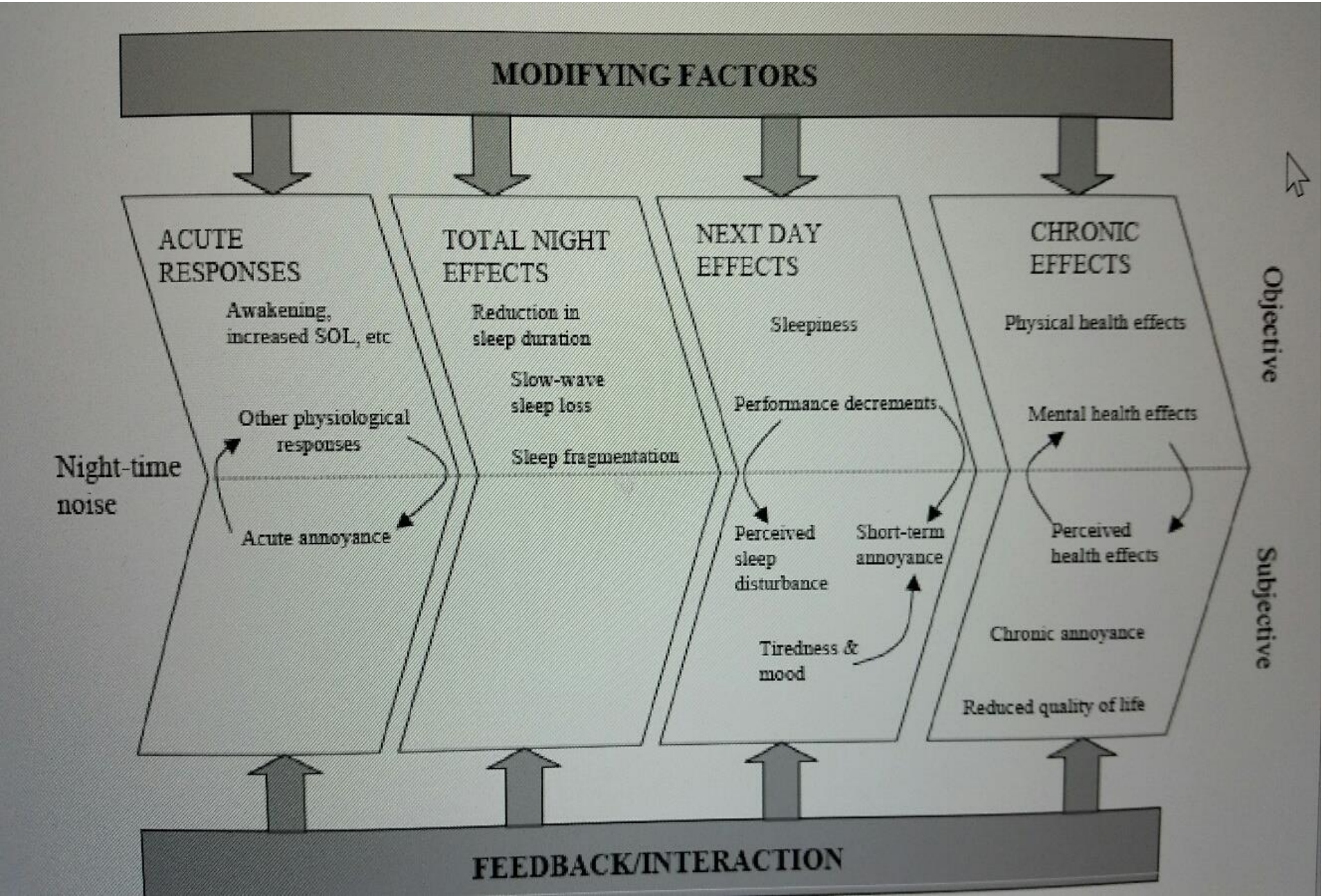
2-Reduction in sleep duration

3-Sleep fragmentation

4-Next day effects

5-Chronic [long term effects]

Figure -2


MODIFYING FACTORS
ACUTE RESPONSES
Awakening, increased SOL, etc
Other physiological responses
Acute annoyance
TOTAL NIGHT EFFECTS
Reduction in sleep duration
Slow-wave sleep loss
Sleep fragmentation
NEXT DAY EFFECTS
Sleepiness
Performance decrements
Perceived sleep disturbance
Short-term annoyance
Tiredness & mood
CHRONIC EFFECTS
Physical health effects
Mental health effects
Perceived health effects
Chronic annoyance
Reduced quality of life
Night-time noise
Objective
Subjective
FEEDBACK/INTERACTION

DAY AND NIGHT NOISE LEVELS

Typical Noise Level per dB

Day	Night	Acoustical Quality
35	35	natural sounds only
50	40	quiet rural environment
55	45	suburban neighbourhood
65	50	urban noise situation
75	75	very noisy, unfit for permanent habitation

Sources of Noise

- Road Traffic
- Air Traffic
- Rail Traffic
- Industry
- Recreational Activities
- Construction Sites
- Traffic on Waterways

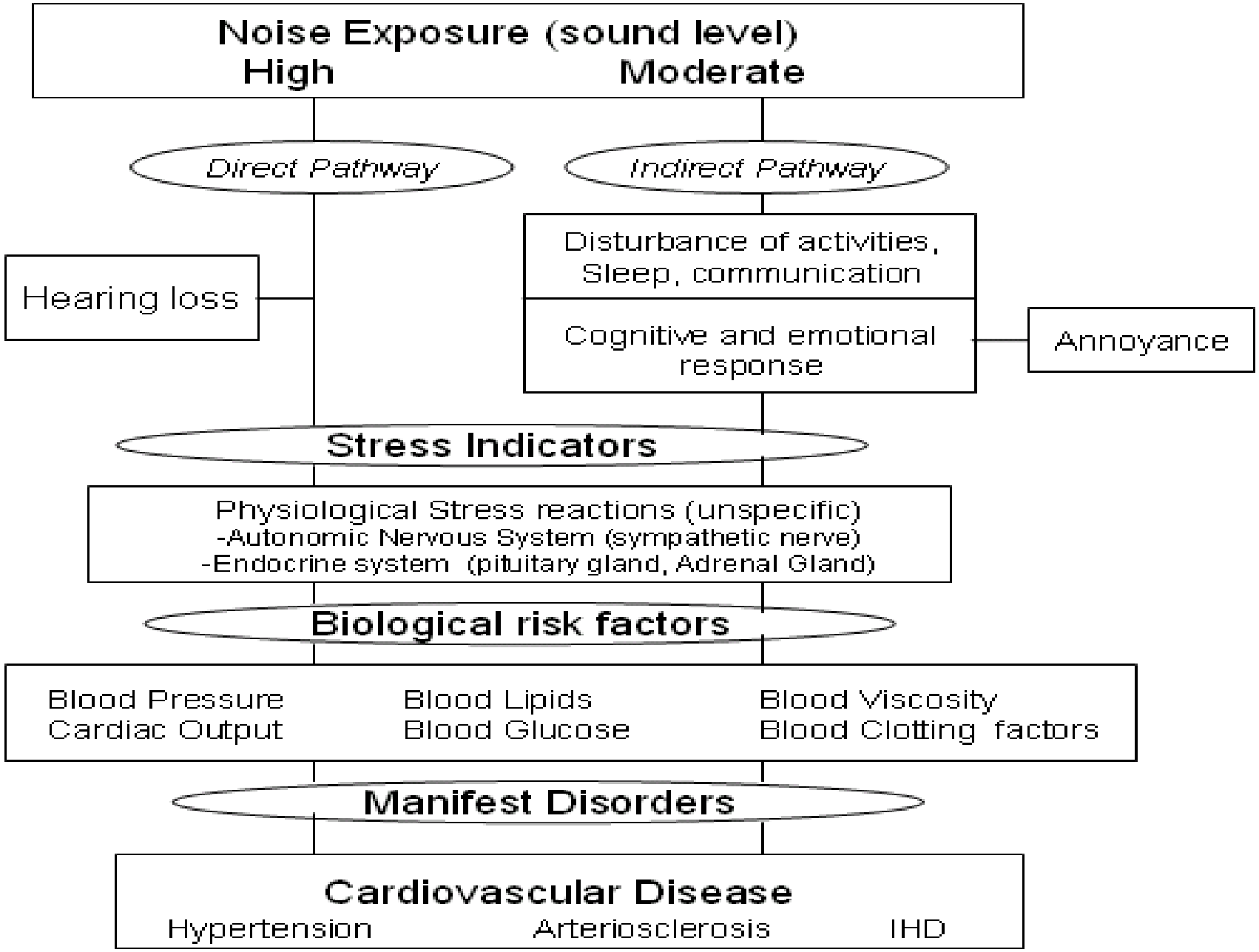
NOISE POLLUTION AND ITS EFFECTS ON HEALTH

1. Chronic exposure to noise may cause noise-industrial hearing loss. A study show that, older males exposed to significant occupational noise demonstrate significantly reduced hearing sensitivity than their non-exposed peers.

2. Unwanted noise can damage physiological and psychological health. Noise pollution can called annoyance and aggression, hypertension, high stress levels, tinnitus, hearing loss, sleep disturbances, and other harmful effects. As shown on Figure3, explain the complex links/associations between the external noise exposure and the effects on human health

3. High noise levels can contribute to cardiovascular effects and exposure to moderately high levels during a single eight hour period causes a statistical rise in blood pressure and an increase in stress and vasoconstriction leading to the increased blood pressure as well as to increased incidence of coronary artery disease.

Figure 3-


Noise Exposure (sound level)
High
Moderate
Direct Pathway
Indirect Pathway
Hearing loss
Disturbance of activities, Sleep, communication
Cognitive and emotional response
Annoyance
Stress Indicators
Physiological Stress reactions (unspecific)
-Autonomic Nervous System (sympathetic nerve)
-Endocrine system (pituitary gland, Adrenal Gland)
Biological risk factors
Blood Pressure
Cardiac Output
Blood Lipids
Blood Glucose
Blood Viscosity
Blood Clotting factors
Manifest Disorders
Cardiovascular Disease
Hypertension
Arteriosclerosis
IHD