OPEN TEXT BASED ASSESSMENT 2016-17
Science (086/090) Class - IX
Theme 2
Healthy Environment, Healthy People

Learning Objectives

- To recognize critical links between environment, development and human well being.
- To list the environmental causes affecting human health.
- To evaluate one’s environmental health.
- To explore solutions to the environmental pollution problems.
- To generate awareness among students to maintain a healthy environment for healthy life.

A Note to readers

After exploring the content, students will develop, a more enlightened view relating human health to nature. They will be able to recognize that plants and animals (including humans) do not exist as independent entities but instead are part of complex and interconnected ecosystems on which they are entirely dependent. It is designed with a view to create awareness relating nature and natural environment to human health and well being.

Students will explore the relations between environment and health. It is of vital importance to consider a broader definition of "environment": not only the quality of the air, water and ground, but also indoor air quality, food and the living and working environment need to be taken into account.
Abstract

Plants and animals (including humans) do not exist as independent entities but instead are part of complex and interconnected ecosystems on which they are entirely dependent. While analysing relations between environment and health, it is of vital importance to consider a broader definition of "environment". Not only the quality of the air, water and ground, but also indoor air quality, food and the living and working environment need to be taken into account.

Health and Environment

(1) Environment plays a significant role in determining the health of people.

(2) The 2030 Agenda for Sustainable Development highlights critical links between development, the environment, human well-being and the full enjoyment of a vast range of human rights, including the rights to life, health, food, water and sanitation.


(3) 

hi! what are you doing?

just came to throw garbage

HERE ... on the street?

So what?

if you will throw the garbage here and there, it will pollute the environment and harm the animals eating it.

I think you are right. The problem of environment pollution is so acute that it has become a major threat for the human beings as well as the animals.
Two main aspects of environment which influence health are the physical and the social.

A. Social Factors

Individual’s working environment presents many potential dangers with almost any form of employment such as-

1. Repetitive strain injury in the office place.
2. Stress related illness in the customer care industries.
3. Labour jobs such as coal miners are at high risk of breathing problems.
4. Family relationships, friends, and peers in the school or work place. These relationships can produce negative peer pressure and potential bullying.

B. Physical Factors

1. Sanitation facilities: Mahatma Gandhi said in 1923, “Sanitation is more important than independence”

Of human excreta, faeces are most dangerous to health. Faeces from an infected person can contain viral pathogens, bacterial pathogens, protozoan cysts or oocysts, and helminth eggs. This contamination is a major cause of diarrhoea, and leads to other major diseases such as cholera, schistosomiasis, and trachoma.
There are many allergens like faecal material of house dust mites that may cause asthma attacks or "hay fever" (allergic rhinitis). Facts show that a high exposure to these allergens during early period of life, increases the possibility of suffering from asthma in later period of life.

2. **Water:** There are various sources of chemical hazards. Water is one of them. If water is soft, it may leach lead from the pipes. Sometimes high content of Nitrate is found in water, which probably arises due to fertilizer leaching. This increases the risk of methaemoglobinaemia ('blue babies') in bottle infants which occurs very rarely.

Recreational Water illness (RWI) can be caused by the chemicals found in water that causes gastrointestinal and various other kinds of infections.

As we know that now a days plastic water bottles are very commonly used. Do you know that a chemical, Bisphenol A (BPA) has been frequently used in plastic bottles. It is harmful to humans as it interferes with their hormone levels and possibility of human reproductive disorders is increased.

3. **Quality of food:** Quality of food and its resources both have a significant impact on our life. We all know how harmful pesticides are, to human life. According to United State Environmental Protection Agency (EPA), “If high levels of pesticides are used for long time it may cause birth defects, nerve damage and cancer”.

Although agencies like EPA carefully monitor pesticide use, but consumers should also be aware and sensitive towards its possible risks. Children are more prone to the serious effects of pesticide exposure.
As one of the effluents released from industries, mercury enters water resources and gets absorbed by naturally occurring bacteria present there and is converted into another form ‘methyl mercury; we all know that fishes are one of the most popular and commonly eaten sea food. If fishes tainted by mercury are consumed by any human, the mercury acting as neurotoxin, interferes with his / her brain and nervous system.

4. **Quality of indoor air:** Fungal hyphae and dust provide favourable conditions for the development of conditions like asthma and allergies.

Smoke contains carcinogenic chemicals and when present in homes or workplaces, possess significant risk in causing cancer to the people.

Inadequately ventilated fire – places and stoves may cause lung diseases. Various sources of pollution are present in the indoor environment and cause adverse impact on health.

Exposure to radiations, Environmental Tobacco Smoke (ETS), Chemical and biological contaminants like mold causes a number of health problems.

<table>
<thead>
<tr>
<th>Disease/injury</th>
<th>Ratio of disease burden linked to environmental factors</th>
<th>Main environment risk factor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diarrhoea</td>
<td>58%</td>
<td>Inadequate water, sanitation, hygiene</td>
</tr>
<tr>
<td>Lower respiratory infections</td>
<td>20%</td>
<td>Household and outdoor air pollution</td>
</tr>
<tr>
<td>Cardio-vascular diseases</td>
<td>14%</td>
<td>Chemical, air pollution and Environmental Tobacco Smoke exposure</td>
</tr>
<tr>
<td>Malaria</td>
<td>42%</td>
<td>Poor water resource, housing and land use management which fails to curb vector populations effectively</td>
</tr>
<tr>
<td>Road traffic injuries</td>
<td>40%</td>
<td>Poor urban design or poor environmental design of transport systems</td>
</tr>
<tr>
<td>Cancer</td>
<td>19%</td>
<td>Exposure to air pollution, pesticides, consumer products, radiation,</td>
</tr>
<tr>
<td>Condition</td>
<td>Percentage</td>
<td>Cause</td>
</tr>
<tr>
<td>------------------------------------------------</td>
<td>------------</td>
<td>-----------------------------------------------------------------------</td>
</tr>
<tr>
<td>Chronic obstructive pulmonary diseases</td>
<td>38%</td>
<td>Use of polluting fuels for cooking, outdoor air pollution and exposures to workplace dusts and fumes</td>
</tr>
<tr>
<td>Perinatal conditions</td>
<td>11%</td>
<td>Exposure of mothers to air pollution, tobacco smoke, pesticides and other chemicals; unsafe water and inadequate sanitation</td>
</tr>
</tbody>
</table>


5. **Radiations**: Exposure to ultraviolet (UV) radiation increases the possibility of skin cancer such as melanoma, and of cataracts

6. **Chemical Hazards - How do they affect us**: We all are aware of the toxic effects of consumption of tobacco to our health. The Government has also launched various awareness campaigns and issued advisories regarding this, from time to time. Likewise tobacco smoke has also been identified as a major airborne chemical risk to health. It causes a number of diseases like lung cancer, chronic bronchitis and emphysema. Smoking adversely affects the immune system, thereby making smokers more prone to the respiratory infections.

   Combustion of solid fuels and coal releases smoke (containing polycyclic aromatic hydrocarbons) and sulphur dioxide. They also generate and release particulate matter in air, add on carbon di-oxide, an important greenhouse gas.

   Large scale industrial release of chemicals with serious acute effects are fortunately rare in India but there are some major events occurred in the past.

   Here are certain incidents which highlight the impact of chemicals and pesticides on human health.
1. The Bhopal Disaster—how can we forget?

Monday 15 December 2014

Rows of people whose lives were snuffed out on the fateful night of December 2-3, 1984 (Photo: Ashok Chaddha)

It was the cursed night of December 2, 1984, when Bhopal died a million deaths. The chemical, methyl isocyanate (MIC), that spilled out from Union Carbide India Ltd’s (UCIL’s) pesticide factory turned the city into a vast gas chamber. People ran on the streets, vomiting and dying. The city ran out of cremation grounds.

Within weeks of the accident, people were seen suffering from common ailments of the poor, such as tuberculosis and anaemia. The health burden was compounded by two more variables—one, children born after the disaster were also its victims because of exposure to the deadly gas while they were in their mothers’ wombs; two, chemical wastes remain dumped in and around the premises of UCIL factory, contaminating the water that was used by people for drinking.

Some of the studies had found high incidence of lung, eye disease and morbidity in the victims. Meanwhile, some independent studies had also pointed to serious health problems such as cancer, mental problems and birth defects. But since there is no epidemiological study, it is easy to dismiss these as ailments caused by poverty and lack of hygiene.

The Indian economy is growing at a tremendous rate but at significant cost in environmental health and public safety as large and small companies throughout the subcontinent continue to pollute. Far more remains to be done for public health in the context of industrialization to show that the lessons of the countless thousands dead in Bhopal have truly been heeded.
2. Cancer Bathinda’s dubious distinction

The crowd waiting to board train no 339 from Bathinda Railway Junction shares more than the overnight journey to Bikaner (Rajasthan), its passengers are bound together by the misery of cancer and the hope of getting cured. "I see close to a hundred people boarding the train every night...What else can be done, there is no hospital for nearly 150 km and every street has patients,” says Vicky Kumar who runs a tea stall at the station. “It’s like a curse on the region, not a personal plight,” he added.

A family of five, from village Gehri Bhagi, 10 km from here, wait at the station to take their 17-year-old son to Bikaner. “We don’t know why he got cancer in the food pipe, he takes no tobacco, no alcohol. But there have been over 15 cases in the last year in our village,” his mother breaks down while speaking about her son’s illness. Home to a million people, Bathinda boasts a thermal power plant, two coal power plants, a fertilizer plant, and a large oil refinery, and countless cancer patients. The latest data from the health department puts the number of patients in Malwa region at 120-125 per lakh against 71, which is the national average. The department states that there is a jump of 80 per cent in the number of cases from the region in 2010 compared to 2009.

A 2007 epidemiological study, known as the PPCB-PGIMER Report, found that Bathinda surface waters are contaminated with arsenic, cadmium, chromium, selenium and mercury. The waste water generated from industry “is drained mostly partially or untreated in the local drains, which had led to the pollution of these drains.” Pesticides such as heptachlor, ethion and chlorpyrifos were also higher in samples of drinking water, vegetables and blood in the cotton belt of Punjab.
3. Cosmetic Products

Think for a while about the products that you or your family members generally apply on your skin or hairs to keep them fresh and glowing. You will find a wide variety of body lotions or shampoos around you. But do you know that various cosmetic products contain different kind of chemicals. Phthalates generally found in nail polish, perfumes is linked to birth defects in human and animals. Shampoos may contain selenium sulphide as one of the ingredient that is a potential carcinogen.

Suggestive Measures

What can we do to reduce our exposure to these chemicals?

- Go for environment friendly and natural products. Make yourself aware about the chemicals harmful to us. Look out for the labels found on the products that display the names of their ingredients. Read the label, think over it and act accordingly. Strongly say ‘No’ to the products that contain harmful chemicals.

- Avoid using plastic bottles, its wear and tear releases toxic chemicals. Then what may be the possible alternatives. Glass is considered as one of the best and safe alternative. Avoid storing food items / eatables in plastic containers and heating food in plastic containers in microwave. On heating, plastic releases harmful chemicals into the food. When such food is consumed, these chemicals enter our body.

Towards safe home

Look at your house and find out-

Is your house properly ventilated?

Is your house free of the ‘big three’? Radon, mold and lead.

1. Radon is a radioactive gas found in the soil. Our house should be free from Radon as its long term exposure is one of the major cause of lung cancer. There are technologies available for testing Radon in the indoor air.

2. Indoor moisture is an important component, it provides favourable conditions for growing mold. Hence it is suggested to test the presence of indoor moisture and mold content.

3. It has been found that paints and plastic pipes contain heavy metals like lead. We should use the paints and plastic pipes that are free from toxic metals and are environment – friendly.

4. For maintaining large lawns use of pesticides and grass cutter machine is common. It causes air as well as noise pollution. We may opt the following, to avoid it –

- Planting perennial ground covers
- Low maintenance landscaping
- Planting native foliage plants
Air monitoring station must be installed at work places to check air quality and all efforts must be made for improving air quality by developing more and more green belt around them.

References

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- http://www.takingcharge.csh.umn.edu/enhance-your-wellbeing/environment/your-personal-environment/what-you-can-do-personal-environmental-
- www.downtoearth.org.in › Environment › Coverage
- http://www.slideshare.net/pjoon007/bhopal-gas-tragedy-case-study
Sample Questions

1. List the impact of consuming fish with high mercury levels on human health. (2)

2. List any three priority problem areas, based on the evidence of the linkages between poor environmental quality and health. (3)

3. Discuss the impact of chemicals on human health through a case-study other than those mentioned in the text. (5)

Marking Scheme

1. Once industrial mercury enters a waterway, naturally occurring bacteria absorb it and convert it to a form called methyl mercury.

When humans eat fish tainted with this mercury, it acts as a neurotoxin, interfering with the brain and nervous system. 1x2=2

2. 1) Household (indoor) and ambient (outdoor) air pollution, which currently cause morbidity and reduced quality of life within countries and across borders;

2) Poor quality of water, insufficient sanitation or hygiene conditions cause mortality, illness and loss in economic productivity.

3) Toxic wastes and chemicals, which cause deaths and mental morbidity.

4) Diet poor in nutrition and quality, and increased physical inactivity has resulted in the increase in the growth of non-communicable diseases throughout the world.

5) Degraded ecosystems and stresses to the Earth’s natural systems, enhance the possibility of natural disasters, food security, and from time to time give has resulted in disease outbreaks.

(any 3) 1x3=3

3.  
   - Identification of case study (1)
   - Impact of this case on (a) human health (b) environment (2)
   - Suggested corrective measures (2)