

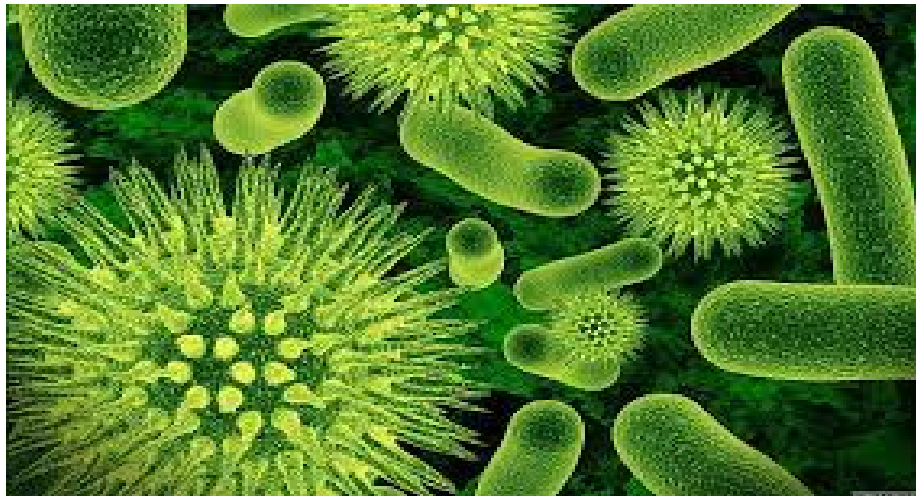


**NATIONAL OPEN UNIVERSITY OF NIGERIA**

**FACULTY OF HEALTH SCIENCES**

**DEPARTMENT OF ENVIRONMENTAL HEALTH SCIENCES**

**COURSE CODE: EHS504**



**COURSE TITLE: OCCUPATIONAL HEALTH AND SAFETY**

## **EHS504 OCCUPATIONAL HEALTH AND SAFETY**

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## **INTRODUCTION**

EHS504 Occupational Health and Safety is a three-credit unit course available to all students of Bachelor of Science degree in Environmental Health.

Occupational hazards constitute a major contributor to mortality globally and a leading cause of functional impairment. They also constitute additional disease burden currently devastating developing nations like Nigeria.

In the past years, developing and developed countries had focused on infectious diseases to the exclusion of non-communicable and chronic diseases. However, the situation is fast changing as the elites in the developing world are emulating the developed world in diets and way of life thus, making the disease equation tilt towards increase in the occurrence of non-communicable disease.

## **WHAT YOU WILL LEARN IN THIS COURSE**

The course content consists of a unit of the course guide which tells you briefly what the course is all about, what course materials you need and how to work with such materials. It also gives you some guideline for the time you are expected to spend on each unit in order to complete it successfully.

It guides you concerning your tutor-marked assignments which will be placed in the assignment file. Regular tutorial classes related to the course will be conducted and it is advisable for you to attend these sessions. It is expected that the course will prepare you for challenges you are likely to meet in the field of Environmental Health.

## **COURSE AIM**

The course aims to provide you with an understanding of occupational and environmental hazards and chronic diseases in different occupational establishments as well as safety measures to prevent workers from injuries. It also intends to let you appreciate the proportion occupied by occupational hazards and chronic diseases in the disease burden in a developing country like Nigeria.

## **COURSE OBJECTIVES**

To achieve the aim set out, the course has a set of objectives. Each unit has specific objectives which are stated at the beginning of the unit. You are advised to read the objectives before you study the unit because you may need to make reference to them during your study to check on your own progress. It is also good that you endeavour to check the unit objectives after completion of each unit to decipher level of accomplishment.

After going through the course, you should be able to:

- discuss the concept and significance of occupational health and safety
- identify the scope and evolution of occupational health
- explain the epidemiology of occupational health and diseases
- list the predisposing factors of occupational and environmental hazards
- mention the causative agents of occupational and environmental hazards
- highlight the preventive and control measures for occupational health
- identify safety procedures and safety management in the working environment
- appraise the role of the worker, the employer, the government and international agencies as well as non-governmental organisations in the prevention and control of occupational and environmental hazards in the working environment.

## **WORKING THROUGH THIS COURSE**

To complete this course you are expected to read each study unit, read the textbooks and other materials which may be provided by the National Open University of Nigeria. Each unit contains self-assessment exercises. In the course, you would be required to submit assignment for assessment. At the end of the course there is final examination. The course should take about 15 weeks to complete.

Listed below are the components of the course, what you have to do and how to allocate your time to each unit, in order to complete the course successfully and timely. The course demands that you should spend good time to read. You are advised to attend tutorial session where you will have the opportunity of comparing knowledge with colleagues.

## **COURSE MATERIALS**

The main components of the course are:

- the course guide
- study units
- references/further reading
- assignment
- presentation schedule

## **STUDY UNITS**

The course units in this course are as follow:

### **Module 1 Occupational Health**

- |        |   |
|--------|---|
| Unit 1 | Definition, Scope and Evolution of Occupational Health                |
| Unit 2 | Principles and Practice of Occupational Health and Industrial Hygiene |
| Unit 3 | Work Environment and Productivity                                     |

- Unit 4 Proxemics and Productivity
- Unit 5 Basic Occupational Health Team

## **Module 2 Occupational Health Problems**

- Unit 1 Common Occupational Health Problems in Industrial Establishment
- Unit 2 Common Occupational Health Problems in Agricultural Establishment
- Unit 3 Common Occupational Health Problems in Health Care Establishment
- Unit 4 Common Occupational Health Problems in Transportation Establishment
- Unit 5 Construction Settings

## **Module 3 Occupational Health Policies**

- Unit 1 Occupational Health Policies, Regulations and Regulatory Agencies
- Unit 2 Evaluation and Measurement of Exposure Levels
- Unit 3 Worksite Wellness Promotion Programs

## **Module 4 Occupational Stress**

- Unit 1 Occupational Stress
- Unit 2 Occupational Diseases
- Unit 3 Environmental and Occupational Hazards
- Unit 4 Identification of the Roles of Human and Environmental Factors in Occupational Hazards

## **Module 5 Methods of Prevention and Control**

- Unit 1 Methods of Prevention and Control
- Unit 2 Safety Procedure in Different Occupation
- Unit 3 Safety Management
- Unit 4 Checklist for Industrial Inspections

## **PRESENTATION SCHEDULE**

Your course materials have important dates for the early and timely completion and submission of your tutor-marked assignment (TMA) and attending tutorials. You are expected to submit all your assignments by the stipulated time and date and guard against falling behind in your work.

## **TEXT BOOKS AND REFERENCES**

The following are list of journals and website addresses that can be consulted for further reading:

Aibor, M. S. and Olorunda, J.O. (2006). *A Technical Handbook of Environmental Health in the 21<sup>st</sup> Century for Professionals and Students*. Akure: His Mercy Publishers.

Amadi, A.N. (2011). *ABC of Environmental Health*. Owerri: Readon Publishers Ltd.

Gill, F. S. and Harrington, J. M. (1983). *Occupational Health*. London: Blackwell Scientific Limited.

Olojoba, A.O. (2009). *Occupational Safety Services and Public Health*. Ughelli: Ama Ohoror

Osanyingbemi, B. F. (1987). *Basic Occupational Health*. Ibadan: Signal Educational Services Printing Press Coy Publishers Consultants. Publishing Company.

Takele, T. and Mengesha, A. (2006). *Occupational Health and Safety*. Ethiopia Public Health Training Initiative.

WAHEB (1991). *Waste Disposal and Environmental Hazard Control*. Ibadan: Sterling

## **ASSESSMENT**

There are three parts to the course assessment. These include self-assessment exercises; tutor-marked assignments and the written examination or end of course examination. It is advisable that you do all the exercises. In tackling the assignments, you are expected to use the information, knowledge and techniques gathered during the course. The assignments must be submitted to your facilitator for formal assessment in line with the deadlines stated in the presentation schedule and assignment file. The work you submit to your tutor for assessment will account for 30% of your total score. At the end of the course you will need to sit for a final end of course examination of about three hours duration. This examination will account for 70% of your total score.

## **TUTOR-MARKED ASSIGNMENT**

The TMA is a continuous component of your course. It accounts for 30% of the total score. You will be given four TMAs to answer. Three of which must be answered before you are allowed to sit for the end of course examination. The TMAs would be given to you by your facilitator and returned after you have done the assignment. Assignment questions for the units in this course are contained in the assignment file. You will be able to complete your assignment from the information and material



contained in your reading, references and study units. However, it is desirable in all degree level of education to demonstrate that you have read and researched more into your reference, which will give you a wider view point of the subject.

Make sure that each assignment reaches your facilitator on or before the deadline given in the presentation schedule and assignment file. If for any reason you cannot complete your work on time, contact your facilitator before the assignment is due, to discuss the possibility of an extension. Extension will not be granted after the due date unless there are exceptional circumstances.

### **FINAL EXAMINATION AND GRADING**

The end of course examination will be for about three hours and it constitutes 70% of the whole course work. The examination will consist of questions, which will reflect the type in self-assessment exercise, practice exercise and tutor-marked assignment problems you have previously encountered. All areas of the course will be assessed.

Ensure that you revise the whole course material before writing your end of course examination. You might find it useful to review your self-test, TMAs and comments on them before the examination. The end of course examination covers information from all parts of the course.

### **COURSE MARKING SCHEME**

Assignment	Marks
Assignment 1-4	Four assignments, best three marks of the four count for 10% each of the 30% course marks
End of course examination	70% of overall course marks
Total	100% of course marks

### **FACILITATORS/TUTORS AND TUTORIALS**

There are 15 hours of tutorials provided in support of this course. You will be notified of the dates, times and location of the tutorials as well as the name and the phone number of your facilitator, as soon as you are allocated a tutorial group.

Your facilitator will mark and comment on your assignments, keep a close watch on your progress and any difficulties you might face and provide assistance to you during the course. You are expected to mail your tutor-marked assignment to your facilitator before the schedule date (at least two working days are required). They will be marked by your tutor and returned to you as soon as possible.

Do not delay to contact your facilitator by telephone or e-mail if you need assistance.

The following might be circumstances in which you would find assistance necessary, hence you would have to contact your facilitator if:

- you do not understand any part of the study or the assigned readings
- you have difficulty with assignment
- you have a question or problem with an assignment or with the grading of an assignment.

You should endeavour to attend tutorials. This is the chance to have face-to-face contact with your course facilitator and to ask question which are answered instantly. You can raise any problem encountered in the course of your study.

To gain more benefit from course tutorials, prepare a question list before attending them. You will learn a lot from participating actively in discussions.

## **SUMMARY**

Occupational Health and Safety is a course that intends to provide you with the concept of occupational health and chronic hazards and diseases, the percentage this class of diseases and hazards contribute to disease burden of the world, mortality from these hazards and diseases and way of preventing and controlling them.

Upon completing this course, you will be equipped with the knowledge of occupational health and safety. You will be able to define what is meant by occupational health and safety; you would be able to state causes, predisposing factors, the distribution of this class of hazards and disease, the effect on the natural and social environment on the occurrence of the diseases and hazards.

You will be able to recognize the signs and symptoms of occupational hazards and diseases as well as the preventive and control measure.

In addition, you should be able to answer questions on the subject such as:

- What does occupational health and safety mean?
- The significance of the knowledge of occupational health and safety
- Enumerate common occupational and environmental hazards, and diseases.
- The percentage contribution of occupational and environmental hazards and diseases in the global disease burden.
- The contribution of occupational and environmental health hazards and diseases to the global mortality rate from diseases.
- What are the preventive and control measures against occupational and environmental hazards and diseases?

To gain most from this course you are advised to consult relevant books to widen your knowledge on the topic.

I wish you success in the course.

**MAIN  
COURSE**

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## **MODULE 1      OCCUPATIONAL HEALTH**

- Unit 1      Definition, Scope and Evolution of Occupational Health
- Unit 2      Principles and Practice of Occupational Health and  
                 Industrial Hygiene
- Unit 3      Work Environment and Productivity
- Unit 4      Proxemics and Ergonomics
- Unit 5      Basic Occupational Health Team
- End of      the Module Questions

## **UNIT 1    OCCUPATIONAL HEALTH**

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### **1.1    INTRODUCTION**

Workers are exposed to factors, problems or hazards at work which affect their health and well-being. In industries, workers are frequently exposed to serious physical, chemical, emotional and biological risks or hazards which can result to injuries, accidents, illness disabilities and death, hence there is need for an understanding of occupational and environmental health hazards. Since most workers spend reasonable

amount of time at work daily, the hazards cannot be overlooked, hence we need occupational health services to promote the health, safety and well-being of workforce. It aims at an adaptation of working environment to workers for the promotion and maintenance of the highest degree of physical, mental and social wellbeing of workers in all occupations. In this unit, you should learn the definition, scope and evolution of occupational health.

## **1.2 LEARNING OBJECTIVES**

At the end of this unit, you will be able to:

- define occupational health
- identify the objectives of occupational health
- highlight the advantages of occupational health and safety
- explain the scope of occupational health
- describe the evolution of occupational health.

## **1.3 MAIN CONTENT**

### **1.3.1 Definition of Occupational Health**

According to WHO (1995) occupational health and safety can be defined as a multidisciplinary activity aiming at:

- (a) Protection and promotion of the health of workers by eliminating occupational factors and conditions hazardous to health and safety at work.
- (b) Enhancement of physical, mental and social well-being of workers and support for the development and maintenance of their working capacity, as well as at professional and social development at work.
- (c) Development and promotion of sustainable work environments and work organizations.

The ILO/WHO definition of occupational health is “The promotion and maintenance of the highest degree of physical, mental, and social well-being of workers in all occupations.” and WHO considers occupational health service to be responsible for the total wellbeing of the worker and, if possible his/her family.

Occupational health is a diverse science applied by occupational health professionals, engineers, environmental health practitioners, chemists, toxicologists, doctors, nurses, safety professionals and others who have an interest in the protection of the health of workers in the workplace.

### **1.3.2 Objectives of Occupational Health**

The objectives of occupational health include:

- the promotion and maintenance of the highest degree of physical, mental, and social well-being of workers in all occupations
- the prevention among workers of departures from health caused by working conditions
- the protection of workers in their employment from risks resulting from factors adverse to health.
- the planning and maintenance of workers in an occupational environment adapted to his physiological equipment
- the adaptation of work to man and each man to his job
- to provide emergency care and prevention of injuries and illness on the job
- to offer adequate advice and rehabilitation services for workers who are injured and for those with psychological problems
- to maintain accurate morbidity and mortality records of workers
- to generate awareness and create safety consciousness in the workers of various cadres
- to create health facilities and services where they are easily accessible and available
- to reduce the risk of injury and health impairment of workers arising from exposures to hazards in working environments.

### **1.3.3 Advantages of Occupational Health and Safety**

The advantages of occupational health and safety programmes include:

- enactment of laws specifying payment to workers for industrial accidents or for illness caused by the occupation
- helping workers to become enlightened about the protection of their rights and that their duties are well defined and attended to.
- ensuring suitable job placement
- promoting better health and ensuring longer life
- lowering personal medical costs
- sustaining employee earnings
- ensuring greater job satisfaction
- contributing to prosperity of the community
- decreasing welfare costs and improving public relations.

### **1.3.4 Scope of Occupational Health**

The scope of occupational health is divided into three:

- occupational medicine
- industrial hygiene and safety services
- industrial welfare services.

### **1.3.5 Occupational Medicine**

Occupational medicine is concerned with the curative treatment/services provided for the workers. It includes:

**(a) Health assessment, which include pre-employment, pre- placement and periodic medical examination**

**(i) Pre – employment medical examination**

Pre–employment medical examination should be carried out on all new employees to provide a base line data and also ensure that the job is suitable for the individual state of health. The health assessment in some cases may be through the confidential health questionnaires while in other cases it may be through the use of real medical and physical examinations.

The medical and laboratory investigations performed actually depend on the types of organisation and processes involved and hazards exposed to. Examples of these investigations are chest x-ray for those whose work involve being in contact with dust, visual acuity test for those who will be welding or examining specimen under microscopes; stool test for food handlers in the canteen etc.

These tests will enable the occupational health unit determine whether an individual is fit or not for a particular job.

**(ii) Pre – placement medical examination**

This type of examination can also be performed on a new employee but it is mostly performed when an employee is changing from one job or unit to another in the establishment. This may be as a result of injury or illness. The objective is to put him in the area most suitable for his health and capability without further risk to his health.

**(iii) Periodic medical examination**

Periodic medical examination is carried out at regular intervals after the initial pre-employment and pre-placement medical examinations. The medical examination could be carried out weekly, monthly, quarterly, and annually in order to treat and prevent the spread of diseases from affecting other vulnerable personnel in the workplace.

**(b) Curative function which include treatment of occupational and non-occupational diseases**

This includes the treatment of occupational and non-occupational ailments of workers. Sick workers are encouraged to report early, whether or not the illness is as a result of the occupation or not. The treatment is to prevent degeneration and spread of the ailment to other workers. The occupational health team should ensure the cooperation of other relevant agencies to ensure optimum treatment and early rehabilitation.

**(c) Family health services**



The management should provide industrial clinic or hospital or retainership in order to have a complete knowledge about the health history of workers and their social problems. The treatment of dependants is important in that it prevents workers from taking time off- work to seek medical help for their family members outside the work environment thereby resulting in decreased productivity.

**(d) Promotion and rehabilitation in health services**

Health promotion services are aimed at improving workers' health, morals and productivity as well as controlling health care costs. The services include: exercise and fitness programmes, stress management, safety education and first aid, posters, pamphlets, newsletters, journals, health seminar/workshop to educate workers.

Rehabilitation is aimed at restoring the patient to his fullest physical, mental, and social capability. It must start immediately after the injury and restoration activities commenced and gradually done in stages as dictated by the health and capability of the patient. Restoration of physical, social and mental health of the patient is achieved through the use of drugs, exercises, psychotherapy, speech therapy, walking etc.

### **1.3.6 Industrial Hygiene and Safety Services**

Industrial hygiene and safety services are concerned with the environmental hygiene and safety of the work place. It consists of:

**(a) Raw materials sampling of toxicity as well as exploration**

Hazardous or toxic materials can be recognised by studying various work processes and working environments to identify potentially dangerous zone, for example:

- the nature of the raw or processing materials utilised by the industry
- the finished product and by-products (waste) involved
- the possible area or point of release or emission of hazardous agents in the company
- the process of packaging and transportation of goods
- the kind of protective gadgets or personal clothing provided
- the posture and movement of the workers
- the amount of time given off for rest at work

**(b) Storage and disposal of radioactive and industrial toxic wastes or substances**

**(c) Engineering control of plants, which involves mainly the redesigning of industrial equipment, tools and work stations include:**

- substituting of safety or less hazardous materials
- shielding or screening of workers against hazard
- isolation of dangerous machines

- redesigning of work processes and procedures
- protecting the workers by way of protective clothing and devices
- designing ventilating system to extract or dilute air borne contaminations natural, and artificial ventilations
- preparing a work rest regime of job rotation in order to reduce workers' stress
- exposure limits regulation.

**(d) Evaluation/analysis of actual potential hazards or stress in the work place**

These include:

- measuring the intensity or concentration of hazardous or toxic substances in the factory
- limitation of the threshold limit value (tlv) exposure period of workers to hazards in the work environment
- comparing the results of measured hazards against known standards or research toxicological data
- ascertaining the human physiological effects upon workers from result of tests provided by the medical team, for example; blood, and urine analysis, lung function test etc.

### **1.3.7 Industrial Welfare Services**

Industrial welfare services are specially arranged for workers to benefit from at work place. It includes:

- (a) Hazard/risk allowances, overtime, or shift duty allowances for the workers
- (b) Accommodation/housing services for workers: The management should provide housing accommodation for workers, that is, either free or subsidised renting value or loan with low interest rate can be granted to workers to build and live in their own houses.
- (c) Life and health insurance schemes
- (d) Transport facilities for workers: Buses can be provided to convey workers to and from place of work. Interest free loan can also be provided for workers to purchase their own vehicles.
- (e) Subsidising cafeteria or restaurant services in the work place: Workers in large establishments should be provided with cafeteria or restaurant services where their meals are prepared and served at appropriate times. The purpose is to ensure that workers eat balanced and nutritive diets and time wasted to search for food outside the premises is saved.

The provision of adequate running water is also desirable to ensure that the workers observe enough personal hygiene. It is also expected that food should be subsidised to assist workers financially.

- (f) Educational facilities to children of employees:

The management should provide educational opportunities to workers, their dependants or wards to ensure the workers' comfort. Programmes such as in-service training, seminars, workshops, conferences are possible areas where workers can update their knowledge for challenges over emerging situations

(g) Employee recreational facilities:

Recreational facilities such as table and lawn tennis, volley ball, basket ball, short put, swimming etc should be provided in the work environment for workers to recreate themselves. The purpose is to ensure that workers keep fit in order to prevent debilitating diseases such as fatigue, heart attack, high blood pressure, stroke, diabetes etc.

### Self-assessment Exercise 1

1. Workers are exposed to hazards at work which can affect... .. and .....
2. Industrial hygiene and safety services are concerned with .....

## 1.4 Historical background of Occupational Health

Occupation is as old as man and the relationship between the two was established since ancient times when hunters got killed by carnivorous animals during hunting in the forest. The work place has been recognized as potentially hazardous environment. The work environment and its relation to worker health was recognized as early as the fourth century BC when Hippocrates noted lead toxicity in the mining industry. In the first century AD, Pliny the Elder, a Roman scholar, perceived health risks to those working with zinc and sulfur. He devised a face mask made from animal bladder to protect workers from exposure to dust and lead fumes. In the second century AD, the Greek physician, Galen, accurately described the pathology of lead poisoning and also recognized the hazardous exposures of copper miners to acid.

Mining is one of the oldest industries and one of the most hazardous works. Conditions in mining in Greece and Egypt revealed that there was complete neglect of the worker's health. This was so because the labourers used for mining were mainly slaves, prisoners and criminals. Exposure to such jobs was in fact of the punitive measures. Again, the neglect was because little was known and understood about occupational health.

In the middle ages around 1556, the German scholar, Agricola advanced the science of industrial hygiene further when in his book "De Re Metallica", he described the diseases of miners and prescribed preventive measures. The book included suggestions for mine ventilation and worker protection, discussed mining accidents, and described diseases associated with mining occupations.

Industrial hygiene gained further respectability in 1700 when Bernardino Ramazzini (1633-1714), known as the "father of industrial medicine", a physician and professor of medicine in Modena and Padua in Italy, first published "De Morbis Artificum Diatriba" (The diseases of workmen). The first comprehensive book on industrial medicine that contained accurate descriptions of the occupational diseases of most of

the workers of his time. He made use of his observations and that of his predecessors based on visits to workshops in Modena and asserted that occupational diseases should be studied in the work environment rather than in the hospital wards.

In the early 20<sup>th</sup> century in the U.S. Dr. Alice Hamilton led efforts to improve industrial hygiene. She observed industrial conditions first hand and startled mine owners, factory managers and state officials with evidence that there was correlation between worker illness and exposure to toxins. She also presented definitive proposals for eliminating unhealthy working conditions.

However, concrete approach to the control of occupational diseases became valid in most countries after the twentieth century. Emphasis was then given to the control of working hazards, and multidisciplinary approach to such effective measures in which at least tripartite: the employer, the employee and the competent authority are together participating in the problem solution. Much improvement in the workers' health protection has been made in developed countries in the field of industrial hygiene and safety, and occupational medicine. However, there is still a long way for developing countries.

### **1.4.1 Occupational Health during Industrial Revolution**

The industrial revolution in the 18th century in America and Europe exposed the industrial workers of all grades to the pressures of increasing production and associated physical and psychological hazards of work. This ushered in many occupational diseases and social problems:

- family lives were disrupted when men moved to new industrial areas leaving their families behind. this led to alcoholism and prostitution
- the change from peasant to town life led to poor nutrition, unemployment, overcrowding and epidemics
  - workers were exposed to hazards of injury, accidents and adverse effects of excessively long hours at work.

Industrial revolution had a great effect on humanists and public opinion. Man's indifference to less fortunate fellow man was assured during the eighteenth century by the liberal ideas of men like Rousseau, Voltaire and John Howard who led reform of British prison, William Wilberforce who started campaign against slave trade and Earl of Shaftesbury who influenced the legislation that improved the working conditions of women and young people. A few enlightened employers like Robert Owen, Michael Sadler, Sir Robert Peel, influenced the introduction of legislation that controlled hours of work.

Towards the end of the 18th century and 19th century, a few more physicians followed the examples of Ramazzini and took active interest in occupational medicine.

In 1775, Percival POH associated soot as a cause of scrotal cancer in chimney sweepers. Charles Turner Thackrah (1775-1833) published the British book in occupational medicine. He died later at the age of 38 years as a result of pulmonary tuberculosis.

## **1.4.2 Occupational Health in Great Britain**

Trade unions also expressed their concern for occupational health and safety of workers. In Great Britain, the Factory Act of 1833 introduced two innovations. The appointment of factory inspectorate and confirmation of age of children suspected to be below nine years of age by a medical officer. At that time, at least nine years was age below which employment was prohibited in textile mills.

The Act of 1855 ushered in rudimentary industrial medical services and towards the end of that century, workers started to have periodic medical examination. Apart from Great Britain, there were developments in other countries as well.

## **1.4.3 Occupational Health in U.S.A.**

In the United States of America (U.S.A.), there was considerable freedom for each state to pursue its own policies dealing with problems of rapid industrialisation. The Government had great influence on the development of occupational health through the fund allocated to the various states for setting up occupational hygiene programmes for the control of occupational diseases.

Massachusetts was the first to establish a Bureau of Labour Statistics. The government of America embarked on various occupational health and hygiene programmes which made it become the leading country in environmental control of work place. Among the great pioneers in occupational medicine in U.S.A. was Alice Hamilton (1869-1970) whose contribution led to improvement in the condition of health and safety of workers. She also raised the standard of medical surveillance. She was the first woman to be an academic staff and held a post in occupational health.

## **1.4.4 Occupational Health in U.S.S.R.**

In Union of Soviet Socialist Republic (USSR) now Russia, the pace and growth was like in other countries but when Alice Hamilton visited Europe in 1920s, she was highly impressed by the elaborate provision made for the study and treatment of occupational health diseases. She rated occupational health activities in U.S.S.R. as being better than any other country she had visited. Among the great pioneer in U.S.S.R. was F.C. Erisman (1842-1915).

In 1923, the Research Institute of Occupational Health and Safety was set up in Moscow and health services in work places were organised as integral part of all social care in U.S.S.R.

Since after World War II, there had been rapid industrialisation in all parts of the developed countries of the world. Since then, there had been steady development of industrialisation and progressive improvement in occupational health services. Today, there are adequate numbers of occupational health personnel of various cadres.

Adequate researches and various programmes to improve workers health are in progress in all the countries of the world but more progress in the developed countries.

#### **1.4.5 Occupational Health in Developing Countries**

The main occupation in developing countries is agriculture followed by small scale industries, construction and extraction of mineral resources. With the recent rapid industrialisation and mechanisation, occupational health problems are beginning to emerge. However, changes for better, as achieved by the developed countries, have not been adequately achieved in developing countries because of the following reasons:

- prevalence of endemic diseases
- malnutrition
- socio-cultural practices
- failure to recognise the need of workers
- inadequate finance and other resources.

As at now, government in various parts of developing countries are paying more attention to occupational health through the development of workers' health services, establishment of occupational institute for training of personnel to embark on provision of occupational health services and researches in the area.

#### **1.4.6 Occupational Health in Nigeria**

The medical examining board of Liverpool Infirmary was the first to start health services in Nigeria in 1789 by giving health services to the European slave traders. The United African Company (U.A.C.) known then as the Royal Niger Company around 1899 was the first company to organise its own medical services even though it was mainly curative and exclusively for the expatriates.

After the abolition of slave trade, there was the Royal Naval Patrol trade meant to enforce the abolition of slave trade and also protect the British commercial interests in Nigeria. All the territories were administered by Lord Lugard as the Commander-in-Chief of the armed forces of Nigeria. When many soldiers started to die of malaria disease, a curative and preventive health service was immediately established for health and welfare of soldiers and the colonial administrators. The unit was assigned only to treating the members of armed forces during World War II. This was how public health service started in Nigeria. As regards industrialisation evolution in Nigeria, statistics from environmental and occupational unit of the Federal Ministry of Health indicated that rapid increase in industrialisation began after 1960 when oil was discovered and there was oil boom. This attracted various oil companies and industrialists. Occupational health services were also established for the workers.

Since then, there has been steady awareness and improvement in occupational health and safety services for the workers leading to the following:

- establishment of Environmental and Occupational Health Division of Federal Ministry of Health
- establishment of Institute of Occupational Health by Oyo State Ministry of Health at Ibadan
- directive that all states of the federation should set up occupational health and safety units. This was agreed at the 1980 National Council on Health at the Jos meeting
- integration of occupational health into the course curriculum of preventive health personnel of various cadres
- establishment of occupational health department in some Nigerian universities.

The various bodies undertake various activities to improve the services of occupational health. Such services include:

- training of industrial nurses
- training of first aiders
- organisation of workshops on occupational health and safety
- health surveillance of workers
- research
- consultancy services

### **Self-Assessment Exercise 2**

1. “*De Morbis Artificum Diatriba*” means .....
- .....
2. .... was the first to start health services in Nigeria.

## **1.5 CONCLUSION**

In conclusion, you have learnt the definition, scope and evolution of occupational health. In the next unit, you will be introduced to the principles and practice of occupational health and industrial hygiene.

## **1.6 SUMMARY**

In this unit, you have learnt the definition of occupational health, its aims and objectives including advantages. You have learnt also the scope of occupational health as well as the evolution of occupational health in ancient times, during industrial revolution, in USSR, in USA, in developing country and to its developments in Nigeria.

## **1.7 TUTOR-MARKED ASSIGNMENT**

1. Define occupational health?

2. What are the main objectives of occupational health?
3. Why in your own opinion do we study occupational health?
4. Enumerate the scope of occupational health?
5. Describe the evolution of occupational health?
6. Who is the father of occupational medicine?

## **1.8 REFERENCES / FURTHER READING**

Aibor, M. S. & Olorunda, J.O. (2006). *A Technical Handbook of Environmental Health in the 21<sup>st</sup> Century for Professionals and Students*. Akure: His Mercy Publishers.

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## **1.9 POSSIBLE ANSWERS TO SAEs**

### **Self-Assessment Exercise 1**

1. Health and Wellbeing
2. The hygiene and safety of the workplace

### **Self-Assessment Exercise 2**

1. The Diseases of workers
2. The Medical Examining Board Liverpool Infirmary



## **UNIT 2    PRINCIPLES AND PRACTICE OF OCCUPATIONAL HEALTH AND INDUSTRIAL HYGIENE**

### **CONTENTS**

- 2.1 Introduction
- 2.2 Objectives
- 2.3 Main Content
  - 2.3.1 Principles and Practice of Occupational Health
  - 2.3.2 Principles and Practice of Industrial Hygiene
- 2.4 Conclusion
- 2.5 Summary
- 2.6 Tutor-Marked Assignment
- 2.7 References/Further Reading

### **2.1 INTRODUCTION**

In the previous unit, you learnt the definition, scope and evolution of occupational health. In this unit, you will learn the principles and practice of occupational health and industrial hygiene.

### **2.2 OBJECTIVES**

At the end of the unit, you should be able to:

identify the principles and practice of occupational health

highlight the principles and practice of industrial hygiene.

## **2.3 MAIN CONTENT**

### **2.3.1 Principles and Practice of Occupational Health**

A number of key principles underpin the field of occupational health and safety. These principles and the provisions of international labour standards are all designed to achieve a vital objective: that work should take place in a safe and healthy environment.

- (a) All workers have rights: Workers, employers and governments must ensure that these rights are protected and must strive to establish, maintain and guarantee decent working conditions and a descent working environment. More specifically:
  - (i) Work should take place in a safe and healthy working environment
  - (ii) Conditions of work should be consistent with workers' well-being and human dignity
  - (iii) Work should offer real possibilities for personal achievement, self-fulfillment and service to society (ILO, 1984).
- (b) Occupational health and safety policies must be established: Such policies must be implemented at both the governmental and enterprise levels. They must be effectively communicated to all parties concerned.
- (c) There is need for consultation with the social partners (that is, employers and workers) and other stakeholders: This should be done during formulation, implementation and review of such policies.
- (d) Prevention and protection must be the aim of occupational health and safety programmes and policies: There must be primary prevention at the work place level. Work places and working environments should be planned and designed to be safe and healthy.
- (e) Information is vital for the development and implementation of programmes and policies: The collection and dissemination of accurate information on hazards and hazardous materials, surveillance work places, monitoring of compliance with policies and good practices, and other related activities are central to the establishment and enforcement of effective policies.
- (f) Health promotion is a central element of occupational health practice: Efforts must be made to enhance worker's physical, mental and social well-being.
- (g) Occupational health services covering all workers should be established: All workers in all categories (cadre) of economic activity should have access to such services, which aim to protect and promote workers' health and improve working conditions.
- (h) Compensation, rehabilitation and curative services must be made available to workers who suffer occupational injuries, accidents and work-related diseases: Action must be taken to minimise the consequences of occupational hazards.
- (i) Workers and employers must be made aware of the importance and the means of establishing safe working procedures: Trainers must be trained in areas of special relevance to different industries, which have specific occupational health and safety concerns.
- (j) Workers, employers and competent authorities have certain responsibilities, duties and obligations: Workers must follow established safety procedures; employers must

provide safe work places and ensure access to first aid; and the competent authorities must devise, communicate and periodically review and update occupational health and safety policies.

- (k) Policies must be enforced: A system of inspection must be in place to secure compliance with occupational health and safety and other labour legislation.

**Self-Assessment Exercise 1**

1. The principles and the provisions of international labour standards are all designed to achieve a vital objective.....

**2.3.2 Principles and Practice of Industrial Hygiene**

The profession that aims specifically at the prevention and control of hazards arising from work processes is occupational hygiene. Occupational hygiene is defined by the International Occupational Hygiene Association (IOHA) as the discipline of anticipating, recognizing, evaluating and controlling health hazards in the working environment with the objective of protecting worker’s health and wellbeing and safeguarding the community at large. It involves the practice of identifying the hazardous agents (chemical, physical and biological) in the work place that could cause disease or discomfort, evaluating the extent of the risk due to exposure to these hazardous agents, and the control of those risks to prevent ill-health in the long or short term. Occupational hygiene draws upon, yet integrates, background disciplines such as biology, chemistry, physics, medicine, engineering, toxicology, environmental management etc. The classical steps in occupational hygiene practice are:

- The recognition of the possible health hazards in the work environment (like sampling of raw materials for toxicity)
- engineering control of plants, which involves mainly the redesigning of industrial equipment, tools, and work stations
- the evaluation of hazards, which is the process assessing exposure and reaching conclusions as to the level of risk to human health.
- Prevention and control of hazards, which is the process of developing and implementing strategies to eliminate, or reduce to acceptable levels , the occurrence of harmful agents and factors in the work place.
- Evaluation of risk analysis and management of actual potential hazards agent, process or stress in the work place.
- Educate, train, inform and advise persons at all levels, in all aspects of hazard communication.

**Self-Assessment Exercise 2**

1. IOHA means .....

2. IOHA defines Occupational Hygiene as.....

## 2.4 CONCLUSION

You have learnt the principles and practice of occupational health as well as industrial hygiene services in the work place. In the next unit, you will be introduced to work environment and productivity.

## 2.5 SUMMARY

In this unit, you have learnt the principles and practice of occupational health. You also learnt the principles and practice of industrial hygiene services in the work place.

## 2.6 TUTOR-MARKED ASSIGNMENT

1. Outline the 3 major rights of workers that are to be protected
2. List and explain three principles and practices of occupational health.
3. State and explain two principles and practices of industrial hygiene services.

## 2.7 REFERENCES / FURTHER READING

Aibor, M. S. & Olorunda, J.O. (2006). *A Technical Handbook of Environmental Health in the 21<sup>st</sup> Century*. Akure: His Mercy Publishers.

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[www.ilo.org/wcmsp5/public.../@publ/wcms-093550.pdf](http://www.ilo.org/wcmsp5/public.../@publ/wcms-093550.pdf)

World Health Organization <http://www.who.int/topics/occupational-health/en>

## 2.8 POSSIBLE ANSWERS TO SAEs

### Self-Assessment Exercise 1

1. That work should take place in a safe and healthy environment.

### Self-Assessment Exercise 2

1. International Occupational Hygiene Association
2. The discipline of anticipating, recognizing, evaluating and controlling health hazards in the working environment with the objective of protecting worker's health and wellbeing and safeguarding the community at large.



## UNIT 3 WORK ENVIRONMENT AND PRODUCTIVITY

### CONTENTS

- 3.1 Introduction
- 3.2 Objectives
- 3.3 Main Content
  - 3.3.1 Work Environment and Productivity
  - 3.3.2 Factors that Enhance Productivity
- 3.4 Conclusion
- 3.5 Summary
- 3.6 Tutor-Marked Assignments
- 3.7 References/Further Reading

### 3.1 INTRODUCTION

In the previous unit, you learnt principles and practice of occupational health and industrial hygiene. In this unit, you will be introduced to work environment and productivity.

### 3.2 OBJECTIVES

At the end of the unit, you should be able to:

- . explain work environment and productivity
- . highlight the factors that enhance productivity.

### 3.3 MAIN CONTENT

#### 3.3.1 Work Environment and Productivity

The work environment can affect workers productivity (output) positively or negatively. Work should be a means of economic survival, source of satisfaction, happiness, social status and companionship but it can also result to stress, dissatisfaction, threats to workers' health and well-being. Poor work environment reduces productivity and workers' efficiency whereas conducive work environment improves workers' efficiency and productivity. The work environment comprises the totality of forces, actions and other influential factors that are currently and, or potentially contending with the employee's activities and productivity.

The work environment according to Opperman (2002) comprises three major sub-environments namely:

- i. **The technical environment:** Technical environments include tools, equipment, technological infrastructure and other physical or technical elements. This environment

creates elements that enable workers perform their respective responsibilities and activities.

- ii. **The human environment:** The human environment includes peers, others with whom workers relate, team and work groups, interactional issues, the leadership and management. Human environment is designed in such a way that it encourages informal interaction in the work place so that the opportunity to share knowledge and exchange ideas could be enhanced. This is the basis to attain maximum productivity.
- iii. **The organisational environment:** The organisational environment includes systems, procedures, practices, values and philosophies. Management has control over organisational environment. For example, measurement system where people are rewarded on quantity (rather than quality) hence workers will have little interest in helping those workers who are trying to improve quality. Issues of organisational environment influence workers productivity.

Productivity is a measure of economic performance that compares the amount of goods and services produced (output) with the amount of of inputs used to produce those goods and services. Productivity in an organisation can in principle be influenced by a wide range of internal and external factors which may be categorized thus:

- (a) **General factors:** General factors include climate, geographic distribution of raw materials, fiscal and credit policies, adequacy of public utilities and infrastructural facilities etc.
- (b) **Organisational and technical factors:** These include the degree of integration, percentage of capacity, size and stability of production.
- (c) **Human factors:** These include management relations, social and psychological conditions of work, wage incentives, physical fatigue, and trade union practices.

**Self-Assessment Exercise 1**

- 1. The work environment can positively or negatively impact workers 'output. (**TRUE OR FALSE**)
  
- 2. According to Opperman (2002), the work environment consist of three major sub-environments namely ....., ..... and .....

**3.3.2 Factors that Enhance Productivity**

The factors which either contributes positively or negatively to worker's productivity are: temperature, humidity and air flow, noise, lighting, worker's personal aspects, contaminants and hazards in the work environment and types of sub-environment. Kyko (2005) identifies two types of work environment namely conducive work environment and toxic work environment.

- (a) Conducive work environment gives pleasurable experience to workers and enable them to actualise their abilities and behaviour. This type of environment also reinforces

self-actualising behaviours. For example, an irresponsible worker can change into a responsible worker in a conducive environment.

- (b) Toxic work environment gives unpleasant experiences and at the same time deactualises workers' behaviour. This environment reinforces low self-actualising behaviour and it leads to the development of negative traits in workers' behaviour. In toxic work environment, responsible and sensible worker can change into irrational and irresponsible worker as a survival strategy.

Additionally, Kyko identifies six factors that contribute to toxic work environment hence contributing to low productivity of workers. The factors include opaque (not clearly understood) management, biased boss, company's policies, working conditions, interpersonal relationship and pay. The ability of workers within an organisation to share knowledge throughout the system depends on their work environment. It is observed that workers tend to be more productive in a well-facilitated work environment. The quality of comfort derivable from work environment determines the level of satisfaction and productivity of workers. Workers productivity cannot be optimal (most desirable), if the conditions of work environment are unfavourable (Brener: 2004).

Improved work environment will enhance workers' productivity. For example, standard health facilities will protect the life of the workers. In case of any hazard on the job they have some assurance of income. The performance of a corporate organisation, which determines its survival and growth, depends to a large extent on the productivity of its workforce.

**Self-Assessment Exercise 2**

1. The two types of work environment identified by Kyko (2005) are ..... and .....
2. Three factors that contribute to toxic work environment are ....., ..... and .....

**3.4 CONCLUSION**

You have learnt to describe the work environment and productivity, as well as the factors that positively or negatively affect productivity. In the next unit, you will learn about proxemics and ergonomics

**3.5 SUMMARY**

In this unit, you have learnt work environment and productivity. You learnt also the factors that positively or negatively affect productivity. The positive factors include conducive work environment while the negative factors include toxic work environment.



### 3.6 TUTOR-MARKED ASSIGNMENT

- 1 Briefly define:
  - i. work environment
  - ii. productivity
- 2 List and explain the factors that positively or negatively affect productivity.
- 3 Enumerate six factors that contribute to toxic work environment.

### 3.7 REFERENCES / FURTHER READING

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### 3.8 POSSIBLE ANSWERS TO SAEs

#### Self-Assessment Exercise 1

1. TRUE
2.
  - i. Technical environment
  - ii. Human environment
  - iii. Organisational environment

#### Self-Assessment Exercise 2

1. Conducive environment and toxic environment
2.
  - i. opaque management
  - ii. biased boss
  - iii. company's policies
  - iv. working conditions
  - v. interpersonal relationship
  - vi. Pay (any 3)

## **UNIT 4      PROXEMICS AND ERGONOMICS**

### **CONTENTS**

- 4.1 Introduction
- 4.2 Objectives
- 4.3 Main Content
  - 4.3.1 Definition and Meaning of Proxemics
  - 4.3.2 Types of Space in Proxemics
  - 4.3.3 Describing Proxemics Based on Hall's Observation
  - 4.3.4 Proxemics in Personal Space
  - 4.3.5 Proxemics in Social Space
  - 4.3.6 Proxemics in Public Space
- 4.4 Definition and Meaning of Ergonomics
  - 4.4.1 Ergonomics of the Office and Workplace
  - 4.4.2 Work Ergonomics: Minimise Back Injuries
  - 4.4.3 Office Chair, Posture and Driving Ergonomics
  - 4.4.4 Manual Material Handling to Prevent Injury
- 4.5 Conclusion
- 4.6 Summary
- 4.7 Tutor-Marked Assignment
- 4.8 References/Further Reading

### **4.1 INTRODUCTION**

In the previous unit, you learnt about work environment and productivity. In this unit, you will learn about proxemics and ergonomics.

### **4.2 OBJECTIVES**

At the end of this unit, you should be able to:

- define and highlight the meaning of proxemics
- identify the types of space in proxemics
- define and highlight the meaning of ergonomics
- describe the ergonomics of the office and workplace.

### **4.3 MAIN CONTENT**

#### **4.3.1 Definition and Meaning of Proxemics**

The kind of relationship we share with our friends, family and society, as a whole, is based on spatial differences. There are thousands of instances wherein the behaviour we exhibit, enables us to judge a situation and explain the probable ways to deal with them. Despite being aware of our perceptions, we seldom

analyse that the common factor governing our actions is the ‘distance,’ which we either try to reduce or increase.

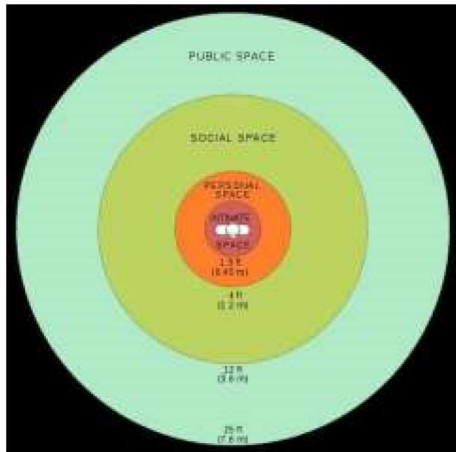
The space shared between two individuals or objects has been studied deeply by anthropologists. Edward T. Hall being the pioneer termed this space as proxemics. He defines proxemics as “the study of measurable distances between people as they interact.” Basically, proxemics is the study of space and how we use it, how it makes us feel more or less comfortable, and how we arrange objects and ourselves in relation to space.

### 4.3.2 Types of Space in Proxemics

The types of space in proxemics include, fixed – feature space, Semifixed – feature space, and informal space.

- (i) **Fixed–feature space:** The space created by stationary and immobile objects like territorial boundary and cross border walls.
- (ii) **Semifixed–feature space:** This is the dimension of the variable/constant space created by mobile and portable objects like pieces of furniture in a house.
- (iii) **Informal space:** This is the space around your body which depends on your physical movements.





### 4.3.3 Describing Proxemics Based on Hall’s Observation



**Fig. 1.1: Proxemics Based on Hall’s Observation**  
**Source: The Science of Proxemics (2012)**

The diagram above is a technical representation of Hall’s observations of proximal shifts. The diagram delineates the correlation between an individual and the physical spaces shared by him with others. These include; intimate distance, personal distance, social distance, and public distance. Have a look at the images in the following table to learn about their association with his observations.

**Table. 1.1: Hall's Observations of Proximal Shifts**

S/N	Image	Description	Intimate (space) Distance
1		Expressing affection by embracing, hugging, holding hands, showering love by kissing, cuddling, caressing.	Min. Distance: <6 inches(15c m) Max. Distance: 6-18inches(15-46cm)
2		Casual interaction with friends. Mingling with family members.	Min.Distance: 1.5-2.5ft (46-76cm) Max. Distance: 2.5-4ft (76-120 cm)
3		Interacting with neighbours and other acquaintances and official conversation with colleagues	Min. Distance: 4-7ft (1.2- 2.1m) Max. Distance: 7-12ft (2.1- 3.7m)
4		Speaking before an audience (public speaking) performing on stage or in a public space	Min. Distance: 12-25ft (3.7-7.6m) Max. Distance: 25ft (7.6m or more)

Source: The Science of Proxemics (2012)

#### **4.3.4 Proxemics in Personal Space**

Personal space is intensely dynamic as it depends on your decision to move away or to develop intimacy with someone. For example, if you dislike a person, you will simply withdraw from him/her. Thus, you tend to increase the personal space. Sentiments like love and compassion bring two individuals close and share a personal space. In interpersonal relationships, personal distance can be gauged from the nature of relation one is involved in.

The personality of an individual is a vital parameter for measuring personal space. An introvert and inexpressive person tend to increase the distance between himself and people around him. Anxiety, restlessness and impatience are some other emotions that can cause an increase in personal distance from others. Contrary to this, an extrovert and sociable person can minimise personal distance easily.

Personal space is defined based on situations. This is because circumstances, to a large extent, are responsible for bringing someone close to the other; on the other hand, these very circumstances can cause impromptu cessation of an oncoming relationship. For example, while travelling, you initiate conversation with your fellow passenger, and in the phase of the journey you get to know each other better. Gradually you become friends. Therefore technically, it is the circumstance that brought both of you together and reduced the personal space.

Age and gender are also variable factors that impact on personal space. When a child is born, he is at the highest degree of proximity with his mother. As he grows older, he remains sentimentally attached to his parents, but mingles with friends and establishes a connection with his surroundings. From this example, it is evident that there is no standard principle that makes the basis of proxemics of personal space based on age. Regarding gender, it is solely an individual's decision to contract or expand the personal space shared by him.

Hall clearly states that, "personal space is an area with an invisible boundary surrounding the person's body into which intruders may not come and the region surrounding the person is regarded as psychologically theirs." It is a space reserved for talking to friends or family members.

Gbefwi states that, personal distance is when you stay close to your friends but keep or maintain a comfortable distance from other people. It is the gap that separates an individual from others within his/her environment and which is only broken into by relatives, friends and colleagues.

#### **4.3.5 Proxemics in Social Space**

Social space should not be confused with public space. Simply put, it is the distance between people residing in the same society. The proximity with close acquaintance and colleagues is a measurable quantity, which varies according to the status of a society and behaviour of its residents. Social space means we're getting a little closer

and it is the kind of space you are in if talking to a colleague or a customer at work. Anthropology has sub-categorised social space into affective, interactive and normative social distance.

Affective social distance is based on the emotional quotient of an individual. Social distance tends to decrease when a person is emotionally connected to other members of the society or the group to which he belongs. Feelings of hatred and apathy are the negative forces that lead to expansion of social distance.

It is quite natural to bond with people you interact with frequently. The distance created or averted through communication comes under the sub-category of interactive social distance. The social bonding is likely to manifest owing to mutual conversation and exchange of views among people. This results in shrinkage of social space.

The norms prevalent in a society to a large extent are responsible for inculcating feelings of prejudice and discrimination. On grounds of religion, one might face downright rejection from society and several groups can be formed by various castes and creeds. The distance created by man-made norms of a society is known as normative social distance. These sub-categories have been defined solely based on observations, and concepts differ as people's attitude towards society changes. Social distance might reduce when different groups start mixing freely with each other and establish social harmony.

Social distance refers also to the distance between people who are from different social classes or backgrounds. Their backgrounds differ because of their level of education, wealth or religious persuasions. Whatever the case, these differences often keep people apart. We have titles like, Reverend Sisters, Very Important Personality (VIP) etc. There could be a big social distance.

#### **4.3.6 Proxemics in Public Space**

A doctor diagnosing his patients, a teacher teaching her students in a classroom, and workers working in an office; how are these activities connected to the science of proxemics? In the aforementioned instances, there is an intersection point, which is created by the spatial arrangement of one individual with another by the medium of some non-living object. The chair on which a doctor sits is kept at a certain distance from the chair on which a patient sits. Thus, it is the chair that creates the space between the doctor and his patient. The same explanation holds true for the example of teacher – students and workers working together. In this case, the public space can be reduced by eliminating the non-living object or by establishing personal contact.

According to Hall, “a public space is a social space such as a town square that is open and accessible to all, regardless of genders, age or socio-economic level.” It is a vast territory (parks, libraries, streets, malls) which is open to people hailing from different religious, cultures and countries.

Public space is the distance kept by public figures – politicians and top civil servants for protection from danger, or hostile members of the public. At times, in spite of tight security, assassination occurs – a case in point is Nigeria’s General Murtala Muhammed, 1976. Incidents like these help people to appreciate the need to maintain public distance at the appropriate time between the health practitioner and the clients, especially in the rural areas. However, this could lead to a communication gap between them if not properly handled. (Gbefwi; 2004).

Proxemics is all about the visual perception of a surrounding space and relating it with objects present around us. The space is subject to variation as we change our boundaries and is quantified only after considering the nature of the relationship we share.

### Self-Assessment Exercise 1

1. Edward T. Hall scientifically defines proxemics as .....
2. Anthropology has sub-categorised social space into .....,  
..... and .....

## 4.4 Definition and Meaning of Ergonomics

The word ergonomics comes from the Greek “*ergon*” which means work and “*nomos*” which means laws. It’s essentially the “laws of work” or “science of work”. Ergonomic design removes incompatibilities between the work and the worker and creates the optimal work environment. Ergonomics is an applied science concerned with designing and arranging things people use so that the people and things interact most efficiently and safely. The simplest definition of ergonomics is “the science of making the job fit the worker”; another is “the application of human sciences to the optimisation of people’s working environment”.

International Labour Organisation (ILO) defines ergonomics as: “the application of the human biological sciences in conjunction with the engineering sciences to the worker and his working environment, so as to obtain maximum satisfaction for the workers which at the same time enhance productivity.” While according to International Ergonomics Association (IEA), Ergonomics is defined as the scientific discipline concerned with the understanding of interactions among humans and other elements of a system, and the profession that applies theory, principles, data and methods to design in order to optimize human well-being and overall system performance. The main aspects of ergonomics are: **safety, comfort, ease of use performance and aesthetics**. With resulting benefits of: **lower costs, higher productivity, better product quality, improved employee engagement and better safety culture**.

According to International Ergonomics Association (IEA), there are three broad domains of Ergonomics: Physical, Cognitive and Organizational.

**Physical Ergonomics:** this is concerned with human anatomical, anthropometric (human body measurements), physiological and biomechanical characteristics as they

relate to physical activity. Physical Ergonomics is the ergonomics domain we are most concerned with since its focus is the Ergonomics of the office and workplace

#### **4.4.1 Ergonomics of the Office and Workplace**

Work is defined as an “activity involving mental or physical effort done in order to achieve a purpose or result. This is about everything we do, and when you consider that ergonomics is about designing the environment to optimize human well-being and overall performance, it means that ergonomics plays a major role in our lives – at work, at home and all the places in between. Workplace ergonomics is the science of fitting workplace conditions and job demands to the capabilities of the working population in order to deal with a number of problems among them are work related musculoskeletal disorders. The Back pain is one of the most common works - related injuries and is often caused by ordinary work activities such as sitting in an office chair or heavy lifting. Applying ergonomic principles - the study of the workplace as it relates to the worker - can help prevent work-related back pain and back injury and help maintain a healthy back. The goal of an ergonomics programme in industry is to adapt the workplace to a specific worker, dependent on the job description, required tasks and physical makeup of the employee performing those tasks. Two types of situations typically cause people to begin having back pain or to sustain a back injury while on the job:

- i. Non-accidental injury, where pain arises as a result of normal activities and requirements of the task. Poor body mechanics (such as slouching in an office chair), prolonged activity, repetitive motions, and fatigue are major contributors to these injuries. This may occur from sitting in an office chair or standing for too long in one position.
- ii. Accidental injury results when an unexpected event triggers injury during the task. A load that slips or shifts as it is being lifted, and a slip and fall or hitting one’s head on a cabinet door are typical examples. These accidents can jolt the neck, back and other joints with resulting muscle strain or tearing of soft tissue in the back.

#### **Back injury from physically demanding jobs**

Occupations that are physically demanding and require repetitive lifting (such as in nursing or heavy industry) are at greatest risk for both nonaccidental and accidental back injury. For example, many healthcare workers have back problems because patients are of different stature and weight with varying needs. Often, the patients need help changing position, rising from a chair and walking. Similarly, the physical effort needed on an accident or fire scene to release a trapped person or save a life is unpredictable. The same problems occur in the construction industry where consistencies of tasks are a challenge.

#### **Office chair back injuries**



People who sit most of the day, such as those who work at a computer while sitting in an office chair, are also at high risk for non-accidental back injury. Office ergonomics, or computer ergonomics, can help minimise the risk of repetitive injury, such as carpal tunnel syndrome, and the risks associated with prolonged sitting in an office chair such as neck strain lower back pain and leg pain. Staying physically fit, strong and flexible improves the likelihood of avoiding back injuries in all types of work environments.

#### **4.4.2 Work Ergonomics: Minimise Back Injuries**

There are certain basic ergonomic guidelines that may help an employee avoid back pain or back injury:

- Develop a job description based on the forces present in a particular work environment; the time spent performing the task and the biomechanics (which define human motions and seated posture in an office chair) used in the task.
- Use body posture as a tool that can be changed to meet the job demands with minimum stress on the muscles, ligaments, bones and joints.
- Learn and use appropriate body mechanics to limit extra mechanical stress in completing the task.
- Maintain fitness and flexibility and develop a reserve of strength.

#### **Identifying poor posture and risks**

Many potentially harmful situations that lead to back injury can be identified and avoided by following four basic rules of thumb:

1. *Prolonged static posture* is the enemy: The healthy body can only tolerate staying in one position for about 20 minutes. That is why sitting on an airplane, at a desk in an office chair, or at a movie theatre becomes uncomfortable after a short time. Standing in one place, such as standing on a concrete floor at an assembly line for extended periods of time tends to cause back pain. Holding the same position slowly diminishes elasticity in the soft tissues (muscles ligaments and tendons in the back). Then, stress builds up and causes back discomfort and/or leg discomfort.  
The solution is simple. Whether you are sitting in an office chair or standing in a line, change positions frequently. Just move. Stand or sit, stretch, take a short walk. After returning to the standing or sitting posture, use an alternate posture for just a few moments and some of the tissue elasticity needed to protect the joints will return.
2. *Frequent or repetitive stretching* to the end range of motion or awkward, angled postures can bind the joints. Unlike jobs that require long-term sitting in an office chair, jobs that require frequent repetitive motion can cause great discomfort. Such jobs involve lifting from the floor, lifting overhead, moving bulky loads, or using rotational force or twisting while handling material and which signal back injuries might be on the way.
3. *Heavy loads offer greater risk*: If the job requires moving heavy or bulky objects, it is important to have the proper tools or get help.

4. *Fatigue* from sitting in an office chair for days, from work or from insomnia can make people move more awkwardly. If one is overtired or feels fatigued, it is advisable to avoid lifting heavy objects alone or quickly.

#### **4.4.3 Office Chair, Posture and Driving Ergonomics**

Posture is very important both at home and on the job. Back-friendly posture is a valuable component of preventing or managing back pain while performing any activity. Incorrect posture while standing for long periods of time, sitting in an office chair, and driving are all common causes of back pain.

##### **Standing posture**

Maintain the natural curve of the spine when standing promotes “good posture.” So, what does that mean? The human spine looks a little bit like an S from the side, and maintaining those two curves is important (Figure 1.3).



**Fig. 1.3: Standing Posture**

- Keep the head directly over the shoulders (that is, “chest out, head back”)
- Keep the shoulders directly over the pelvis
- Tighten the core abdominal muscles
- Tuck in the buttocks
- Place the feet slightly apart, with one foot positioned slightly in front of the other and knees bent just a little bit (that is, not locked).

If this posture is new it may feel strange at first, but after a while it will feel natural. If it feels too weak or tiring, use light weights or elastic bands to work the muscles between the shoulder blades (for example, rhomboids and middle trapeziums). It will quickly get easier.

If standing on a concrete floor is required at work, it is best to wear shoes with good support and cushioning. A rubber mat placed on the concrete floor will ease pressure on the back and enhance the favourable ergonomic conditions. Use a railing or box to prop one foot up while standing to help take pressure off the back. This standing position takes some practice. Remember to change feet and positions every 20 minutes (Figure 1.4).



**Fig. 1.4: Standing on a Concrete Floor Posture**

### **Office chair sitting posture**

Posture is important for sitting in office chairs and at a workstation. Many of us spend hours in front of the computer, resulting in back pain or neck pain. Much of this pain may be avoided by a combination of:

- Adopting a user-friendly workstation by adjusting the office chair, computer and desk positioning
- Modifying sitting posture in an office chair. Many people sit towards the front of their chair and end up hunching forward to look at their computer screen. The better seated posture is to sit back in the office chair and utilize the chair's lumbar support to keep the head and neck erect.
- Taking stretch breaks and walking breaks if sitting in an office chair for long periods of time.

A consistent, comfortable workstation depends on where the computer screen is situated, where the hands and feet are placed, and the kind of office chair.

Figure 1.5 provides a common sense, easily remembered approach to fitting a seated workstation to the individual worker. To make it work, begin by selecting or adjusting the position or the work surface, then adjust the office chair.



**Fig. 1.5: Office Chair Sitting Posture**

- *Choose the surface height for the desk* (standing, sitting or semiseated) best for the task to be performed. Architects and draftsman may want a higher surface for drawing while computer entry work could be seated or standing, depending on the need to use other tools or references. The specific height of the work surface will also need to vary based on the height of the individual worker.

- *Adjust the seat of the office chair* so that the work surface is “elbow high.” A fist should be able to pass easily behind the calf and in front of the seat edge to keep the back of the legs from being pressed too hard and the feet from swelling. Two fingers should slip easily under each thigh. If not, use a couple of telephone books or a footrest to raise the knees level with the hips. The backrest of the office chair should push the low back forward slightly. If these adjustments cannot be adequately made with the existing office chair, a different make or type of chair may be considered.
- *Fit the height of the computer screen.* Sit comfortably in the newly adjusted office chair. Close both eyes and relax. Then, slowly reopen them. Where the gaze initially focuses should be when the eyes open is the place to put the centre of the computer screen. The screen can be raised using books or a stand if needed.

### **Driving posture to and from work**

Regardless of travel time to and from work, one’s seated posture while driving can either contribute to or alleviate back discomfort. Similar to those that sit in an office chair for hours, those with extensive commutes (an hour or more each way) can have an adverse impact on their back.

First and foremost, it is important to sit with the knees level with the hips. Either a rolled up towel or a commercial back support placed between the lower back and the back of the seat for more comfort and support of the natural inward curve of the low back.

Drivers are advised to sit at a comfortable distance from the steering wheel. Reaching increases the pressure on the lumbar spine and can stress the neck, shoulder and wrist, so sitting too far away can aggravate back pain (Figure 1.6).



**Fig. 1.6: Driving Posture**

However, sitting too close can increase risk of injury from the car’s airbag. According to the Federal Road Safety Administration, drivers (and front-seat passengers) should buckle their seat belts and keep about 10 inches between the centre of the air bag cover and their breastbone to reduce the risk of air bag injury yet still be protected by the air bag in the event of a collision.

Good posture combined with body mechanics (the way activities are performed throughout the day) can substantially improve the way one’s back and neck feels at the end of the workday.

#### 4.4.4 Manual Material Handling to Prevent Injury

Any job that involves heavy labour or manual material handling may be in a high-risk category. Manual material handling entails lifting, but also usually includes climbing, pushing, pulling and pivoting, all of which pose the risk of injury to the back.

**Lifting** from the floor places strain the structures in the lumbar spine. Ergonomic lifting techniques involve the use of a diagonal foot position, and getting as close to the load as possible. The load should be kept as close to the body as possible when standing up (Figure 1.7).



**Fig. 1.7: Lifting from the Ground Posture**

- It is easier to move loads that are waist high than ones that are on the floor. Stacking pallets to raise the height of the load is one ergonomic solution. A scissors lift will mechanically raise the load to a comfortable lifting level. Repetitive lifting from the floor is particularly risky, so try to get the material off the floor (figure 1.8)



**Fig. 1.8: Lifting from the Shelf Posture**

- Keep all loads as close to one's centre of gravity as possible. Carrying loads on one shoulder is safer for long and narrow material. This would include construction material or rolls of carpet (figure 1.9).



### Fig. 1.9: Carrying Loads on the Shoulder

- When lifting anything with a handle, place one hand on one knee to get additional leverage and use a diagonal foot position. Carrying two objects of the same weight will balance the load as long as the weight of the load is reasonable.
- When **climbing** with a load, “three-point” contact is important for safety. This means two hands and a foot or both feet and a hand must be in contact with the ladder or stairs at all times. If the load is bulky, get another person or a mechanical device to assist (figure 1.10).



**Fig. 1.10: Climbing with a Load**

Manual material handling may require **pushing** or **pulling**. Pushing is generally easier on the back than pulling. It is important to use both the arms and legs to provide the leverage to start the push (figure 1.11).



**Fig. 1.11: Pushing or Pulling**

- A handle would ideally be waist high for ease of pushing
- If it is necessary to pull, avoid twisting the lower back
- Sometimes, for very large loads, turning around and using the back to push against an object allows the legs to provide maximum force while protecting the low back from strain or twisting.
- The opposite of twisting is **pivoting**. Pivoting means moving the shoulders, hips and feet with the load in front at all times. The lower back is not designed to torque or repetitive twisting.  
Whether using a shovel or moving material or products, always avoid twisting the back (figure 1.12 and figure 1.13).



**Fig.1.12: Twisting**



**Fig. 1.13: Pivoting**

**Cognitive Ergonomics:** Is concerned with mental processes, such as perception, memory, reasoning and motor response, as they affect interactions among humans and other elements of a system.

**Organizational Ergonomics:** Is concerned with the optimization sociotechnical systems, including their organizational structures, policies and processes.

**Self-Assessment Exercise 2**

1. The laws of work is otherwise known as  
.....
2. What is the full meaning of IEA?
2. According to IEA, there are three broad domains of Ergonomics  
....., ..... and .....

**4.5 CONCLUSION**

You have learnt the definition and meaning of proxemics and identified the types of spaces in proxemics. You have learnt also the definition and meaning of ergonomics including the ergonomics of the office and workplace. In the next unit, you should learn basic occupational health team.

**4.6 SUMMARY**

In this unit, you have learnt the definition and meaning of proxemics and ergonomics as well as the types of space in proxemics. You have learnt also the ergonomics of office and workplace, work ergonomics: minimise back injuries, office chair, posture and driving ergonomics and manual material handling to prevent injury.

**4.7 TUTOR – MARKED ASSIGNMENT**



1. What is the definition and meaning of proxemics?
2. Briefly define Work.
3. What is the definition of Ergonomics, according to the International Labour Organization and according to International Ergonomics Association?
4. Enumerate the five main aspects and the major benefits of Ergonomics.
5. Describe ergonomics of the office and workplace.
6. What are the major concerns of cognitive and organizational Ergonomics?

#### **4.8 REFERENCES / FURTHER READING**

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#### **4.9 POSSIBLE ANSWERS TO SAEs**

##### **Self-Assessment Exercise 1**

1. “the study of measurable distances between people as they interact.”
2. i. affective ii. Interactive iii. normative

##### **Self-Assessment Exercise 2**

2. Ergonomics
3. International Ergonomics Association
4. i. Physical ii. Cognitive iii. Organizational



## **UNIT 5    BASIC OCCUPATIONAL HEALTH TEAM**

### **CONTENTS**

- 5.1 Introduction
- 5.2 Objectives
- 5.3 Main Content
  - 5.3.1 Criteria for Selection of Health Team
  - 5.3.2 Members of Occupational Health Team
  - 5.3.3 Occupational Health Physician
  - 5.3.4 Occupational Health Nurse
  - 5.3.5 Occupational Hygienist
  - 5.3.6 Occupational Psychologist
  - 5.3.7 Ergonomics / Safety Engineer
  - 5.3.8 Environmental Health Officer (EHO)
  - 5.3.9 Occupational First Aider
  - 5.3.10 Occupational Physiotherapist
  - 5.3.11 Medical Health Record Officer
  - 5.3.12 Medical Laboratory Scientist
  - 5.3.13 Occupational Laboratory
- 5.4 Conclusion
- 5.5 Summary
- 5.6 Tutor-Marked Assignment
- 5.7 References/Further Reading

### **5.1 INTRODUCTION**

In the previous unit, you learnt proxemics and ergonomics. In this unit, you will learn about basic occupational health team.

### **5.2 OBJECTIVES**

At the end of the unit, you should be able to:

- identify the basic occupational health team
- describe the functions of each team member.

## **5.3 MAIN CONTENT**

### **5.3.1 Criteria for Selection of Health Team**

A good occupational health team is central to the effective management of workplace health. The following factors should be considered when selecting occupational health team:

- number of employees, age and sex distribution
- severity of potential hazards and the associated risks
- geographical areas covered
- number of locations to be served - the size and hazards
- travelling time between locations
- statutory regulation and requirements for health surveillance (close observation of a person or group).

### **5.3.2 Members of Occupational Health Team**

An effective team requires an interdisciplinary approach. Occupational health team comprises professionals, technical and supportive staff. In selecting the team to operate the occupational health service efforts should be made to choose experienced and interested workers. Those officials selected should have training in occupational health.

The composition and work involvement of any occupational health team will be dependent on the requirements of the workplace. There is no prescriptive model of how a team should be established or organized. However, the members of the occupational health team include: Occupational physician, nurse, hygienist, psychologist, ergonomics / safety engineer, environmental health officer (EHO), first – aider, physiotherapist, record officer, laboratory scientist, and radiographer.

### **5.3.3 Occupational health Physician**

Occupational physician is trained and suitably qualified in the management of occupational diseases. An appointed doctor should be a registered medical practitioner that should be able to undertake statutory medical surveillance, prescribe drugs to workers and makes suggestions to the management about the improvement of occupational safety.

### **5.3.4 Occupational health Nurse**

The occupational nurse is a trained and registered professional nurse involved in the day-to-day care of those affected by occupational diseases. The nurse is expected to go daily with kits containing dressing items, drugs etc. Each plant should have a treatment

room and a first-aid box. The nurse also inspects the working environment, especially if there is an incident which he is expected to investigate and write a report on for the doctor.

Serious accidental injuries and other illnesses that cannot be treated at the plant are sent to the centre for the doctor to be consulted. If the sending of the patient to the centre could delay effective management of the case, the nurse can refer such to the nearest hospital, using a referral form. A duplicate copy of the referral form should be shown to the doctor, and it should be put in the patient's confidential file.

Daily attendance/treatment register is kept at the plant site, and all cases treated daily are entered into the register indicating the diagnosis, treatment given and discharges. An unfit worker should be referred to see the doctor who determines the duration of his excuse duty. A copy of the excuse duty certificate is sent to the personnel officer while a duplicate copy is kept in the centre for computation of the sickness/absence pattern of each worker and of the industry as a whole.

### **5.3.5 Occupational Hygienist Including a Toxicologist**

The Hygienist will be principally involved in measurement and monitoring of health hazards, including the chemical components of the work environment, their monitoring and control. He is responsible for keeping the work environment very clean and free from injury and disease organisms. He collects samples of blood from workers to assess the level of toxicants in the system. He reduces the exposure of workers to toxicants.

### **5.3.6 Occupational Psychologist**

He is concerned with the day to day interaction of the workers and engages in health promotion activities which are done through health education. The occupational psychologist is involved with the man-man inter-phase at work, more especially the behavioural modifications, better individual and group occupational health and safety relationships, for example, line management relationships, conditions of service, social services at work, alcoholism, drug abuse, neurosis, food habit modification and exercise fitness programmes at work etc.

### **5.3.7 Ergonomics/Safety Engineer**

He is a mechanical engineer concerned with the safe performance and modifications of tools and machines to fit (better) man's make-up in the work situations. An ergonomist is usually involved with occupational safety and equipment that is the mechanical environment of work.

### **5.3.8 Environmental Health Officer**

He is a trained and licensed professional in environmental health whose job is mainly preventive. He prevents physical, biological, chemical, mechanical and psychological factors that can affect adversely the health of the workers in the work place.

He works as a safety officer in an industry. He organises the safety education among workers by sensitising them on the need to use their personal protective equipment (PPE) while at work and health hazards posed on them if they are not safety-conscious.

### **5.3.9 Occupational First Aider**

He is part of the medical team and has received adequate training in occupational hazards. His main function is to be around the work place at all times for treatment of the injured and illness arising at work place under emergency conditions. He should work directly under the physician or nurse and a standing order should also be provided for him.

### **5.3.10 Occupational Physiotherapist**

He is a trained professional who treats diseases, injuries or weakness in the joints or muscles by exposing the victims to exercise. Since hazards cannot be completely eliminated in a work place, those who have one minor fracture or another can easily recover through physiotherapy.

### **5.3.11 Medical Health Record Officer**

He is a trained and registered record officer whose job is to issue medical cards for patients (clients) and keep all the health information for data analysis from time to time. By so doing, the industry will be able to know the prevalence (prevailing) of occupational disease and direct more attention towards controlling it.

### **5.3.12 Medical Laboratory Scientist**

He is part of the medical team. He is concerned with the preemployment, pre-placement and periodic medical examination among workers. He collects and examines their blood, stool and urine samples for occupational and non-occupational, communicable and noncommunicable diseases. This helps to assess the health status of workers at the work place.

### **5.3.13 Occupational Radiographer**

Radiographer also known as radiologic technologist, diagnostic radiographer, medical radiation technologist is an allied health professional that specializes in taking x-rays and other medical images to assist doctors in diagnosing diseases and injuries. A radiographer does your scan.

#### **Self-Assessment Exercise 1**

1. The formation of an effective occupational health team requires an .....approach.
2. The .....organises safety education among workers and encourages them to use their personal protective equipment (PPE)

## 5.4 CONCLUSION

You have learnt about the composition of members, and functions of the basic occupational health team at the work place. In the next unit, you should learn occupational health problems in industrial establishment.

## 5.5 SUMMARY

In this unit, you have learnt about occupational health team members. You have also learnt about the functions of the various professional staff involved in occupational health services such as doctors, nurses, and environmental health officers etc.

## 5.6 TUTOR-MARKED ASSIGNMENT

1. Comment briefly on the composition of the occupational health team
2. List three professional health staff involved in occupational health service.
3. Explain the functions of the professional health staff mentioned in 2 above.

## 5.7 REFERENCES / FURTHER READING

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## 5.8 POSSIBLE ANSWERS TO SAEs

### Self-Assessment Exercise 1

1. Interdisciplinary approach
2. Environmental Health Officer

## 5.9 END OF MODULE QUESTIONS

1. One major aim of occupational health and safety is to eliminate conditions hazardous to work and safety at work. (**True /False**)
2. The full meaning of ILO is.....
3. Provision of curative services for workers is an integral part of occupational medicine. (**True /False**)

4. Services specially arranged for workers to benefit from at work are collectively called  
(**welfare services, allowances**)
5. Occupational hygiene specifically targets life insurance schemes. (**True /False**)
6. Two main types of work environment have been identified, these are conducive work environment and wage incentives. (**True /False**)
7. The study of space and how we use it is known as (**proxemics, proximity**)
8. Ergonomics essentially means science of work.  
(**True /False**)
9. A good and effective Occupational Health Team requires an interdisciplinary approach. (**True /False**)
10. The requirements of the work place determine the composition and work involvement of the occupational health team. (**True /False**)

## **MODULE 2 COMMON OCCUPATIONAL HEALTH PROBLEMS**

- |        |  |
|--------|--|
| Unit 1 | Common Occupational Health Problems in Industrial Establishments     |
| Unit 2 | Common Occupational Health Problems in Agricultural Establishments   |
| Unit 3 | Common Occupational Health Problems in Health Care Establishments    |
| Unit 4 | Common Occupational Health Problems in Transportation Establishments |
| Unit 5 | Construction Settings  |

### **UNIT 1 COMMON OCCUPATIONAL HEALTH PROBLEMS IN INDUSTRIAL ESTABLISHMENT**

#### **CONTENTS**

- 1.1 Introduction
- 1.2 Objectives
- 1.3 Main Content
  - 1.3.1 Occupational Lung/Respiratory Diseases
  - 1.3.2 Occupational Dermatitis
  - 1.3.3 Occupational Injuries and Accidents
  - 1.3.4 Occupational Cancer
  - 1.3.5 Musculoskeletal disorders (MSDs)
  - 1.3.6 Hearing loss
  - 1.3.7 Stress and Mental health disorders
- 1.4 Conclusion
- 1.5 Summary
- 1.6 Tutor-Marked Assignment
- 1.7 References/Further Reading

## **1.1 INTRODUCTION**

In the previous unit, you learnt occupational health team. In this unit, you would learn about health problems in industrial establishment.

## **1.2 OBJECTIVES**

At the end of the unit, you should be able to:

- highlight common health problems in industries
- describe the health effects of industrial diseases on workers
- identify preventive measures.

## **1.3 MAIN CONTENT**

The occupational health problems or diseases are conditions or disorders that result from the nature of your work. An occupational disease is one that is caused by work environment or activities that are part of your occupation. Generally, health conditions or disorders that occur among a group of people with similar occupational exposures at a higher frequency than the rest of the population are considered to be occupational diseases. The list of the most common occupational health problems was established based on information from CDC, the ILO and European Agency for Safety and Health at work. The list include:

- occupational lung / respiratory diseases
- occupational dermatitis
- occupational injuries and accidents
- occupational cancer.
- musculoskeletal disorders (MSDs)

- Hearing loss
- Stress and Mental health disorders

### **1.3.1 Occupational Lung/Respiratory Diseases**

Most of the lung/respiratory diseases that afflict workers are known to be occupationally related, this include asthma, disease of the lung and chronic obstructive pulmonary diseases. The most serious health problem from many industries is the inhalation of dust by workers. The various kinds of dust include coal dust, metallic dust to which miners, grinders, polishers and painters are exposed; the mineral dust to which stone workers, asbestos workers and cement workers are exposed; animal dusts to which leathers, woolen makers are exposed, dust do not only block the tissues of the respiratory tract, but also cause some irritation. The dust may also carry germs with it, inhalation of any of these dust can lead to serious pneumoconiosis such as silicosis and anthracosis. It can also lead to asbestosis, byssinosis, asphyxiation and tuberculosis.

Preventive measures include eliminating the source of dust by applying water, segregating the dust process or by use of individual mask, medical supervision and giving of appropriate health instruction to the workers.

### **1.3.2 Occupational Dermatitis**

This is an occupational skin disease. Occupational dermatitis is the most common cause of occupational health problems (related disease) that usually lay off workers and are also responsible for suffering and anxiety among workers. The great bulk of occupational skin disease is caused by chemical factors which act either as primary irritant or sensitisers. Primary irritants are agents or substances which on exposure to skin are irritating and produce lesions, for example, strong acids or alkali. Sensitisers are agents or substances that do not have irritant effect after first exposure. If exposure is repeated, irritation subsequently occurs. Coal tar derivatives and petroleum distillates used in road building and furniture factory are examples. Factory workers and mechanics who use machine oil do suffer from skin disease including house wives using detergents for house-hold washing.

Allergic reactions may occur as a result of plant sensitivity in agriculture. There may be irritation of the skin from polluted water. Instances of skin diseases or problems from soap manufacturing industry, pharmaceutical and chemical industries, textile industries, building and construction industries, boat building and repair industry, hair dressing, dyes and drugs have been reported.

#### **Preventive measures include:**

1. Identify those substances which are dangerous. Where possible, enclose the process in which they are used. Harmful products should be substituted where possible.
2. All operators must be provided with personal protective equipment (PPE).
3. Personnel exposed to substances which are liable to produce skin disease should be told of the potential dangers and be informed of all ways in which they can protect themselves.



4. Personal cleanliness hygienic conditions for the work environment should be observed.
5. Provision of factory-based laundry service that will enable the worker to change their overall more often than they otherwise would.
6. Personal hygiene and periodic examination of workers.

### **1.3.3 Occupational Injuries and Accidents**

In most cases, these are the end products of dampness. Many people are employed in places which are exceedingly damp, for example, fishing industries, leather industries, potteries, paper industries, and the agricultural sector.

Accidents include falls from a higher height or highly polished floors or unequally platforms. Punctured, lacerated or contuse wound from mechanical appliances or sharp objects, defective seats, window louvers and doors. The state of health might well be expected to be at the root of some accident. Defects in vision or hearing do sometimes cause accident for example, drivers.

Some of the industries with the highest risk of accidents worldwide are mining, agricultural, including forestry and logging, and construction. Preventive measures include wearing of strong boots, and hard coats or protective cover cloths as well as building industries in such a way as to prevent dampness and excessive exposure to unpleasant weather as well as preventing the siting of industries at water logged or marshy areas.

### **1.3.4 Occupational Cancer**

Occupational Cancers occur when workers are in contact with carcinogenic substances in their workplace. Certain substances are associated with different cancers, and certain carcinogens can be especially prevalent in certain industries.

In ultra-violet and infra-red irradiations, for example, welding, black-smithing, iron and steel factories, there are such hazards as intense irritation of the eyes which can cause total blindness. The use of radium x-ray, ultra-violet rays and various other radio-active substances by workers at hospitals, radio and television stations can predispose individual worker to cancer when serious burns and irritation of the skin are produced. They may also affect the blood forming organs so that deficiencies may occur in both the red and white blood cells.

Preventive measures include the enforcement of the various standards for maximum permissible concentrations that have been established with reasonable confidence. Proper monitoring and shielding and appropriate disposal of radio-active waste can eliminate the dangers posed by the use.

### **1.3.5 Occupational musculoskeletal disorders (MSDs)**

MSDs are prevalent in most workplaces, even in office settings. Most work-related MSDs develop over time and can be caused by repetitive movements, awkward positions, handling loads, high work demands, lack of breaks etc.

### **1.3.6 Occupational Hearing loss**

Workers in the mining, construction and manufacturing industries need better hearing conservation strategies.

### **1.3.7 Stress and Mental health disorders**

Mental health disorders can also be considered as occupational diseases in certain contexts. Post-traumatic stress disorder (PTSD) is the commonly cited. PTSD can affect workers in high pressure workplaces.

#### **Self-Assessment Exercise 1**

1. Occupational health problems and diseases are conditions or disorders that result from.....
2. The list of the most common occupational health problems was established based on information from.....
3. Occupational Cancers occur when workers are in contact with .....

## **1.4 CONCLUSION**

You have learnt the four categories of common occupational health problems in industrial establishment as well as the occupational workers that were affected. You have learnt also the appropriate preventive measures. Health problems in agricultural establishment would be discussed in the next unit.

## **1.5 SUMMARY**

In this unit, you have learnt the four categories of common occupational health problems in industries such as respiratory diseases, dermatitis, injuries and cancer; the workers that were mostly affected with occupational diseases and the appropriate preventive measures.

## **1.6 TUTOR-MARKED ASSIGNMENT**

- 1 What are occupational health problems?
- 2 Enumerate the main occupational health problems/diseases in industries.
  3. a. Comment briefly on occupational dermatitis
  - b. Outline 4 preventive measures of occupational dermatitis

## **1.7 REFERENCES/FURTHER READING**

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Maia, F. (2020). 7 most common occupational diseases. [thesafetymag.com](http://thesafetymag.com)

WAHEB (1991). *Waste Disposal and Environmental Hazard Control*. Ibadan: Sterling Publishers.

## **1.8 POSSIBLE ANSWERS TO SAEs**

### **Self-Assessment Exercise 1**

1. from the nature of the work
2. CDC, the ILO and European Agency for Safety and Health at work
3. carcinogenic substances in the workplace

## **UNIT 2      COMMON      OCCUPATIONAL HEALTH PROBLEMS IN AGRICULTURAL ESTABLISHMENT**

### **CONTENTS**

- 2.1 Introduction
- 2.2 Objectives
- 2.3 Main Content
  - 2.3.1 Biological Health Problems
  - 2.3.2 Physical Health Problems
  - 2.3.3 Social Health Problems
- 2.4 Conclusion
- 2.5 Summary
- 2.6 Tutor- Marked Assignment
- 2.7 References/Further Reading

### **2.1 INTRODUCTION**

In the previous unit, you learnt about health problems in industrial establishment. In this unit, you will learn about health problems in agricultural establishment.

### **2.2 OBJECTIVES**

At the end of the unit, you should be able to:

- explain the types of health problems in agricultural establishment
- identify health diseases in agricultural establishment.

### **2.3 MAIN CONTENT**

#### **2.3.1 Biological Health Problem**

In developing countries such as Nigeria the main occupation is farming. The type of agricultural work ranges from mechanised to nonmechanised farming. The activities involved are mainly: clearing the bush, planting, weeding, harvesting and in some cases processing of agricultural products. Some farmers are involved in livestock farming. This involves breeding, raising and caring for animals. The agricultural problems may be classified into four, namely: biological, agricultural diseases, physical, and social problems.

Biological problems include zoonosis or diseases transmitted from animals to man which affect the health and survival of man at his work place thereby resulting in decreased productivity. Such diseases include bovine tuberculosis (ingestion of infected milk); anthrax; brucellosis (infect meat handlers in slaughter houses or veterinary surgeons); Lassa fever (transmitted by infected rats); rabies (transmitted by infected cats and dogs); Bird flu, Avian flu, and Swine flu.

The environment consists of living organisms such as plants and animals. There are micro-organisms such as viruses, bacteria, fungi, protozoa, and metazoan. Some of these micro-organisms can cause diseases, for example ankylostomiasis (hookworm in farmers); rabies (infects veterinarians and wild life keepers); brucellosis, bovine tuberculosis, and anthrax (found in animal and cattle rearers; and leptospirosis (characterised by jaundice and fever. Other parasitic diseases include tetanus, sleeping sickness, and malaria.

### **3.3.2 Physical Health Problem**

The physical health problems farmers encounter in agricultural establishments include exposure to heat and sunlight, noise from machinery (mechanised farming), dust, fumes, puncture wounds from pointed sticks and thorns, matched cuts, bruises and lacerated wounds, hoe cuts. Other physical problems include backache because of prolonged bending, lifting of heavy load and wrong posture. Accidents such as falling from height of tall palm trees, mango trees do occur. There are also records of snake bites, dog bites, scorpion bites, and bee stings among farmers.

### **2.3.3 Social Health Problem**

The social health problems farmers in agricultural establishments experience are violence over ownership of farm land, over boundary issues, economic tress resulting in interpersonal, intrapersonal, human bites, matched cuts, murder, body injuries and death in severe cases. The problem may also degenerate to communal violence, incessant litigation and transcend from one generation to another.

#### **Self-Assessment Exercise 1**

- |   |
|---|
| <ol style="list-style-type: none"><li>1. Zoonosis are diseases that are .....</li><li>2. Agricultural problems may be classified into four, namely ....., ....., ..... and.....</li><li>3. The social agricultural problem may degenerate to communal violence, incessant litigation and transcend from one generation to another. (<b>TRUE OR FALSE</b>)</li></ol> |
|---|

## **2.4 CONCLUSION**

You have learnt the common health problems in agricultural establishments including its effects on farmers. Health problems in Health Care Establishments would be discussed in the next unit.

## **2.5 SUMMARY**

In this unit, you have learnt the occupational health problems inherent in agricultural establishments such as biological, physical, and social problems as well as its health effects on farmers.

## **2.6 TUTOR-MARKED ASSIGNMENT**

1. Enumerate three factors that contribute to health problems in agricultural establishments.
2. Explain two of the factors mentioned in (a) above.
3. Comment briefly on the social health problems farmers in agricultural establishments' experience.

## **2.7 REFERENCES / FURTHER READING**

Achalu, F. I. (2000). *Occupational Health and Safety*. Lagos: Simarch Nigeria Ltd.

Amadi, A. N. (2011). *ABC of Environmental Health*. Owerri: Readon Publishers.

Asogwa, S. E. (2007). *A Guide to Occupational Health*. Enugu: Snaap Press Ltd.

WAHEB (1991). *Waste Disposal and Environmental Hazard Control*. Lagos: Sterling Publishing Consultants.

## **2.8 POSSIBLE ANSWERS TO SAEs**

### **Self-Assessment Exercise 1**

1. transmitted from animals to man
2. i. biological                      ii. agricultural diseases  
    iii. physical                      iv. social problems
3. TRUE

## **UNIT 3 OCCUPATIONAL HEALTH PROBLEMS IN HEALTH CARE SYSTEMS**

### **CONTENTS**

- 3.1 Introduction
- 3.2 Objectives
- 3.3 Main Content
  - 3.3.1 Health Problems in health care systems
  - 3.3.2 Exogenous Problem
  - 3.3.3 Endogenous Problem
- 3.4 Conclusion
- 3.5 Summary
- 3.6 Tutor-Marked Assignment
- 3.7 References/Further Reading

## 3.1 INTRODUCTION

In the previous unit, you learnt about health problems in agricultural establishment. In this unit, you will learn about health problems in health care systems.

## 3.2 OBJECTIVES

At the end of the unit, you should be able to:

- identify the occupational health problems in health care systems
- highlight health care diseases.

## 3.3 MAIN CONTENT

### 3.3.1 Health Problems in health care systems

Health workers in health care establishments such as hospitals, health centres, clinics, maternities and dispensaries are faced with numerous health problems, because major hazards exist such as exposure to infectious agents, chemical agents, manual handling of patients and materials, slips, trips, falls and occupational violence. The problems can be classified into two: Exogenous and endogenous.

### 3.3.2 Exogenous Problems

Exogenous is from the words “*exo*” meaning “*outside*” and “*genous*” meaning “*born from*”. Exogenous infections involve a pathogen entering a patient’s body from the environment. The pathogens can be introduced through a contaminated device, healthcare worker, surface, or other vector. Exogenous health problems are such diseases that were transferred into health institutions by the health worker suffering from such disease without manifesting it (healthy carrier). Such diseases include tuberculosis, chicken pox, infective hepatitis B., human Immuno deficiency virus (HIV) etc. Eliminating exogenous infections focuses on reducing the bio burden in the patient’s environment. If the reservoir for pathogens can be reduced, the opportunities for cross-contamination diminish. Hand hygiene is the single most important way to reduce transmission of pathogens vulnerable to patients. Other interventions focus on environmental decontamination of surfaces through daily cleaning and self-sanitizing surfaces.

### 3.3.3 Endogenous Problems

Endogenous is from the Greek words “*endo*” meaning “*within*” and “*genous*” meaning “*born from*”. An endogenous infection is a disease arising from an infectious agent already on or in the host’s body but previously asymptomatic or prior to the start of infection.

- (i) Endogenous (internal) problems are such diseases health workers contract within the health institution from patients, clients, patients’ relations in the course of attending to them. The diseases include Human Immunodeficiency Virus (HIV), hepatitis B, and

chicken pox. Infected blood and blood sera pose danger to health workers. Other health problems include cuts from razor, surgical blades, and lancet or scalpel that were infected.

- (ii) The health workers in the laboratory services department are exposed to blood and blood products during cross – matching, collection of blood, urine and faeces (excreta) samples for analysis. This exposes the laboratory workers to the risk of contracting communicable diseases such as infective hepatitis B. The doctors and nurses are exposed to the same risk during blood and dextrose (sugar) transfusion.
- (iii) Health problems resulting from radiation such as x-ray used for radiotherapy. This may result to radiation injuries such as cancer. This problem may be seen in health workers that work in x-ray departments where radio-active substances are used for therapeutic purposes.
- (iv) Health problems can arise from chemicals (cleaning agents and disinfectants) used in concurrent and terminal disinfections in the health institutions. This may cause some hazards if not properly used and disposed by health workers.
- (v) Health problems may arise from contaminated food and water bought from restaurants in health institutions. Such diseases like diarrhoea, gastroenteritis, salmonellosis (food poisoning, and typhoid fever) may occur.
- (vi) Other health problems include work-related stress, whose causal factors include excessive working time and over work, shortage of personnel, bullying which may include emotional and verbal abuse, sexual harassment, burn out, mobbing and exposure to unhealthy elements during meetings with business associates, for examples, tobacco smoking and uncontrolled alcohol intake. There may be problem of violent attack from aggressive and emotionally unstable patients on health worker. Health workers mostly affected of health problems include doctors, nurses, pharmacists, laboratory scientists, radiographers, mortuary attendants, cleaners, environmental health officers (EHOs), theatre staff, and other supportive staff.
- (vii) Health problems may arise from hospital waste if not regularly disposed. Hospital waste is the smallest waste but the most dangerous. It includes wastes such as needles, syringes, culture media, human parts, lancet, scalpel, refuse from kitchens and patients (both in-patient and out-patient). The EHO should ensure that refuse be segregated at the health institution and disposed of in a manner that public health nuisances will not occur.

### **Self-Assessment Exercise 1**

1. The Health problems associated with health care industry can be classified into two. ....and .....
2. “*endo*” means .....
3. Three (3) endogenous diseases associated with health workers are ....., ..... and .....

## **3.4 CONCLUSION**

You have learnt the various health problems that pose threat to health workers in health systems. In the next unit, we will discuss health problems in transportation systems.



### **3.5 SUMMARY**

In this unit, you have learnt the exogenous problems in health institutions. You have learnt also the endogenous problems among health workers in clinics, laboratory services, radiography services, kitchen services and environmental health services.

### **3.6 TUTOR-MARKED ASSIGNMENT**

1. Distinguish between endogenous and exogenous infections.
2. Enumerate four factors that contribute to health problems in health systems.
3. Explain two factors listed in (2) above.

### **3.7 REFERENCES/FURTHER READING**

Achalu, F. I. (2000). *Occupational Health and Safety* Lagos: Simarch Nigeria Ltd.

Amadi, A. N. (2011). *ABC of Environmental Health*. Owerri: Readon Publishers.

Asogwa, S. E. (2007). *A Guide to Occupational Health*. Enugu: Snaap Press Ltd.

### **3.8 POSSIBLE ANSWERS TO SAEs**

#### **Self-Assessment Exercise 1**

1. Exogenous and endogenous
2. Within(internal)
3.
  - i. Human Immunodeficiency Virus (HIV)
  - ii. hepatitis B
  - iii. chicken pox.

## **UNIT 4 COMMON OCCUPATIONAL HEALTH PROBLEMS IN TRANSPORTATION ESTABLISHMENT**

### **CONTENTS**

- 4.1 Introduction
- 4.2 Objectives
- 4.3 Main Content
  - 4.3.1 Health Problems in Transportation Establishment
  - 4.3.2 Pollution
  - 4.3.3 Noise
  - 4.3.4 Air Pollution
  - 4.3.5 Water Pollution
  - 4.3.6 Soil Contamination
  - 4.3.7 Biodiversity
  - 4.3.8 Landscapes
  - 4.3.9 Safety and Accidents
- 4.4 Conclusion
- 4.5 Summary
- 4.6 Tutor-Marked Assignment
- 4.7 References/Further Reading

### **4.1 INTRODUCTION**

In the previous unit, you learnt common occupational health problems in health care establishments. In this unit, you will learn about common occupational health problems in transportation establishment.

### **4.2 OBJECTIVES**

At the end of this unit, you should be able to:

- identify the health problems in transportation establishment
- highlight pollution, noise, air pollution, and pollution of water
- describe biodiversity, land take, safety and accidents.

## **4.3 MAIN CONTENT**

### **4.3.1 Health Problems in Transportation Establishment**

Transport is an essential component of modern life and brings with it the potential to improve and erode public health. Road traffic is a major cause of adverse effects – traffic-related air pollution, noise, accidents and social effects combine to generate a wide range of negative health consequences, including increased mortality, increased physical injury, cardiovascular, respiratory and stress-related diseases and cancer. These affect not only transport users but also the general population at large.

### **4.3.2 Pollution**

A major category of transport-related health impact is transportation pollution emissions. Motor vehicles produce various pollutants which can cause health problems, pollution of the environment and ecological damage. Although control technologies have reduced emissions per vehicle-kilometer, motor vehicle pollution remain a major health risk in part because reduced emission rates are partly offset by increased vehicle travel.

One of the most serious forms of pollution is the contamination of the air by various particles and gases. Most forms of transportation modes emit pollutants but the ones that emit the greatest amount of pollutants are the ones that employ the internal combustion engines. These pollutants have deleterious effects on the health of the populace particularly in urban centres where the population is large. Included in this category of pollutants are the highway motor vehicles, the aircraft and the motorcycle.

### **4.3.3 Noise**

Another form of pollution which is harmful both physically and psychologically is noise. This is nuisance product of almost all movements. It is a problem in the vicinity of roads, where vehicles operate at high speed or accelerate and in the vicinity of airports. The transmission of vibration by railroads, rapid transit lines such as subways in cities and aircraft such as the concord is another source of pollution.

Noise represents the general effect of irregular and chaotic sounds. It is traumatising for the hearing organ and that may affect the quality of life by its unpleasant and disturbing character. Long term exposure to noise levels above 75dB seriously hampers hearing and affects human physical and psychological well-being. Transport noise emanating from the movement of transport vehicles and the operations of ports, airports and rail yards affects human health, through an increase in the risk of cardiovascular diseases. Increasing noise levels have a negative impact on the urban environment reflected in falling land values and loss of productive land uses.

### Self-Assessment Exercise 2

1. Noise represents the. ....
2. Motor vehicles produce various..... which can cause health problems ..... and .....
3. Transport is an essential component of modern life and brings with it the potential ..... and .....

#### 4.3.4 Air Pollution

Highway vehicles, marine engines, locomotives and aircraft are the sources of pollution in the form of gas and particulate matters emissions that affects air quality causing damages to human health. Toxic air pollutants are associated with cancer, cardiovascular, respiratory and neurological diseases. Carbon monoxide (CO) when inhale affects bloodstream, reduces the availability of oxygen and can be extremely harmful to public health. An emission of nitrogen dioxide (NO<sub>2</sub>) from transportation sources reduces lung function, affects the respiratory immune defence system and increases the risk of respiratory problems. The emissions of sulphur dioxide (SO<sub>2</sub>) and nitrogen oxides (NO<sub>x</sub>) in the atmosphere form various acidic compounds that when mixed in cloud water creates acid rain. Acid precipitation has detrimental effects on the built environment, reduces agricultural crop yields and causes forest decline. The reduction of natural visibility by smog has a number of adverse impacts on the quality of life and the attractiveness of tourist sites.

Particulate emissions in the form of dust emanating from vehicle exhaust as well as from non-exhaust sources such as vehicle and road abrasion have an impact on air quality. The physical and chemical properties of particulates are associated with health risks such as respiratory problems, skin irritations, eyes inflammations, blood clotting and various types of allergies.

#### 4.3.5 Pollution of Water

Transport activities have an impact on hydrological conditions. Fuel, chemical and other hazardous particulates discarded from aircraft, cars, trucks and trains or from port and airport terminal operations, such as de-icing, can contaminate rivers, lakes, wetlands and oceans. Because demand for shipping services is increasing, marine transport emissions represent the most important segment of water quality inventory of the transportation sector. The main effects of marine transport operations on water quality predominantly arise from dredging, waste, ballast waters and oil spills.

Dredging is the process of deepening harbour channels by removing sediments from the bed of a body of water. Dredging is essential to create and maintain sufficient water depth for shipping operations and port accessibility. Dredging activities have a two-fold negative impact on the marine environment. They modify the hydrology by creating turbidity that can affect the marine biological diversity. The contaminated sediments and water raised by dredging require spoil disposal sites and decontamination techniques.

Wastes generated by the operations of vessels at sea or at ports cause serious health problems, since they can contain a very high level of bacteria that can be hazardous for public health as well as marine ecosystems when discharged in waters. Besides, various types of garbage containing metals and plastic are not easily biodegradable. They can persist on the sea surface for long periods of time and can be a serious impediment for maritime navigation in inland waterways and at sea and affecting as well berthing operations. Ballast waters are required to control ship's stability and draught and to modify their centre of gravity in relation to cargo carried and the variance in weight distribution.

Ballast waters acquired in a region may contain invasive aquatic species that, when discharged in another region may thrive in a new marine environment and disrupt the natural marine ecosystem. There are about 100 non-indigenous species recorded in the Baltic Sea. Invasive species have resulted in major changes in near shore ecosystems, especially in coastal lagoons and inlets. Major oil spills from oil cargo vessel accidents are one of the most serious problems of pollution from maritime transport activities.

#### **4.3.6 Soil Contamination**

The environmental impact of transportation on soil consists of soil erosion and soil contamination. Coastal transport facilities have significant impacts on soil erosion. Shipping activities are modifying the scale and scope of wave actions leading to serious damage in confined channels such as river banks. The removal of earth's surface for highway construction or lessening surface grades for port and airport developments have led to important lost of fertile and productive soils. Soil contamination can occur through the use of toxic materials by the transport industry. Fuel and oil spills from motor vehicles are washed on road sides and enter the soil. Chemicals used for the preservation of railroad ties may enter into the soil. Hazardous materials and heavy metals have been found in areas contiguous to railroads, ports and airports.

#### **4.3.7 Biodiversity**

Transportation also influences natural vegetation. The need for construction materials and the development of land-based transportation has led to deforestation. Many transport routes have required draining land, thus reducing wetland areas and driving-out water plant species. The need to maintain road and rail right-of-way or to stabilise slope along transport facilities has resulted in restricting growth of certain plants or has produced changes in plants with the introduction of new species different from those which originally grew in the areas. Many animal species are becoming extinct as a result of changes in their natural habitats and reduction of ranges.

#### **4.3.8 Landscapes**

Transportation facilities have an impact on the urban landscape. The development of port and airport infrastructure is significant features of the urban and semi-urban built environment. Social and economic cohesion can be severed when new transport

facilities such as elevated train and highway structures cut across an existing urban community. Arteries or transport terminals can define urban borders and produce segregation.

Major transport facilities can affect the quality of urban life by creating physical barriers, increasing noise levels, generating odours, reducing urban aesthetic and affecting the built heritage.

### **4.3.9 Safety and Accidents**

One of the most disturbing by-products of transportation is that it causes injuries and deaths (together called casualties) through accidents. There are lots of programmes developed to improve the safety in transportation, for example, regular inspection of vehicles for roadworthiness. Licensing of vehicle operators is another programme to improve the safety records of transportation.

Pipelines are highly vulnerable since they can carry very toxic and volatile materials, which can spill all over the place causing accidental deaths. Ships may be damaged by storms in the high seas, collision or accidental grounding may occur leading to the release of dangerous cargo to marine life. Trains and heavy duty vehicles may as a result of accidents release obnoxious gases or materials, which may be deadly to the inhabitants of the areas. Stiff lines, re-designated routes, rerouting of vehicles are some of the measures that can be taken against some of these erring operators in order to minimize such hazardous accident.

#### **Self-Assessment Exercise 2**

1. Toxic air pollutants are associated with .....,.....and .....
2. The environmental impact of transportation on soil consists of .....
3. Injuries and deaths caused by accidents are collective called .....

## **4.4 CONCLUSION**

You have learnt common health problems in transportation establishment. In the next unit, you will learn about construction settings.

## **4.5 SUMMARY**

In this unit, you have learnt common health problems in transportation establishment. The problems include; noise, air pollution, water pollution, etc.

## **4.6 TUTOR – MARKED ASSIGNMENT**

1. State common health problems in transportation establishment.

2. Explain, briefly pollution of the environment as a consequence of activities of the transportation industry.
3. Write notes on the following types of pollution:
  - (i) Noise pollution
  - (ii) Air pollution
  - (iii) Water pollution

#### **4.7 REFERENCES/FURTHER READING**

- Anekwe, C. M. (1987). "Some Factors Affecting Transportation Development In Nigeria." *Journal of the Federation of Building and Civil Engineering Contractors in Nigeria*, 4 (2).
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- Steward, C. E., (1976). Loading and Securing Wheel chairs in Transportation of Students, *Transportation Research Board*, No, 578.
- The Environmental Impacts of Transportation [people.hofstra.edu/Home/Contents/Chapter 8](http://people.hofstra.edu/Home/Contents/Chapter 8). (Accessed 02/09/2012)
- The Roles of Transportation in Nigerian Society. <http://www.ilorin.info/> (Accessed 02/09/2012)

#### **4.8 POSSIBLE ANSWERS TO SAEs**

##### **Self-Assessment Exercise 1**

1. general effect of irregular and chaotic sounds
2. pollutants, pollution of the environment and ecological damage
3. potential to improve and erode public health

##### **Self-Assessment Exercise 2**

1. i. cancer          ii. Cardiovascular  
   iii respiratory   vi. neurological diseases
2. soil erosion and soil contamination
3. casualties

## **UNIT 5 CONSTRUCTION SETTINGS**

### **CONTENTS**

- 5.1 Introduction
- 5.2 Objectives
- 5.3 Main Content
  - 5.3.1 Safety Measures at the Construction Site
  - 5.3.2 Scaffolding and Ladder Safety
  - 5.3.3 Falling Safety
  - 5.3.4 Forklift Safety
  - 5.3.5 Body Protection
  - 5.3.6 Electrical Safety
  - 5.3.7 Other Safety Issues
- 5.4 Conclusion
- 5.5 Summary
- 5.6 Tutor – Marked Assignment
- 5.7 References/Further Reading
- 5.8 End of Module Questions

### **5.1 INTRODUCTION**

In the last unit, you learnt about common occupational health problems in transportation establishment. In this unit, you will learn about problems in construction settings.



## 5.2 OBJECTIVES

At the end of the unit, you should be able to:

- describe safety measures at the construction site
- identify safety measures for hand tools at the construction site
- highlight safety measures for body protection.

## 5.3 MAIN CONTENT

### 5.3.1 Safety Measures at the Construction Site

Construction workers are exposed to job hazards on a daily basis. It is important for companies to observe safety procedures at the site. Various types of injuries can result from improper safety on construction of commercial and residential structures. Construction job-related accidents can be significantly reduced with the proper safety equipment.

### 5.3.2 Scaffolds and Ladders

Collapsing scaffolds and falls from ladders are serious hazards on construction sites. Workers should routinely inspect scaffolds and ladders to make sure they are in proper working condition and are not exceeding the manufacturers' recommended weight restrictions. Workers should set up scaffolds and ladders only on sound footing. For exterior construction, workers should be advised not to use scaffolds or ladders within 10 feet of power lines or during bad weather conditions, such as on windy or rainy days.

### 5.3.3 Falling Safety

The main cause of fatalities in construction accidents is due to falls. Workers are required to wear safety protection equipment that will prevent a complete fall. Employers should provide safety nets in areas where there is a long drop. Safety lines should be chalked out in high areas to keep workers aware of edges where they can plummet in a fall.

Head injuries from falls can be very severe. Workers are required to wear the proper safety hats, particularly when working on scaffolding, high areas or ladders. A trained team safety member should inspect safety hats prior to each shift to ensure that employees have hats that are in good condition for maximum protection.

#### Self-Assessment Exercise 1

- |   |
|---|
| <ol style="list-style-type: none"><li>1. The main cause of fatalities in construction accidents is due.<br/>.....</li><li>2. The severity of head injuries from falls can be reduced by<br/>wearing .....</li></ol> |
|---|

### **5.3.4 Forklift Safety**

Forklifts are a big part of the construction work life. A trained safety team member should supervise and ensure that safety standards are observed when forklifts are used on the construction site. Under no circumstance should a minor be allowed to operate or even be near a forklift. All forklift drivers should be certified by the Federal Road Safety Administration. Stiff sanctions should be meted to workers caught stunt-driving, racing or horse playing while on or around the forklifts. The maximum speed to drive a forklift is 5 mph.

The trained team safety member should inspect forklifts at the beginning and end of each shift. Forklifts should have a working rollover protective structure. All lights should be in good working condition. The audio signal for backing up should be loud and functional. Any and all forklifts that do not meet the required safety standards should be immediately removed from the workplace and visibly tagged for repair.

### **5.3.5 Body Protection**

Workers should wear face protection such as safety glasses or face shields when they are grinding, nailing, welding, cutting, working near electrical hazards or using any material that could fly up and hit them. Workers should wear helmets when there is danger of falling objects. Shoes should have reinforced toes such as steel tips and should resist sole punctures. Workers should wear thick gloves for certain tasks, such as welding and electrical work.

### **5.3.6 Electrical Safety**

Electrocution is a constant risk on construction sites. To avoid problems, workers should only use electrical devices and cords recommended for heavy-duty use. Workers should always shut off power to systems before working on them as well as clearly identify all live power lines to prevent mishaps. Employers should replace frayed or broken cords and devices. Also, grounded-type (three-pronged) of electrical devices and extension cords should be used.

### **5.3.7 Other Safety Issues**

Due to the complexity of a construction site, workers should always guard against hidden dangers by taking proper precautions. For example, heavy equipment, such as cranes and forklifts, requires experienced and competent operators. Workers should keep a list of any hazardous materials on-site and clearly mark them with the appropriate warning signs. Employers should train workers who use hazardous materials to deal with any emergency situations. Also, employers should cover any large openings in floors to prevent falls, and set up guardrails in high areas that do not have walls.

### **Self-Assessment Exercise 2**

1. Workers are expected to wear thick gloves for certain tasks, such as .....and .....
2. Construction job-related accidents can be significantly reduced with .....

## **5.4 CONCLUSION**

You have learnt about safety measures at the construction site as well as the safety equipment used at the construction site. In the next unit, you will learn occupational health policies, regulations and regulatory agencies.

## **5.5 SUMMARY**

In this unit, you have learnt about safety measures at the construction site. You have learnt also the safety equipment used at the construction site to protect workers from injury.

## **5.6 TUTOR-MARKED ASSIGNMENT**

1. List any three safety equipment used at the construction site.
2. Explain any two of the safety equipment in (1) above.
3. Briefly outline how problem of electrocution can be avoided in the workplace.

## **5.7 REFERENCES / FURTHER READING**

[http://www.ehow.com/list\\_construction\\_safety\\_checklist.html](http://www.ehow.com/list_construction_safety_checklist.html) (Assessed  
03/09/2012)

## **5.8 POSSIBLE ANSWERS TO SAEs**

### **Self-Assessment Exercise 1**

1. to falls
2. wearing proper safety hats

### **Self-Assessment Exercise 2**

1. welding and electrical work
2. the proper safety equipment

## **5.9 END OF MODULE QUESTIONS**

1. Health conditions or disorders that occur among a group of people with similar occupational exposures at high frequency than the rest of the population are considered to be
  - a. health problems
  - b. occupational diseases
  - c. health disorders
  - d. occupational problems

2. Which of the following is not an occupational health problem
  - a. occupational dermatitis
  - b. occupational cancer
  - c. occupational schistosomiasis
  - d. occupational lung diseases
3. All the following are classification of problems of the agricultural sector except
  - a. biological health problems
  - b. physical health problems
  - c. social health problems
  - d. mechanized health problems
4. Zoonosis is a disease
  - a. that can be transmitted from animals to humans
  - b. that affects animals in the Zoo
  - c. that can kill instantly
  - d. that is severe
5. Exogenous infections involve a pathogen entering a patient's body from
  - a. the body agent
  - b. the chemical agent
  - c. the environment
  - d. the hazard
6. The following are endogenous diseases except
  - a. chicken pox
  - b. hepatitis B
  - c. HIV
  - d. diabetes
7. A major category of transport-related health impact is
  - a. transportation pollutants emission
  - b. improve public health
  - c. cardiovascular diseases
  - d. population explosion
8. Toxic air pollutants are associated with all the following except
  - a. loss of hearing
  - b. cardiovascular disorders
  - c. respiratory diseases
  - d. neurological disorders
9. Transportation – through accidents causes injuries and deaths that are all together called
  - a. mishaps
  - b. casualties
  - c. contagious diseases
  - d. neurological diseases
10. The introduction of harmful materials into the environment appropriately describes
  - a. infection
  - b. pollution
  - c. congestion
  - d. adulteration

## **MODULE 3      OCCUPATIONAL HEALTH POLICIES**

- Unit 1      Occupational Health Policies, Regulations and Regulatory Agencies
- Unit 2      Evaluation and Measurement of Exposure Levels
- Unit 3      Worksite Wellness Promotion Programs

### **UNIT 1      OCCUPATIONAL HEALTH POLICIES, REGULATIONS AND REGULATORY AGENCIES**

#### **CONTENTS**

- 1.1    Introduction
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#### **1.1    INTRODUCTION**

In the previous unit, you learnt about construction settings. In this unit, you will learn about occupational health policies, regulations and regulatory agencies.

#### **1.2    OBJECTIVES**

At the end of the unit, you should be able to:

- highlight occupational health policies
- describe occupational health regulations
- identify occupational health regulatory agencies.

#### **1.3    MAIN CONTENT**

##### **1.3.1    Occupational Health Policy**

There is the dire need to have certain policies and regulations in place so as to protect workers exposed to industrial hazards and accidents in the workplace. Before

independence, developing countries adapted the occupational health policies of the home countries of their colonial masters. After gaining independence, these developing countries automatically inherited policies and regulations of the countries of their former colonial masters which they in the course of time made attempts to revise as circumstances and the needs demanded.

In the case of Anglophone West African sub-region including Nigeria, some of the occupational health policy in operation are those enacted in Britain. Certain provisions of occupational health policies and regulations as embodied in the statutes of most countries within the Anglophone West African sub-region are very similar. What may differ is the wording and perhaps the penalties but in every respect, the message is essentially the same.

In general terms, occupational health policies are aimed at:

- securing the health, safety and welfare of persons at work
- safe-guarding persons other than those at work against risks to health or safety arising from work activities
- controlling explosive, highly inflammable or dangerous substances
- supervising the emission of noxious or offensive substances from prescribed classes of premises where trade is carried out
- ensuring previously existing health, safety and welfare policies and regulations are progressively replaced by an up-date system of policies and regulations and approved codes of practice.

### **Constitution of the Federal Republic of Nigeria (1999)**

The constitution as the national legal order recognises the importance of improving and protecting the environment and makes provision for it. Relevant sections are:

- Section 20 makes it an objective of the Nigeria state to improve and protect the air, land, water, forest and wildlife of Nigeria.
- Section 12 establishes, though impliedly, that international treaties (including environmental treaties) ratified by the National Assembly should be implemented as law in Nigeria.
- Section 33 and 34 which guarantee fundamental human rights to life and human dignity respectively, have also being argued to be linked to the need for a healthy and safe environment to give these rights effect.

### **1.3.2 Occupational Health Regulations**

The factories Act 1987 was a landmark regulation in occupational health in Nigeria. A substantial revision of the colonial regulation, Factories Act 1958, the 1987 Decree, changed the definition of a factory from an enterprise with 10 or more workers to a

premise with 10 or more workers thereby providing oversight for the numerous small-scale enterprises that engage the majority of the work force in Nigeria.

The current regulation is the Factories Act 1990 which in essence is the same as the 1987 regulation. The regulation is arranged in parts and sections for easy reference in the following order:

## **Part 1 Registration of Factories**

### **General Definition of a Factory**

Generally speaking, premises whether under cover or in the open air constitute a factory if one or more persons are employed in any process for the purposes that may be specified by the regulation governing such registration, provided that the work is carried out by way of trade or for the purpose of gain, and provided also that the employer has the right of access or control.

### **Registration of Workplaces**

Registration of workplaces is usually made mandatory for occupiers of factories. An appropriate body as may be specified in law is vested with the responsibility to register workplaces in accordance with laid down rules or guidelines. Registration is sought by applicants in prescribed forms and on being satisfied that the premises are suitable for use as a factory of the nature stated in the application, such appropriate body so appointed will authorise the registration of the factory and a certificate of registration is issued to the applicant to that effect.

Refusal to issue certificate of registration to an applicant is usually expected to be communicated in writing to the applicant stating the grounds for such refusal.

Contravention to this provision or rule will be liable on conviction to a fine as may be specified in the statutes of each country.

### **Notification of change of business premises**

It is expected that after an application seeking registration of a factory has been submitted to the appropriate body, and a change becomes desirable, such a body should be notified of such new development in writing. Any occupier of business premises who contravenes this provision is usually liable on conviction to a fine or imprisonment as may be stated in the country's regulation.

## **Part II Health (General Provisions)**

Various regulations are available for the health, safety and welfare of workers in each country today. However, the following factors are commonly adopted to enhance good housekeeping and the promotion and maintenance of health of the workers:

## **i. Cleanliness in the workplace**

Cleanliness means that there is no dirt, no dust, no stains no bad smells. The goals of cleanliness are health living, beauty, absence of offensive odour and avoiding the spread of dirt and contaminants to one self and others. Cleanliness gives rise to a good character by keeping body, mind and soul clean and peaceful, it also brings positive thoughts in the mind which slows down the occurrence of diseases. Maintaining cleanliness is the essential part of healthy living. Because by cleaning, people are able to take control of their environment and create a more relaxing environment that helps them focus better on the more pressing issues. This factor calls for each factory to be kept in a clean state and free from effluents arising from any drain, sanitary convenience or nuisance. Refuse should be removed on a daily basis, using suitable methods. The floors of every work place should be washed at least once in a week. In situation of offensive trades, daily washing is required together with some other effective measures.

The walls, partitions and ceilings are washed in accordance with prescribed regulations. Repainting with oil paint or vanishing at least once in every five years and washing at least once a year with hot water and soap or cleaned by other suitable methods.

Premises where offensive trades are carried out should be white-washed or colour-washed and then white or colour washing should be repeated at least every year. Cleanliness generally:

- Promotes mental clarity
- A clean environment boosts self confidence
- Gives fresh and good look to our surroundings
- Prevents dangerous infectious diseases by keeping away microbes, germs and other pathogens
- Minimizes the entry of rats, cockroaches, parasitic worms and insects.

## **ii. Overcrowding in the workplace**

Overcrowding is the condition where more people are located within a given space than is considered tolerable from a safety and health perspective. An overcrowded workplace can create a variety problems, including health and safety issues, privacy concerns, decreased productivity and efficiency. With respect to overcrowding, regulations requires that every workroom to have sufficient floor area, height and unoccupied space to ensure health, safety and welfare. The associated Approved Code of Practice requires enough space for people to move freely and with ease to workstations and within rooms, with each room (excluding meeting rooms, lecture halls and kiosks) having at least 11 cubic metres per person, this is to ensure where work is being carried on should not be so overcrowded as to cause risk or injury to the health of persons employed therein. For this purpose, ceiling height is only counted up to a maximum of 3 metres and that the 11 cubic metres is the minimum and may be insufficient depending on the room layout and furniture within the room.



### **iii. Ventilation in the workplace**

Ventilation is the essential process of replacing stale air with fresh air. Ventilation aims at ensuring continued removal of polluted air and odour from occupied premises and the preservation of a pure dust-free atmosphere of proper temperature and humidity with sufficient movement of air. It is commonly used to remove contaminants such as fumes, dusts and vapours in order to provide a healthy and safe working environment. Polluted air in combination with poor ventilation causes dry throat and eyes, concentration disorders, fatigue, headaches, shortness of breath, poor sleep, drowsiness, dizziness. In addition, complaints may develop such as chronic colds or respiratory infections, development of asthma or other lung diseases.

It is therefore required that all factories and workplaces should be adequately ventilated to achieve the desired effect. Open windows provide the simplest form of ventilation so long as the work place is not situated in a dusty surrounding. In order to derive maximum effect, factories should be sited to take advantage of prevailing wind where possible. A mechanical means of ventilation is desirable when natural ventilation cannot be adequate and where a factory is situated in a dusty environment, or where the existence of fumes, gases or other impurities is harmful.

Mechanical means of ventilation may also be of absolute necessity depending on the nature of business in a factory. For example, in a spinning department of a textile industry, mechanical means of ventilation is preferred to open windows where strong current of air prevails.

It is emphasized that whosoever is appointed in each country to make regulations should do so specifying a standard of adequate ventilation for workplaces or for any class or description of factory.

### **iv. Lighting in the workplace**

Lighting has biological and physical effects that can impact the health and wellbeing of humans. People receive about 85% of their information through their sense of sight. Appropriate lighting, without glare or shadows can reduce eye fatigue and headaches, it can prevent workplace incidents by increasing the visibility of moving machinery and other safety hazards. Direct light from the sun can reduce the rate at which workers get headaches, and it can even reduce stress and drowsiness in workers. From workers' perspective poor lighting at work can lead to eye-strain, fatigue headaches, stress and other accidents. On the other hand, too much light can also cause safety and health problems such as glare, headaches and stress. Both can lead to mistakes at work, poor quality and low productivity. Access to windows and natural lighting are factors that can increase workers' satisfaction and reduce levels of anxiety. Lighting may also influence cognitive performance and problem solving ability by interfering with physiological factors like circadian rhythms. Light can also impact on mood and interpersonal relationships at work and therefore job satisfaction.

Sufficient natural lighting is highly desirable in any room and particularly in a factory. However, effective provision is usually made to secure and maintain adequate and suitable artificial lighting for the job. Improvements in lighting do not necessarily mean more lights and therefore the use of more electricity – it is often a case of

- making better use of existing light
- making sure that all lights are clean and in good condition
- ensuring that lights are positioned correctly for each task
- replacement of dead bulbs and fluorescent tubes
- making the best use of natural light
- making sure that glazed windows in workplaces and passages are kept clean and unobstructed except screens used to mitigate heat or glare penetration.

### **Simple rules for lighting**

- ii. make full use of daylight
- iii. choose appropriate visual backgrounds for walls, ceilings etc.
- iv. find the best place for the source to avoid glare
- v. use the most appropriate lighting devices and fixtures
- vi. avoid shadows
- vii. ensure regular cleaning and maintenance of lights and windows.

### **v. Drainage of floors in the workplace**

In any processing business liable to render the floor wet to such an extent that the wet is capable of being removed by drainage, effective means should be provided and maintained for draining. To do this effectively and with ease, it is required that floors should be constructed with a slight slope to aid natural drainage into gutters. Where such gutters discharge into drains, such drains are required to have a suitable gradient.

### **vi. Sanitary conveniences in the workplace**

Sanitary conveniences are facilities such as toilets, urinals, sinks, showers, bathtubs that must be provided at readily accessible places in the workplace. Provision usually requires that sufficient and suitable sanitary conveniences be provided, maintained, adequately ventilated and kept clean for all persons employed in the workplace. Effective lighting of the conveniences is important from the point of view of encouraging patronage and promoting healthful practice.

In an event where persons of both sexes are to be engaged, except for the situation where only persons engaged are members of the same family, such conveniences should be available separately to afford proper and separate accommodation for both sexes and clearly marked “males” or “females.” A suitable means for the disposal of sanitary dressings should be provided by where toilets are used by women.

are necessary: one unit for every 25 female persons employed one unit for every 20 male persons employed, but if more than 100 persons are employed, sufficient urinal accommodation is also provided, after the first 100 persons, 1 unit for every 40 workers.

Furthermore, it is required that sanitary conveniences should be separated from working places by corridors or open space. Also, the walls and floors of sanitary conveniences should be provided with tiles. Wash-hand basins should be provided. Provision of doors ensures privacy during use. Special provision should be made for any workers with disabilities. Facilities should provide adequate protection from weather conditions. The minimum number of toilets depends on the number of people at work:

- one toilet for up to 5
- two toilets for up to 25
- three toilets for up to 50
- four toilets for up to 75
- five toilets for up to 100

However, in order to have ease of usage, the following numbers of conveniences will still be regarded as a sufficient minimum:

- one toilet for every 25 females (or fraction of 25)
- one toilet for every 25 males (or fraction of 25) up to first 100
- where more than 100 males are employed and sufficient urinal accommodation is provided, four toilets for the first 100 and one toilet for every 40 additional males (or fraction of 40).

### **Part III Safety (General Provisions)**

#### **Powered machinery**

Eye injuries caused by accident arising from powered machinery in industries are common. In order to minimise these eye injuries; appropriate eye protective devices must be worn by workers.

Industrial regulation requires that every power shall be provided with an efficient starting and stopping devices.

#### **Other machinery**

It is demanded also that every dangerous part of any machinery other than the prime movers or transmission machinery should be securely fenced if it is likely to endanger the people.

The term “prime mover” refers to every engine, motor or other appliances which provides mechanical energy derived from steam, water, wind, electricity, combustion of fuel or other sources. “Transmission machinery” on the other hand includes shaft, wheel, drum, coupling, pulley system of fast and loose pulleys, clutch, driving belt or other devices by which the motion of a prime mover is transmitted to or received by any machine.

Machinery or its part is dangerous if it is a possible cause of injury to anybody acting in a way which a human being may be reasonably expected to act.

## **Unfenced machinery**

On rare occasions an examination of a machine may reveal that it requires immediate lubrication or adjustment and that this can only be carried out while the machine is working. In such rare instances, and subject to very stringent conditions, an authorised person by the management of a factory who is 18 years of age and above may approach such unfenced machinery while it is in motion for the purpose of examination, necessary lubrication or adjustment.

All other prime movers and flywheels must be securely fenced irrespective of their position. Such fencing is required by regulation to be a substantial construction and maintained in an efficient state of repairs. In the circumstance where the management of a factory claim that a machine or its part cannot be securely fenced, as they often do, its use should be banned. Compliance with provisions governing fencing of machinery by management in industries should be strictly enforced as non-compliance often leads to accidents.

## **Fire**

In many countries, adequate and effective means for detecting fire in industries and other related workplaces are available. Such means should be correctly installed in appropriate places within the factory. Most importantly, the management of a factory should ensure that all staff employed are adequately trained to enable them: know the locations of hoses and other fire protection equipment in and around the work areas, know emergency exits, know fire pull stations, know fire extinguisher locations and know how to operate the fire extinguishers provided in the workplaces.

Fire drills are called for in order to make workers conversant with the practice of handling fire incidents. This practice is controversial in some quarters on the claims that it may make workers non-responsive to situations of real fire outbreaks in the factory or workplace. The two options should be weighed for a proper decision.

The possibility of escape in an event of a fire outbreak in a workplace should be given due consideration. Adequate means of escape therefore should be provided. Emphasis is laid on doors which ensures easy exit for persons working in locked factories. Such doors should be easy to open from inside and they should open outside unless they are sliding doors. All exits should be distinctively marked in **red letters**, in adequate size and in English or any other local language understood by the workers. The routine practice of checking the condition of all fire equipment should be inculcated.

## **Part IV Welfare (General Provisions)**

### **Water**

A supply of sufficient and safe drinking water must be provided and maintained for all workers and kept free from contamination always. The water supplied should be readily

accessible to all person employed. Where the supply of water is not pipe borne, it should be contained in suitable containers.

### **Washing facilities**

Facilities for washing are required to be provided by the management of a factory in adequate and suitable number. These should be easily accessible to the workers and kept in a clean and orderly condition to encourage usage. More often than not, workers wash up without the use of soap. It is important to ensure that soap is provided by the employer to facilitate thorough cleaning especially for workers handling poisonous agents.

Special washing arrangements should be made for workers engaged in asbestos factories.

### **Cloak room**

The provision and maintenance of suitable accommodation for changing and keeping of clothing not worn by the workers during working hours cannot be over-emphasised. Utilisation of this facility can be maximised where the workers are supplied with appropriate protective clothing especially in certain processes where poisonous chemicals and other substances are present. In such situations, prohibition of workers taking their protective clothes home is imposed to safeguard their families from unnecessary poisoning which can result from accidental contamination by the clothes.

### **First aid in the workplace**

First aid in the workplace is defined as the necessary, emergency and temporary care given to someone who is suffering from an injury, accident or ill-health until professional medical care can be provided. First aid is not considered as medical treatment but the basic help someone with an injury needs before medical care is received. The primary goals of first aid are:

- preserve life
- prevent further injury
- promote recovery

It's necessary to know the most common medical conditions that needs response in order to be able to provide the proper first aid care. A suitably stocked first aid kit is a minimum requirement for every workplace, regardless of its size. The first aid box or cupboard of a suitable size must be provided for 150 workers. Such a box must contain materials required for first aid. Where more than 150 workers are employed, additional first aid box must be provided for every 150 workers. Each first aid box must be prominently marked "**FIRST AID**" and placed under the charge of a responsible staff that should be known by the workers and always readily available during working hours.

The contents of a first aid box should include items such as sterilised dressing for cuts and burns, scissors, cotton wool, waterproof and adhesive plasters, antiseptic cream, eye bath and drops, tourniquet, etc. It is worth mentioning that tourniquet is being omitted in the list of items in some countries due to danger arising from abuse.

However, they should only contain what is laid down in the country's regulation. Where first aid personnel are trained, simple medications may be stocked.

In certain circumstances, factories such as saw mills, certain chemical works, blast furnaces, iron mills, etc., are required to provide and maintain an ambulance room. This service will facilitate easy summoning of an ambulance or other means of transport needed in cases of accidents or illness. The persons in charge of the ambulance room may be a qualified nurse engaged in the clinic.

## **Part V Health, Safety and Welfare (Special Provisions and Regulations)**

### **Protective wears**

Suitable protective wears (including clothing) and appliances must be provided, maintained and its continuous use encouraged in all factories and workplace where workers are engaged in any process involving exposure to wet conditions, injuries or offensive substances. For example, such suitable protective wear may include, where necessary, suitable gloves, effective screens, foot wears, waterproof aprons, goggles, head covers, etc.

### **Staff canteen**

Workers in large establishments are provided with separate rooms or canteens where their meals are prepared and served at appropriate times. Eating is prohibited at workplaces, where dangerous substances such as lead, mercury, cyanide, etc, are present. The provision of adequate running water is desirable to ensure that the workers observe personal hygiene. Efforts should be geared to educate and enlighten the workers on the rationale behind these practice.

### **Samples**

An inspector of factory may after informing an employer or any of his agents in the workplace take for analysis samples in sufficient quantity of any substance used or intended to be used in a workplace. Particularly if the inspector thinks such a sample may prove on examination to constitute danger to the workers. Such sample must be analysed by a government chemist or an authorised person who may be required as a witness at a subsequent legal proceeding.

## **Part VI Notification and Investigation of Accidents and Industrial Diseases**

### **Notification of accidents**

Any accident in a factory which causes loss of life or disability for more than a specified period of days (in the case of the Nigeria provision – three days) must be reported in writing to the inspector of factories by the employer. If death occurs to an injured person later as a result of an accident, the inspector must be informed immediately. In most countries there are prepared forms for these types of reports.

### **Notification of industrial diseases**

If an employer suspects that a case of occupational disease has occurred in the factory, he must immediately notify in writing the nearest inspector of factories. Some of the occupational diseases which are reportable include: Lead poisoning including poisoning by any preparation or compound of lead; phosphorous poisoning; mercury poisoning; manganese poisoning; arsenic poisoning; aniline poisoning; poisoning by carbon bisulphide; benzene poisoning of blood; chronic ulceration due to chronic acid, or dichromate of potassium sodium, ammonium or any preparation of these substances; anthrax; pathological manifestations due to radium or other radioactive substances, or x-rays; jaundice due to toxic substama; anaemia due to toxic substama; primary epitheliomatous ulceration of the skin arising from the handling of or use of tar, pitch, bitumen, mineral oil, paraffin, or other compounds, products or residues of these substances; poisoning by halogen derivatives of hydrocarbons of the aliphatic series; compressed air illness; and asbestosis.

## **Part VII Special Applications, Extension and Miscellaneous Provisions**

### **Power and duties of inspectors**

To ensure compliance with occupational health regulations, factory inspectors are empowered to enter and inspect upon presenting relevant credentials to the occupier of a factory or his accredited agent. Every part of a factory including registers, certificates and other relevant documents required under available regulations of the country may be inspected. Workers also may be questioned for relevant information during such visits.

No employer or his representative shall deny the inspector entry or obstruct him in carrying out his lawful duties. An inspector may prosecute or defend in a court of law any accused charged or any complainant arising under the law.

### **Duties of employers**

Each employer should furnish a worker a place of employment free from hazards which are capable of causing or likely to cause death or serious physical harm. The employer should permit only those workers qualified by training or experience to operate equipment and machinery. Each employer must enlighten his workers of any manufacturing process which is dangerous or hazardous.

Employers should provide and train their workers in the use of appropriate personal protective wears. Furthermore, the employer shall make all operating departments aware of all occupational health regulations governing the factory's operations and ensure that all equipment and materials purchased meet recognised safety practice. Employers may take full disciplinary action against any worker who violates observation of safety practice in workplaces.

### **Duties of workers**

Workers should comply with laid down health and safety regulations relating to their workplaces, particularly those regulations which are applicable to their own actions and conducts. They may request an inspector of factory to conduct incidental inspection if they so believe an imminent danger exists or a violation of a regulation by the occupier of a factory threatens their physical well-being.

Workers are also expected (duty bound) to use all protective wear and appliances placed at their disposal by their employers. Unfortunately, majority of the labour force are uninformed. Because of high rate of illiteracy, most employees are unaware of their rights and labour regulations especially those which are applicable to their own actions and conduct.

The role of trade unionists and other health professionals in educating and enlightening workers on occupational health related issues will go a long way to compliment efforts of the employers in this regard.

### **Other regulations include:**

- Environmental Impact Assessment Act. Cap E12, LFN 2004
- The Land Use Act. Cap 202, LFN 2004
- Harmful Waste (Special Criminal Provisions Act) Cap. HI, LFN 2004
- Nuclear Safety and Radiation Protection Act, - Cap N 142, LFN 2004
- Oil pipelines Act, Cap 07, LFN 2004
- Nigerian Mining Corporation Act. Cap N120, LFN 2004
- Animal Diseases (control) Act. Cap A17, LFN 2004
- Nigeria Urban and Regional Planning Act Cap N138, LFN 2004
- Quarantine Act, Cap Q2, LFN 2004
- National Environmental Health Practice Regulations 2007
- Workmen's Compensation Law 1990 etc.

#### **Self-Assessment Exercise 1**

1. Each employer should furnish a worker a place of employment free from hazards which are. ....and .....
2. Maintaining cleanliness is an essential part of .....



### **1.3.3 Occupational Health Regulatory Agencies**

Enforcement of regulation is carried out by the Factory Inspectorate of the Ministry of Labour. This Ministry produced a National policy on Safety and Health in 2006 which details the responsibilities of employers, workers, manufacturers, and government agencies in the maintenance of health and safety of worker.

The Factories Act promotes the safety of workers and professionals exposed to occupational hazards. Under the Act, it is an offence to use unregistered premises for factory purposes. In particular: Section 13 allows an inspector to take emergency measures or request that emergency measures be taken by a person qualified to do so in cases of pollution or any nuisance (Factories Act, Cap FI, LFN 2004).

#### **National Environmental Standards and Regulations Enforcement Agency (NESREA) Act 2007**

Administered by the Ministry of Environment, NESREA Act of 2007 replaced the Federal Environmental Protection Agency (FEPA) Act. The following sections are worth noting:

- i. Section 7 provides authority to ensure compliance with environmental laws, local and international, on environmental sanitation and pollution prevention and control through monitoring and regulatory measures.
- ii. Section 8(1)(k) empowers the agency to make and review regulations on air and water quality, effluent limitations, control of harmful substances and other forms of environmental pollution and sanitation.
- iii. Section 27 prohibits, without lawful authority, the discharge of hazardous substances into the environment. This offence is punishable under this section, with a fine not exceeding, N1, 000,000 (One Million Naira) and an imprisonment term of five years. In the case of a company, there is additional fine of N50, 000 for every day the offence persists.

#### **Regulations (Under NESREA)**

National effluent limitation regulation under NESREA has the following provisions:

- Section 1(1) requires industry facilities to have anti-pollution equipment for the treatment of effluent
- Section 3(2) requires a submission to the agency of a composition of the industry's treated effluents
- National Environment Protection (Pollution Abatement in Industries and facilities producing Waste) Regulations (1999)
- Section 1 prohibits the release of hazardous substances into the air, land or water of Nigeria beyond approved limits set by the Agency

- Section 4 and 5 require industries to report a discharge if it occurs and to submit a comprehensive list of chemicals used for production to the agency.

**Federal Solid and Hazardous Waste Management Regulations (1999)**

- i. Section 1 makes it an obligation for industries to identify solid hazardous wastes which are dangerous to public health and the environment and to research into the possibility of their recycling.
- ii. Section 20 makes notification of any discharge to the agency mandatory.
- iii. Section 108 stipulates penalties for contravening any regulation.

**Other regulatory bodies include:**

- Federal Ministry of Environment
- Federal Ministry of Health
- National Agency for Food and Drug Administration and Control (NAFDAC)
- Niger-Delta Development Commission (NDDC)
- Environmental Health Officers Registration Council of Nigeria
- National Oil Spill Detection Response Agency (NOSDRA)
- Department of Petroleum Resources (DPR)

**Self-Assessment Exercise 2**

- 1. Each first aid box must be prominently marked .....
- 2. Enforcement of regulation is carried out by the .....
- 3. The Factories Act promotes the safety of workers and professionals exposed .....

**1.4 CONCLUSION**

You have learnt about occupational health policies, regulations as well as regulatory agencies. In the next unit, you should learn evaluation and measurement of exposure levels.

**1.5 SUMMARY**

In this unit, you have learnt about occupational health policies. You have learnt also occupational health regulations as well as the occupational health regulatory agencies.

**1.6 TUTOR-MARKED ASSIGNMENT**

- 1. Enumerate five occupational health regulations.
- 2. State three occupational health regulatory agencies.

3. Comment briefly on power and duties of inspectors

## 1.7 REFERENCES / FURTHER READING

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## 1.8 POSSIBLE ANSWERS TO SAEs

### Self-Assessment Exercise 1

1. capable of causing or likely to cause death or serious physical harm
2. healthy living

### Self-Assessment Exercise

1. "FIRST AID"
2. Factory Inspectorate of the Ministry of Labour
3. to occupational hazards

## **UNIT 2 EVALUATION AND MEASUREMENT OF EXPOSURE LEVELS**

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- 2.1 Introduction
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  - 2.3.2 Measurement of Exposure Levels in Occupational Health Working Environment
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  - 2.3.5 Measurement of Physical Agents
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  - 2.3.7 Measurement of Biological Agents
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### **2.1 INTRODUCTION**

You learnt occupational health policies, regulations as well as regulatory agencies in the previous unit. In this unit, you will learn evaluation of occupational health practices as well as measurement of exposure levels in the workplace in order to identify areas of deficiency or neglect or areas that have implications on the health of the workers and /or people and proffer solution.

### **2.2 OBJECTIVES**

At the end of this unit, you should be able to:

- explain evaluation in occupational health
- analyse measurement of exposure levels in occupational health working environment.

### **2.3 MAIN CONTENT**

#### **2.3.1 Meaning of Evaluation in Occupational Health**

Evaluation means the process by which we can assess the extent to which set objectives have been achieved. For evaluation to be achieved, the general and specific objectives of the programme to be monitored must have been clearly stated right from the planning stage. Evaluation entails assessing the extent to which these objectives have been achieved.

Evaluation also involves the examinations or assessment of the workplace to be able to ascertain what changes have taken place in respect of occupational hazards or injuries in the industry.

In evaluation of occupational health workplaces efforts should be made to measure the intensity or concentration of hazard levels in order to avoid recording injuries so as to ensure greater productivity.

### **2.3.2 Measurement of Exposure Levels in Occupational Health Working Environment**

Certain physical conditions permit measurement and evaluation, which will in turn help to know when they become hazardous to workers exposed to them. In doing this, appropriate instruments or equipment are used. This equipment often comes in the form of metres, detectors, samplers etc. For this to be practicable, units of measurement and acceptable levels or limits are fixed. Also thresholds are determined.

### **2.3.3 Threshold Limit Values (TLV) of Selected Physical and Chemical Substances**

The threshold limit values indicate the point at which the body feels the sensations of pain (the level of consciousness). Any person exposed to hazards of any sort would feel the sensations to a certain degree before the situation is worsened. For example, shaking of hands comes before hand cramps, unfriendly environment and overload of duties at work need better addressed before degenerating to psychological disorders. All sharp objects and heat need to be avoided as well as falling objects before it causes a greater damage. Heat for example must have been inflicting some pains on the body before it finally causes much havoc. Inhalation of pesticides particles need to be avoided before causing respiratory blockages, lead poisoning and carbon monoxide must be avoided with the use of protective devices.

### **2.3.4 Maximum Allowable Concentration (MAC)**

This is the maximum allowable concentrations of harmful substances in the environment (air) of the working area which if workers are exposed to daily for eight hours throughout their entire working life will not cause any disease or deviations from a normal state of health, detestable by various methods of investigation, either during working hours or over a long period.

## 2.3.5 Measurement of Physical Agents

### (i) Heat

Body temperature stays within the range of 36-39°C as a balance struck between metabolic heat, evaporation, convection, conduction, radiation and storage. The severity of health effects from heat increases with temperature, humidity and duration of exposure. This will lead to lassitude, irritability, discomfort, reduced work performances and lack of concentration. Heat rashes, heat cramps, heat exhaustion and heat stroke may occur. Measurement of the thermal environment is expressed in four parameters when the rate of heat flow is being assessed namely:

- the dry bulb temperature of the air
- the moisture content or water vapour pressure of the air
- the air velocity or speed
- the radiant heat exchange between the skin and surrounding surfaces.

Instruments commonly needed are:

- a psychometric chart
- a dry bulb thermometer
- a kata thermometer and chart
- a wet bulb cloaks thermometer

It is important that the scale on the temperature measuring devices can be read under poor lighting and in difficult position.

### (ii) Noise

Noise can be described as unwanted sound. Sound is the pressure changes in the air which is conducted through the ear-drum and carried to the brain. Exposure to noisy process and environment can lead to noise induced hearing loss (deafness).

Noise-induced-hearing loss is different from hearing loss due to advancing age (presbycusis). Measurement of sound intensity in working environments is carried out by using the following instruments:

- personal noise dosi meter
- impulse noise meter
- precision integrating sound level meter
- noise average meter

The measurement is expressed in decibels and the acceptable standard is 85-90DB over an eight-hour period. It must be remembered that hearing

conservation programmes must be carried out for all workers employed in noisy operations.

**(iii) Lighting or illumination**

Adequate lighting is very essential in assisting workers to perform their work satisfactorily except in dark rooms. Poor lighting may lead to eye strain, mental strain, headache, declining productivity and accidents. Measurement of illumination is carried out by using an instrument called a light meter or a photometer which contains photoelectric cells. Shadowing during measurement should be avoided. The measurement is expressed in lumens per food candle.

**(iv) Radiation**

This is energy which is transmitted, or emitted or absorbed in the form of particles or waves. The health effects are acute radiation syndrome which affects the intestine, blood, and central nervous system. Chronic exposure gives rise to cancer and genetic damage. Occupational exposure is said to be not a major factor in the United Kingdom, but poses a potential danger to a large number of workers (above seven million in the United States of America).

Measurement is carried out by using the following gadgets:

- ionization chambers
- Geiger –Muller tube
- scintillation counters
- proportional counters
- film badges
- thermoluminescent dosimeters.

### **2.3.6 Measurement of Chemical Agents**

These agents are classified into the following categories: inorganic and organic chemicals, toxic gases and particles. The basic instruments used are similar with variation depending on the kind of agent.

**(i) Particles**

Coal dust: There are no acute effects, but chronic effect causes pulmonary fibroses ranging from single pneumoconiosis to massuli fibrosis, then death.

Measurement is carried out as for the sampling of airborne respirable fraction by drawing a known volume of air through a pre-weighted filter for re-weighing and analysis.

Various filters are required for:

- gravimetric analysis alone
- x-ray defraction analysis for silica (silver membrane)
- Infra-red analysis for silica (PVC)

**(ii) Asbestos**

The chronic effect on health is asbestosis which is a chronic fibrotic lung disease and carcinoma of the lung. It is necessary to determine the number of airborne respirable fibres by sampling on to a cellulose acetate filter for subsequent microscopic analysis and counting. Instruments used for measuring asbestos dust are:

- a personal dust sampler or
- a Hexhlet dust sampler

**(iii) Toxic gases**

Toxic gases are measured by direct reading instruments using a variety of principles and are sampled over a period of time. Some of these gases are: carbon dioxide which is used in industries as an industrial gas, for example, in carbonisation of drinks, brewing and refrigeration.

**(iv) Inorganic chemicals**

Inorganic chemicals are sampled on cellulose acetate filter. Instruments for measuring toxic chemicals are carried out with a very wide range of chemical indicator tubes and precision hand pump, direct reading by ultra violet mercury vapour meter for mercury; chemical direct reading for vapour analysis. Gas and vapour sampling kits are also used.

### **2.3.7 Measurement of Biological Agents**

This is usually carried out by the occupational health physicians or occupational health nurses through blood sampling, urine analysis, tissue biopsy, x-rays etc. When the hazards are identified, measures will be taken to prevent or control them. The determination of gases or vapours absorbed in the body can also be measured through the breath (for example, carbon monoxide).

### **2.3.8 Biological Monitoring**

- i. Pre-employment medical examination and laboratory tests
- ii. Periodic medical examination and laboratory tests to detect any diseases e.g. urine sampling, respiratory function tests, blood sampling, etc.



These help to detect disease and their causative agents or hazards; help also to plan appropriate preventive/curative measures.

### 2.3.9 Epidemiological Method

This is done by trying to find the association between work condition and certain diseases. Epidemiological method is used to determine if there is a significant difference in the rate of diseases among exposed workers or the general public. It helps in detecting both occupational and non-occupational diseases among workers.

#### Self-Assessment Exercise 1

1. The threshold limit values indicate the point at which .....
2. Chronic exposure to radiation gives rise to .....
3. .... find the association between work condition and certain diseases.

### 2.4 Personal Protective Equipment (PPE)

Personal Protective Equipment (PPE): is equipment that will protect the user against health and safety risks at work. It protects its user against any physical harm or hazards that the workplace environment may present. It is important because it exists as a preventive measure for industries that are known to be more hazardous. PPE typically provides a level of protection from a number of hazards like physical, radiological, chemical, electrical, biological and mechanical hazards. The Environmental Health Officers (EHOs) and other members of the health team should ensure that employers provide personal protective equipment and workers make use of personal protective equipment provided for them in the workplace. Protective devices include:

- eye protectors such as spectacles, goggles or face shields.
- skin protection devices such as gloves, apron, barrier creams, and clothing suited for the purpose, and shoes (rubber shoes)
- respiratory protectors such as simple mask
- hearing protectors such as ear-muffs, ear-plugs

#### 2.4.1 Types and Uses of Personal Protective Equipment (PPE)

##### S/No Types of PPEs Use

- i. Hand gloves Used in all work places to hold firmly and prevent hand or skin contamination (Rubber and penetration cotton)
- ii. Goggles to protect the eye from excessive heat and ultra violet radiations.
- iii. Helmet to protect the head from injury or unexpected accidents.

- iv. Respirators to help in supplying unpolluted oxygen in an environment where there is shortage or nonavailability of oxygen.
- v. Ear to prevent damage to the ear drums and protector/mumps prevent impairment of the ear.
- vi. Rubber boots to prevent against wounds and injuries to the legs, tetanus and skin penetrable infections.
- vii. Face masks to protect the eyes, nostrils and the mouth from inhaling of dangerous dust or fume particles

**Self-Assessment Exercise 2**

- 1. .... protects its user against any physical harm or hazards that the workplace environment may present
- 2. The head can be protected from injury or unexpected accidents by using .....

**2.5 CONCLUSION**

In this unit, you have learnt about evaluation and measurement of exposure levels in occupational health practice as well as how appropriate instruments and equipment can be used to monitor the hazards in the workplace so as to protect the health and safety of workers. In the next unit, you will learn worksite wellness promotion programmes.

**2.6 SUMMARY**

In this unit, you have learnt about evaluation and measurement of exposure levels in the work environment. You have learnt also the extent to which the general and specific objectives were used to monitor the working environment. The assessment of the working environment, the health of the workers should be done before, during, and after work.

**2.7 TUTOR-MARKED ASSIGNMENT**

- 1. What do you understand by the term evaluation in occupational health?
- 2. State one instrument each used in measuring these agents: physical, chemical and biological agents in the work place.
- 3. List four protective devices used in the workplace.

**2.8 REFERENCES / FURTHER READING**

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## **2.9 POSSIBLE ANSWERS TO SAEs**

### **Self-Assessment Exercise 1**

1. the body feels the sensations of pain
2. cancer and genetic damage.
3. Epidemiological surveys

### **Self-Assessment Exercise 2**

1. Personal Protective Equipment (PPE)
2. Helmet

## **UNIT 3 WORKSITE WELLNESS PROMOTION PROGRAMMES**

### **CONTENTS**

- 3.1 Introduction
- 3.2 Objectives
- 3.3 Main Content
  - 3.3.1 Meaning of Workplace Wellness Promotion Programmes
  - 3.3.2 Rationale for Workplace Wellness Programme
  - 3.3.3 Employee Health Programme
  - 3.3.4 Workplace Safety Programme
  - 3.3.5 Corporate Wellness Programmes
- 3.4 Conclusion
- 3.5 Summary
- 3.6 Tutor-Marked Assignment
- 3.7 References/Further Reading

### **3.1 INTRODUCTION**

In the previous unit, you learnt about evaluation and measurement of exposure levels. In this unit, worksite wellness promotion programmes will be discussed.

## **3.2 OBJECTIVES**

At the end of the unit, you should be able to:

- describe the meaning of worksite wellness promotion programmes
- identify the rationale for worksite wellness programmes
- explain the meaning of employee health programmes
- identify workplace safety programmes
- highlight corporate wellness programmes.

## **3.3 MAIN CONTENT**

### **3.3.1 Meaning of Workplace Wellness Promotion Programme**

Workplace wellness is a term used to describe workplace health promotion activities and organisational policies designed to support healthy behaviour in the workplace and to improve health outcomes. Wellness is more than physical fitness. In addition to physical fitness, the dimension of optimal health include: Spiritual Wellness, Emotional Wellness, Social Wellness and Intellectual Wellness. It encompasses all aspects of working life, from the quality and safety of the physical environment, to how workers feel about their work, their working environment, the climate at work and work organization.

Generally speaking, health promotion is defined as “the process of enabling people to increase control over and to improve their health.”

Health promotion can be carried out in the workplace as well as many other settings. It consists of a variety of activities such as health fairs, health education, medical screenings, health coaching, weight management programmes, wellness newsletters, on-site fitness programmes and /or facilities and educational programmes.

Workplace wellness also known as “corporate well-being” includes organizational policies designed to facilitate employee health including allowing flex time for exercise, providing on-site kitchen and eating areas, offering healthy food options in vending machines, holding “walk and talk” meetings, and offering financial and other incentives for participation, among many other option. Workplace wellness has been extended over the past decade to encompass the overall creation of a “Culture of health” within the worksite.

### **3.3.2 Rationale for Workplace Wellness Programme**

A healthier workforce is more engaged, more focused, and more productive. Being healthy improves the overall quality of life, reducing risk factors for diseases. A healthy workforce and a healthy workplace will reduce absenteeism and improve employee turnover. Thus, employers can reap many benefits by promoting employee health in their workplaces, because they appreciate that their most important resources are their human resources – their people. A lack of

recognition on the need to promote workers well-being may give rise to workplace problems, such as stress, bullying, conflict and mental disorders.

### **3.3.3 Employee Health Programmes**

Workplace health programmes are a coordinated and comprehensive set of health promotion and protection strategies implemented at the worksite, designed to encourage the health and safety of all employees. Employee health programmes aim to help employees take an active role in being responsible for their own health and well-being. Employee health programmes provide education and counseling on a wide range of issues, from cancer prevention, to depression and anxiety, to eating smart, to managing everyday stress. Employee health programmes include a wide range of topics from smoking cessation, to weight management, to exercise and active lifestyle.

### **3.3.4 Workplace Safety Programmes**

Workplace safety refers to the provision of a safe environment, safe equipment, and safe procedures in the workplace in order to ensure workers health and safety. Workplace safety programmes can help reduce work-related illnesses and injuries, keeping workers safe will improve employee morale and their productivity. Workplace safety programmes help develop conscientious employees who look out for their own safety and for the safety of their fellow workers, because an effective safety also works to reduce risk.

The topics of enlightened workplace safety programmes range from:

- elimination: physically removing hazards,
- engineering control: complying with regulatory requirements and isolate people from the hazard
- administrative control: change the way people work
- substitution: replace the hazard
- personal protective equipment(PPE): protect the worker

### **3.3.5 Workplace Productivity Programmes**

Employee productivity is an assessment of the efficiency of a worker or group of workers, usually evaluated in terms of the output of an employee in a specific period of time. A healthy, productive workforce is essential to a competitive, profitable business enterprise. Workplace productivity programmes help employees strike a good balance between work and personal life, while still doing a great job. Major factors that are important in enhancing productivity are:

- Positive attitude and involvement of management
- Good working conditions/healthy workplace environment
- Proactive employees
- Training and a good onboarding process.
- Employee motivation and involvement in decision making

- Proper tools and technology.

The topics of modern workplace productivity programmes range from getting organised, to dealing with stress, to promoting team work, to coping with change.

### 3.3.6 Corporate Wellness Programmes

Corporate wellness programmes are programmes that employers provide, in one form or another to help employees stay healthy or to improve their health. It is an employers’ approach towards achieving a healthy workplace by incorporating various health activities within the daily work schedule to promote employees’ wellbeing. Corporate wellness programmes boost productivity, increase employee health and wellness, reduce on-the-job stress, and cut healthcare costs. Wellness programmes typically include activities such as weight loss competitions, exercises, stress management or resiliency education, smoking cessation programmes and wellness assessments that are designed to help individuals or employees eat better, lose weight and improve their physical health. Corporate wellness programmes are a good investment, with a proven, strong return on investment. Additionally, corporate wellness programmes improve morale, increase job satisfaction, and lower employee turnover, while reducing disability and absenteeism.

#### Self-Assessment Exercise 1

1. Wellness is more than physical fitness, it also includes....., ..... and.....
2. Workplace safety refers to the provision of a ..... and .....in the workplace in order to ensure workers health and safety
3. “Corporate well-being” is also known as .....

## 2.4 CONCLUSION

You have learnt in this unit the worksite wellness promotion programmes as well as the rationale for employees and corporate wellness programmes. In the next unit, you will learn about occupational stress.

## 2.5 SUMMARY

You have learnt about worksite wellness promotion programmes. You have learnt also the rationale, the employees, work place safety and the corporate wellness programmes. You have learnt how diet in the workplace contributes to obesity epidemics.

## 2.6 TUTOR-MARKED ASSIGNMENT

1. Write notes on the following worksite wellness promotion programmes:
  - (i) Employee wellness programme
  - (ii) Corporate wellness programme
2. What are the major factors that are important in enhancing workplace productivity?
3. What is the essence of Workplace Wellness Programmes?

## 2.7 REFERENCES / FURTHER READING

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## 2.8 POSSIBLE ANSWERS TO SAEs

### Self-Assessment Exercise 1

1. 

i. Spiritual Wellness	ii. Emotional Wellness
iii. Social Wellness	iv. Intellectual Wellness

  2. 

i. safe environment	ii. safe equipment,	iii. safe
---------------------	---------------------	-----------

procedures
  3. Workplace wellness

## 2.9 END OF MODULE QUESTIONS

1. Occupational health policies are aimed at
  - a. ensuring emission of noxious or offensive substances
  - b. securing the health, safety and welfare of persons at work
  - c. reviewing the constitution
  - d. linking work and workplace.
2. Avoiding dirt and contaminants to oneself and to others appropriately defines
  - a. selflessness
  - b. peacefulness
  - c. cleanliness
  - d. orderliness
3. An overcrowded workplace can create all the following except
  - a. decreased efficiency
  - b. improved efficiency
  - c. decreased productivity
  - d. decreased privacy

4. Replacing stale air with fresh air is known as
  - a. pollution
  - b. substitution
  - c. ventilation
  - d. combination
5. People receive about 85% of their information through
  - a. sense of sight
  - b. sense of direction
  - c. irritation
  - d. avoiding shadows
6. The following are sanitary conveniences except
  - a. drainage
  - b. urinals
  - c. toilets
  - d. bathtubs
7. The primary goal of first aid is to
  - a. preserve life
  - b. provide medical treatment
  - c. provide medical attention
  - d. get attention from a nurse
8. The full meaning of PPE is
  - a. productivity programmes evaluation
  - b. personal protective equipment
  - c. proactive and productive employees
  - d. personal protection of employees
9. Elimination in terms of workplace safety programmes means
  - a. physically removing hazard
  - b. physically isolating people
  - c. physically replacing hazard
  - d. physically using PPE
10. Thresh hold limit values for chemical substances indicate
  - a. point at which great damage is caused
  - b. point at which the body feels the sensation of pain
  - c. point at which the body becomes paralyzed
  - d. point at which the does not feel any pain.



## **MODULE 4      OCCUPATIONAL STRESS**

Unit 1	Occupational Stress
Unit 2	Occupational Diseases
Unit 3	Environmental and Occupational Hazards
Unit 4	Identification of the Roles of Human and Environmental Factors in Occupational Hazards

### **UNIT      OCCUPATIONAL STRESS**

#### **1**

#### **CONTENTS**

1.1	Introduction
1.2	Objectives
1.3	Main Content
1.3.1	Definition and Meaning of Occupational Stress
1.3.2	Signs of Occupational Stress
1.3.3	Prevalence of occupational stress
1.3.4	Economic Factors
1.3.5	Preventive Measures
1.4	Conclusion
1.5	Summary
1.6	Tutor-Marked Assignment
1.7	References/Further Reading

#### **1.1      INTRODUCTION**

In the previous unit, you learnt about worksite wellness promotion programmes. In this unit, occupational stress will be discussed.

#### **1.2      OBJECTIVES**

At the end of this unit, you should be able to:

- define occupational stress
- highlight the signs and prevalence of workplace stress
- enumerate the economic factors that lead to workplace stress as well as its preventive measures.

## **1.3 MAIN CONTENT**

### **1.3.1 Definition and Meaning of Occupational Stress**

Occupational stress, by definition, is a condition arising from the interaction of people and their jobs and characterized by changes within people that force them to deviate from their normal functioning. Occupational stress is an ongoing or progressing stress an employee experience due to the responsibilities, conditions, environment or other pressures of the workplace. Stress occurs due to a demand that exceeds the individuals coping ability, disrupting their psychological equilibrium. Hence, in the workplace environment stress arises when the employee perceives a situation to be too strenuous to handle, and is threatening to their well-being. There are many external stressors that contribute to an employee's ability to adapt to the demands of the environment. For instance, our technologically inclined society can provide a source of workplace stress seeing that some individuals may not have the capacity and the resources to advance their skills.

A person's status in the workplace can also affect levels of stress. While occupational stress has the potential to affect employees of all categories; those who have very little influence to those who make major decisions for the company. However, less powerful employee (that is, those who have less control over their jobs) are more likely to suffer stress than powerful workers.

Occupational stress is the harmful physical and emotional response that occurs where there is a poor match between job demands and the capabilities, resources, or needs of the worker. A variety of factors contribute to workplace stress such as negative workload, isolation, extensive hours worked, toxic work environments, lack of autonomy, difficult relationships among co-workers and management, management bullying, harassment and lack of opportunities or motivation to advancement in one's skill level. The concept of job stress is often confused with challenge, but the two concepts are not the same. Challenge energizes psychologically and physically, then motivates the learning of new skills and mastering jobs.

Stress sets off an alarm in the brain, which responds by preparing the body for defensive action. The nervous system is aroused and hormones are released to sharpen the senses, quicken the pulse, deepen respiration and tense the muscles. The response is programmed biologically. Everyone responds in much the same way, regardless of whether the stressful situation is at work or home. Short-lived or infrequent episodes of stress pose little risk. But when stressful situations go unresolved, the body is kept in a constant state of activation, which increases the rate of wear and tear to biological systems. Ultimately, fatigue or damage results, and the ability of the body to repair and defend itself can become seriously compromised. As a result, the risk of injury or disease escalates.

Stress-related disorders encompass a broad array of conditions, including psychological disorders, (for example, depression, anxiety, post-traumatic stress

disorder), and other types of emotional strain (for example, dissatisfaction, fatigue, tension etc), maladaptive behaviours (for example, aggression, substance abuse), and cognitive impairment (for example, concentration and memory problems). In turn, these conditions may lead to poor work performance, higher absenteeism, less work productivity or even injury increased rates of accidents on and off the job. Job stress is also associated with various biological reactions that may lead ultimately to compromised health, such as cardiovascular disease or in extreme cases death.

### **1.3.2 Signs of Occupational Stress**

Stress related problems include mood disturbance, psychological distress, sleep disturbance, upset stomach, headache, and problems in relationships with family and friends. The effects of job stress on chronic diseases are more difficult to ascertain because chronic diseases develop over relatively long periods of time and are influenced by many factors other than stress. Nonetheless, there is some evidence that stress plays a role in the development of several types of chronic health problems – including cardiovascular disease, musculoskeletal disorders, and psychological disorders.

### **1.3.3 Prevalence of occupational stress**

Some of the causes of work-related stress include long hours, heavy workload, job insecurity and conflicts with co-workers. Stress is a prevalent and costly problem in today's workplace. About one-third of workers report high levels of stress. One quarter of employees view their jobs as the number one stressor in their lives. Three-quarters of employees believe the worker has more on-the-job stress than a generation ago. Evidence also suggests that stress is the major cause of turnover in organisations. With continued stress of the workplace, workers will develop psychological dysfunctions and decreased motivation in excelling in their position.

#### **Self-Assessment Exercise 1**

- |   |
|---|
| <ol style="list-style-type: none"><li>1. Challenge is different from stress in that it .....</li><li>2. Occupational stress plays a role in the development of several types of chronic health problems – including....., ..... and .....</li></ol> |
|---|

### **1.3.4 Economic Factors**

Economic factors that employees are facing in the 21<sup>st</sup> century have been linked to increased stress levels. Researchers and social commentators have pointed out that the computer and communications revolutions have made companies more efficient and productive than ever before. This boom in productivity however,

has caused higher expectations and greater competition, putting more stress on the employee (Primm, 2005).

The following economic factors may lead to workplace stress:

- pressure from investors, who can quickly withdraw their money from company stocks
- the lack of trade and professional unions in the workplace
  - Inter-company rivalries caused by the efforts of companies to compete globally
- the willingness of companies to swiftly lay off workers to cope with changing business environments.

Bullying in the workplace can also contribute to stress. It can create a hostile work environment for the employees that, in turn, can affect their work ethic and contribution to the organisation.

### **1.3.5 Preventive Measures**

The control of occupational hazards decreases the incidence of work-related diseases and accidents and improves the health and morale of the work force, leading to decreased absenteeism and increased worker efficiency. A combination of organisational change and stress management is often the most useful approach for preventing stress at work. The preventive measures include:

- ensure that the workload is in line with worker's capabilities and resources
- design jobs to provide meaning, stimulation, and opportunities for workers to use their skills
- clearly define workers' roles and responsibilities
- to reduce workplace stress, managers may monitor the workload given out to the employees also while they are being trained they should let employees understand and be notified of stress awareness
- give workers opportunities to participate in decisions and actions affecting their jobs
- improve communications - reduce uncertainty about career development and future employment prospects
- provide opportunities for social interaction among workers
- establish work schedules that are compatible with demands and responsibilities outside the job
- combat workplace discrimination (based on race, gender, national origin, religion or language)
- bringing in an objective outsider such as a consultant to suggest a fresh approach to persistent problems
- introducing a participative leadership style to involve as many subordinates as possible to resolve stress-producing problems.

### **Self-Assessment Exercise 2**

1. Bullying in the workplace contribute to occupational stress. **(true/false)**
2. Control of occupational hazards leads to decreased absenteeism **(true/false)**
3. A participative leadership style can resolve stress producing problems. **(true/false)**

## 1.4 CONCLUSION

In this unit, you have learnt the definition and meaning of occupational stress as well as the signs, prevalence, and economic factors that lead to workplace stress and its preventive measures. In the next unit, you will learn about occupational diseases.

## 1.5 SUMMARY

You have learnt the definition and meaning of occupational stress. You have learnt also the signs, prevalence and economic factors that lead to workplace stress. You have learnt preventive measures of stress.

## 1.6 TUTOR-MARKED ASSIGNMENT

1. State the signs of occupational stress.
2. Enumerate the preventive measures of workplace stress.
3. Distinguish between occupational stress and challenge.

## 1.7 REFERENCES / FURTHER READING

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## 1.8 POSSIBLE ANSWERS TO SAEs

### Self-Assessment Exercise 1

1. Challenge energizes psychologically and physically, then motivates the learning of new skills and mastering jobs
2.
  - i. cardiovascular disease
  - ii. musculoskeletal disorders
  - iii. psychological disorders

## **Self-Assessment Exercise 2**

1. TRUE
2. TRUE
3. TRUE

## **UNIT 2 OCCUPATIONAL DISEASES**

### **CONTENTS**

- 2.1 Introduction
- 2.2 Objectives
- 2.3 Main Content
  - 2.3.1 Occupational Diseases in Industrial Establishments
  - 2.3.2 Silicosis
  - 2.3.3 Asbestosis
  - 2.3.4 General Preventive Measures
- 2.4 Occupational Diseases in Agricultural Establishments
  - 2.4.1 Anthrax
  - 2.4.2 Brucellosis
  - 2.4.3 Byssinosis
  - 2.4.4 Bagassosis
- 2.5 Occupational Diseases in Healthcare Establishments
  - 2.5.1 Tuberculosis
  - 2.5.2 Serum Hepatitis B
- 2.6 Conclusion
- 2.7 Summary
- 2.8 Tutor–Marked Assignment
- 2.9 References/Further Reading

### **2.1 INTRODUCTION**

In the previous unit, you learnt about occupational stress. In this unit, occupational diseases are the focus.

### **2.2 OBJECTIVES**

At the end of the unit, you should be able to:

- identify diseases in industrial establishments
- highlight diseases in agricultural establishments
- mention diseases in healthcare establishments.

### **2.3 MAIN CONTENT**

#### **2.3.1 Occupational Diseases in Industrial Establishments**

Industrial disease is a sickness or injury which workers in a particular industry are prone to as result of repeated exposure to hazard in the workplace. The pollutants emitted from industrial complexes enter human body through the respiratory system or skin and cause chronic diseases. Most of the lung/respiratory diseases that afflict workers are known to be occupationally related. The most serious health problems from many industries are

the inhalation of dust by workers. The various kinds of dust include coal dust, metallic dust to which miners, grinders, polishers and painters are exposed; the mineral dust to which stone workers, asbestos workers and cement worker are exposed; animal dusts to which leathers, woolen makers and carpet makers are exposed. Dust do not only block the tissues of the respiratory tract, but also causes some irritation. The dust may also carry germs with it, inhalation of dust can lead to serious pneumoconiosis such as silicosis and asbestosis.

### **2.3.2 Silicosis**

Silicosis is an incurable lung disease (pneumoconiosis) caused by the inhalation of dust that contain fine free crystalline silicon dioxide or quartz. Silicosis is a disease common amongst workers in quarrying, hard rock mining and extraction, stone dressing and polishing, casting, foundry work, ceramic manufacture, porcelain and enamel manufacture, and occupations in which sand is used as an abrasive. Despite all efforts to prevent it silicosis still afflicts lots of workers in hazardous occupations and kills many every year, everywhere in the world. With its potential to cause progressive and permanent physical disability, silicosis continues to be one of the most important occupational health illness in the world.

### **2.3.3 Asbestosis**

Asbestosis is a progressive, irreversible, chronic lung disorder arising from the inhalation of silicates with no free silica content which is caused by the inhalation of asbestos fibers. Prolonged exposure to these fibers can cause lung tissue scarring and shortness of breath.

Workers in the following occupations are at great risk of developing asbestosis: mining, milling, and processing of asbestos; transportation of mined or milled asbestos, manufacture of asbestos products etc.

### **2.3.4 General Preventive Measures**

General preventive measures for dust diseases include:

- (i) Pre-wetting or wet-drilling: Dust can be prevented from getting air borne through suppression of dust by water.
- (ii) Ventilation: Dusty work rooms should be adequately ventilated. Residual dust should be properly removed and source of emission of dust should be fitted with exhaust ventilative system so that dust cannot be airborne.
- (iii) Monitoring: Regular monitoring of the repairable dust levels and free silica content of dust in work environment.
- (iv) Personal Protection: Every worker should be provided with protective equipment for protection, for example, mask and pressure hoods.
- (v) Medical Supervision: Periodic medical examinations for every occupational group exposed to a duty work environment.



### Self-Assessment Exercise 1

1. Most of the lung/respiratory diseases that afflict workers are known to be occupationally related. **(true/false)**
2. Silicosis is a disease common amongst workers in ceramic industries. **(true/false)**
3. Silicosis is characterized by lung tissue scarring and shortness of breath. **(true/false)**

## 2.4 Occupational Diseases in Agricultural Establishment

Agricultural workers are exposed to a variety of environmental hazards that are potentially harmful to their health and wellbeing. Farmers and farm workers suffer from increasing rate of Anthrax, Brucellosis, Byssinosis, and Bagassosis.

### 2.4.1 Anthrax

- (i) **Occurrence:** Anthrax is an infectious disease that occur naturally in soil and commonly affects domestic and wild animals around the world. People especially agricultural workers can get infected when spores of the infectious agent gets into the body. The occurrence is world-wide. The main sources of reservoir of infection are cattle. Handlers of infested meat, hides and skins, wool or other animal products are at risk, including veterinary practitioners, and employees handling unsterilised hair, bone, hide and wool.
- (ii) **Infectious agent:** The infectious agent is gram-positive spore forming *Bacillus anthracis*. The spore is highly resistant to disinfecting process and can survive for long periods in the soil and in animals.
- (iii) **Incubation Period:** When anthrax spores get inside the body, within seven days, usually two to five days they become activated. The bacteria can then multiply, spread out in the body, produce toxins, and cause severe illness.
- (iv) **Mode of transmission:** The infectious agent enters the body through abrasion which is in direct contact with infected animal. Ingestion of contaminated meat may result in gastro-intestinal anthrax which is very rare. Inhalation of spore may result into pulmonary infections.
- (v) **Signs and symptoms:** The symptoms of anthrax depend on the type of infection, but all types of anthrax have the potential to spread throughout the body if untreated. Cutaneous anthrax is very common. It occurs on an exposed part of the body. It is caused by spores from an infected material gaining entry through cuts or abrasions on the skin. This condition is characterized by a group of small blisters or bumps that may itch and swelling may occur around the sore. Most often sore will be on the face, neck, arms or hand.

Pulmonary anthrax is not very common. It is symptomless for a few days, followed by fever; wide spread pulmonary congestion and oedema with blood stained sputum.

#### Preventive measures:

- isolation of infected animal until cured, cremate and bury infected animal in a deep lime-pit when dead
- by educating occupationally exposed workers on how to recognise the lesion of the diseases in order to facilitate early treatment
- by controlling and restricting the importation of hide, wool and products made from animal bone
- airborne anthrax may be prevented in certain work place through dust suppression by exhaust ventilation
- protective clothing must be provided to workers and high personal hygiene maintained
- immunising occupationally exposed workers with anthrax antigen
- isolation of infected persons until cured; all contaminated materials should be disinfected.

### 2.4.2 Brucellosis

- (i) **Occurrence:** Brucellosis is a bacterial disease caused by *Brucella* species, which mainly infect cattle, swine, goats and sheep. Humans generally acquire the disease through direct contact with infected animals, by eating or drinking contaminated animal products or by inhaling airborne agents. The disease usually occurs in men handling meat or those working in slaughter houses. Veterinary surgeons and farm-workers are an outstanding high risk group. Members of the public especially young adults and children are infected by drinking raw milk from infected animal.
- (ii) **Infectious agent:** The infectious agent is *Brucella abortus*. This infects cattle and is also found in cow milk. *Brucella meliteusis* infect sheep and goats while *Brucella suis* infects pigs.
- (iii) **Incubation period:** This ranges from five to 21 days or a few days to a few weeks.
- (iv) **Mode of transmission:** Mode of transmission is through ingestion, inhalation and direct contact with infected materials. The organism may gain entry to the body through abraded or broken skin or through mucous membranes including conjunctiva.
- (v) **Signs and symptoms:** The onset of the disease is gradual with non-specific sign and symptoms such as fever, headache, joint pains, insomnia and low back pain. There is abdominal pain and generalised lymph-adenopathy and a palpable spleen.
- (vi) **Preventive measures:**
  - (a) Vaccination of cattle, goats and sheep in enzootic areas with high prevalence rate is recommended.
  - (b) Elimination of infection in animals, all infected animals must be destroyed and buried in a deep pit.
  - (c) Pasteurise all milk products before consumption.
  - (d) Occasionally, exposed workers should be educated about avoiding unpasteurized milk products and that great care must be taken when handling meat or specimen from infected animals as well as policies on the sale of such products.

### 2.4.3 Byssinosis

- (i) **Occurrence:** Byssinosis is an occupational lung disease caused by inhalation of cotton or jute dust in inadequately ventilated working environments and can develop over time with repeated exposure. It is rampant among textile workers carrying out dusty operations due to inhalation of cotton, flax, soft hemp or sisal dusts.
- (ii) **Signs and symptoms:** The symptoms of the disease always appear on the first day of the working week when workers return from weekend away from duty. It includes tightness in the chest, wheezing and coughing, with or without sputum.

#### 2.4.4 Bagassosis

- (i) **Occurrence:** Bagassosis is an allergic pneumonitis condition among farmers that inhale fungal spores (*Thermoactinomyces vulgaris*) contained in sugar cane fibres after extraction of sugar water from the cane stalk. Fibres are called bagasse and used for making board.
- (ii) **Infectious agent:** Bagassosis is an airborne disease caused by inhalation of the bagasse dust contaminated by thermophilic actinomycetes, most notably *Thermoactinomyces vulgaris*.
- (iii) **Signs and symptoms:** The signs and symptoms are fever, breathlessness and severe cough.
- (iv) **Preventive measures for byssinosis and bagassosis**

The general preventive measures include:

- (i) Pre-wetting or Wet-drilling: Dust can be prevented from getting air borne through suppression of dust by water.
- (ii) Ventilation: Dusty work rooms should be adequately ventilated. Residual dust should be properly removed and source of emission of dust should be fitted with exhaust ventilative system so that dust cannot be airborne.
- (iii) Monitoring: Regular monitoring of the respirable dust levels and free silica content of dust in work environment.
- (iv) Personal Protection: Every worker should be provided with protective equipment for protection, for example, mask and pressure hoods.
- (v) Medical Supervision: Periodic medical examinations for every occupational group exposed to a dusty work environment.

#### Self-Assessment Exercise 2

1. fungal spores of *Thermoactinomyces vulgari* are responsible for Bagassosis (true/false)
2. Which occupational lung disease is associated with cotton dust?
3. The main sources of reservoir of infection for Anthrax are cattle. (true/false)

### 2.5 Occupational Diseases in Health Care Establishments

Occupational diseases in health care establishment are tuberculosis, serum hepatitis.

### 2.5.1 Tuberculosis

- (i) **Occurrence:** Tuberculosis (TB) is a potentially serious infectious bacterial disease that mainly affects the lungs. The disease is world-wide. It is an occupational risk of health workers in hospitals and sanatoria who care for patients with disease. It is also prevalent among occupations like mining, cattle rearing, agricultural workers and veterinarians.
- (ii) **Infectious agents:** There are two types of Tubercule bacilli that affect man and they include:
  - (a) *Mycobacterium tuberculosis* (Human type). Is a species of pathogenic bacteria in the family Mycobacteriaceae and the causative agent of tuberculosis. It is responsible for pulmonary tuberculosis, which is contagious disease and the bacteria are easily spread from an infected person to someone else.
  - (b) *Mycobacterium bovis* (Bovine type). Is a slow-growing aerobic bacteria and the causative agent of tuberculosis in cattle. It causes tuberculosis-like infection in humans and other mammals.
- (iii) **Incubation period:** From 2 to 10 weeks after the initial infection. The risk of the disease is highest in the first two years, but the bacteria can be carried in the body many years before active disease develops.
- (iv) **Mode of transmission:**
  - (a) **Human Type:** Its spread when a person with active TB disease in in the lungs coughs or sneezes and someone else inhales the expelled droplets, which contain TB bacteria. Doctors, nurses, and other paramedical in close contact with infected materials are at high risk of infection.
  - (b) **Bovine type:** Infection is due principally to ingestion of infected milk.
- (v) **Signs and symptoms:** Signs and symptoms are painful cough, weight-loss, chest pain, fever, anaemia, slight rise in normal body temperature in every evening. Hemoptysis (blood in sputum) occurs frequently.
- (vi) **Preventive measures:**
  - (a) A heaf test should be done as routine for the occupationally exposed persons, for example, nurse, miners, and pathologist. BCG vaccine offered to those found to be negative. Heaf test must be repeated every five years in order to identify those that have reverted to negative.
  - (b) Protective masks must be worn by pathologists, nurses and other paramedical when dealing with active case.
  - (c) Industrial survey must be carried out for early detection of those with the disease.
  - (d) Health educate workers on the ways and methods by which tuberculosis could be spread, for example, discourage indiscriminate spitting in work environment and public places.
  - (e) Provision of good and workers. Bad and unsuitable housing contributes to continuous existence of infection in a family.

## 2.5.2 Serum Hepatitis B

- (i) **Occurrence:** Serum hepatitis B (also called HBV) is a serious liver infection caused by the hepatitis B virus that is easily preventable by a vaccine. This disease is most commonly spread by exposure to infected bodily fluids. It occurs world-wide and its endemicity is seasonal and varies.
- (ii) **Infectious agent:** Probably a virus.
- (iii) **Incubation period:** The incubation period for acute hepatitis B ranges from 45 to 180 days (average 120 days). The clinical manifestation of acute HBV infection are age dependent. Infants, young children and immunosuppressed adults with newly acquired HBV are usually asymptomatic.
- (iv) **Mode of transmission:** The virus gets into the body by inoculation either orally or through venereal spread.
- (v) **Signs and symptoms:** The disease is manifested by acute fever, headache, yellowing of the eyes, abdominal pain, and dark urine. This can be fatal and is more severe than infective Hepatitis A.
- (vi) **Preventive measure:**
  - (a) All blood meant for transfusion should be screened medically.
  - (b) Occupationally exposed workers should be well protected.
  - (c) Health education is essential.

### Self-Assessment Exercise 3

1. Serum hepatitis B is a serious liver infection (**true/false**)
2. Human tuberculosis is caused by .....
3. Bovine tuberculosis is caused by.....

## 2.6 CONCLUSION

You have learnt occupational diseases in industrial establishment, agricultural establishment as well as health establishments. In the next unit, you should learn environmental and occupational hazards.

## 2.7 SUMMARY

You have learnt about occupational diseases in industrial establishment such as silicosis and asbestosis including its preventive measures. You have learnt also diseases in agricultural establishment such as anthrax, brucellosis, byssinosis and bagassosis including its preventive measures. You have learnt about diseases such as tuberculosis and serum hepatitis B in health care establishment.

## 2.8 TUTOR-MARKED ASSIGNMENT

1. State two diseases of industrial establishment.
2. Enumerate three diseases in agricultural establishment.
3. Write notes on the following:
  - (a) Tuberculosis

- (b) Serum hepatitis B
- (c) Anthrax

## 2.9 REFERENCES/FURTHER READING

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## 2.10 POSSIBLE ANSWERS TO SAEs

### Self-Assessment Exercise 1

1. TRUE
2. TRUE
3. FALSE

### Self-Assessment Exercise 2

1. TRUE
2. Byssinosis
3. TRUE

### Self-Assessment Exercise 3

1. TRUE
2. *Mycobacterium tuberculosis*
3. *Mycobacterium bovis*

## **UNIT 3 ENVIRONMENTAL AND OCCUPATIONAL HAZARDS**

### **CONTENTS**

- 3.1 Introduction
- 3.2 Objectives
- 3.3 Main Content
  - 3.3.1 Environmental Hazards
  - 3.3.2 Examples of Environmental Hazards
  - 3.3.3 Environmental Hazards Control Measures
- 3.4 Occupational Hazards
  - 3.4.1 Chemical Hazards
  - 3.4.2 Physical Hazards
  - 3.4.3 Biological Hazards
  - 3.4.4 Mechanical Hazards
  - 3.4.5 Social or Psychosocial Hazards
  - 3.4.6 Control Measures
- 3.5 Conclusion
- 3.6 Summary
- 3.7 Tutor-Marked Assignment
- 3.8 References / Further Reading

### **3.1 INTRODUCTION**

In this unit, you will learn about environmental and occupational hazards.

### **3.2 OBJECTIVES**

At the end of this unit, you should be able to:

- identify environmental hazards
- highlight occupational hazards
- explain control measures in both environmental and occupational hazards.

### **3.3 MAIN CONTENT**

#### **3.3.1 Environmental Hazards**

Any condition in a work place that has the potential to cause occupational injuries, diseases, disabilities or death through work to a worker is a hazard. Hazard can be classified into two: Occupational hazard, and environmental hazard.

Environmental hazard is a generic term for any situation or state of events which poses a threat to the surrounding natural environment and adversely affects people's health. This term incorporates topics like pollution and natural disasters such as storms and earthquakes. Hazards can be categorised in five types:

- chemical
- physical
- mechanical
- biological
- psychosocial

Environmental hazards can be found in the following ecosystems: Aquatic, atmospheric, soil and domestic. The environment is commonly polluted by the hazardous wastes. Pollution is the contamination of water, air, and soil by the discharge of waste or other offensive (hazardous) materials.

### **3.3.2 Examples of Environmental Hazards**

These include: Allergens, anthrax, antibiotic agents in animals destined for human consumption, arbovirus, arsenic – a contaminant of fresh water sources ( water – wells ), asbestos – carcinogenic, avian influenza, bovine spongiform encephalopathy (BSE), carcinogens, cholera, cosmic rays, DDT, dioxins, drought, dysentery, electromagnetic fields, endocrine disruptors, epidemics, e-waste, explosive material, floods, food poisoning, fungicides, furans, haloalkanes, heavy metals, herbicides, hormones in animals destined for human consumption, lead in paint, light pollution, lighting, lightening, malaria, marine debris, mercury, moulds, mutagens, noise pollution, onchocerciasis (river blindness), pandemics, Pathogens, Pesticides, pollen for allergic people, polychlorinated biphenyls (pcb), quicksand, rabies, radon and other natural sources of radioactivity, severe acute respiratory syndrome (SARS), sick building syndrome, soil pollution, tobacco smoking, toxic waste, ultraviolet light, vibration, wildfire, and x-rays.

### **3.3.3 Environmental Hazards Control Measures**

Environmental hazard control measures include:

- routine monitoring of the surrounding air, water and soil for hazards
- prompt management of hazardous wastes
- adequate training of environmental health officers and others involved in hazard management
- provision of adequate facilities for hazard management.



## Self-Assessment Exercise 1

1. Hazard can be defined as .....
2. The term Hazard incorporates topics like pollution and natural disaste (**true/false**)

### 3.4 Occupational Hazards

There are an unlimited number of occupational hazards that can be found in almost any workplace. There are obvious unsafe working conditions, such as unguarded machinery, slippery floors or inadequate fire precautions, but there are also a number of categories of insidious hazards (that is, those hazards that are dangerous but which may not be obvious). Occupational hazards are divided into five groups (Amadi, 2011). These include:

- chemical hazards
- physical hazards
- biological hazards
- mechanical hazards
- social or psychosocial hazards.

#### 3.4.1 Chemical Hazards

Chemical hazards arise from liquids, solids, dusts, fumes, vapours and gases. There is hardly any industry which does not make use of chemicals. The chemical hazards are on the increase with the introduction of newer and complex chemicals. Chemical agents act in three ways; local action or skin absorption, inhalation and ingestion. The ill-effects on the worker depend upon the duration of exposure, the quantum of exposure and individual susceptibility.

- (a) **Local action or skin absorption:** Some chemicals cause dermatitis, eczema, ulcers and even cancer by primary irritant action. Others are absorbed through the skin and cause system effects. Occupational dermatitis has been noted to be a big problem in industries as it can also be caused by allergic action.
- (b) **Inhalation:** Inhalation of dust particles, gases, fumes, metals and their compounds such as silica, coal, cotton, carbon monoxide gas, sulphur dioxide, chloroform, lead, calcium, manganese, mercury, zinc respectively is prominent in the industrial environment. These can give rise to disease conditions such as pneumoconiosis, silicosis, anthracosis, asphyxiation. The adverse effects depend largely upon the duration of exposure and the dose or concentration of exposure.
- (c) **Ingestion:** Occupational hazards may also result from ingestion of chemical substances such as lead, arsenic, mercury, zinc, chromium, calcium, phosphorous, gases; usually these substances are swallowed in minute amounts through contaminated hands, food or cigarettes.

### 3.4.2 Physical Hazards

Physical hazard has possible cumulative or immediate effects on the health of employees. Therefore employers and inspectors should be alert to protect the workers from adverse physical hazards. Physical hazards which can adversely affect health include noise, vibration, unsatisfactory lighting, radiation and extreme temperatures etc. Majority of employees are exposed to a variety of these potential hazards.

- (a) **Extremes of Temperature:** The work environment is either comfortable or extremely cold or hot and uncomfortable. The common physical hazard in most work-places is heat. The direct effects of heat exposure are burns, heat exhaustion, heat stroke, heat stress, cold stress and heat cramps. The indirect effects are decreased efficiency, increased fatigue and enhanced accident rates.

Many work-places have local “hot spot” ovens and furnaces, which radiate heat. Radiant heat is the main problem in foundry (factory where metal castings are produced), glass and steel industries. Physical work under such conditions is very stressful and impairs the health and efficiency of the workers.

Important hazards associated with cold work place are chilblains (inflammation of the hands and feet caused by exposures to cold and moisture), erythrocyonosis, immersion foot, and frostbite (destruction of tissue by freezing).

- (b) **Illumination:** good and sufficient lighting is aimed at promoting productivity, safety, health, well-being and pleasant working conditions at an economical cost. The workers may be exposed to the risk of poor illumination or excessive brightness. The acute effects of poor illumination are eye strain, headache, eye pain, lachrymation (shedding tears), and congestion around the cornea and eye fatigue. Exposure to excessive brightness or “glare” is associated with discomfort; annoyance, and visual fatigue, intense direct glare may also result in blurring of vision and may lead to accident. There should be sufficient and suitable lighting, natural or artificial, wherever people are working.
- (c) **Noise:** Noise is defined as unwanted sound. Sound is any pressure variation or a stimulus that produces a sensory response in the brain. Noise is a potential health hazard in many industries and workplaces The effects of noise are of two types:
- auditory effects which consist of temporary or permanent hearing loss. Noise induced hearing loss is one of the most common occupational disease.
  - non – auditory effects which consist of nervousness, fatigue, interference with communication by speech, decreased efficiency and annoyance. The degree of injury from exposure to noise depends upon a number of factors such as intensity and frequency range, duration of exposure and individual susceptibility. However noise threshold limit value is from 85 to 90 decibel (db).

- (d) **Vibration:** Vibration usually affects the hands and arms. After some months or years of exposure, the fine blood vessels of the fingers may become increasingly sensitive to spasm (white fingers). Exposure to vibration may also result to injuries of the joints of hands, elbows and shoulders.
- (e) **Ultraviolet radiation:** Occupational exposure to ultraviolet radiation occurs mainly in arc welding. Such radiation mainly affects the eyes, causing intense conjunctivitis and keratitis. Symptoms are redness of the eyes and watery painful eyes and blurred vision.
- (f) **Ionising radiation:** Radiation that falls within the ionizing radiation range has enough energy to remove tightly bound electrons from atoms, thus creating ions. Ionizing radiation has many practical uses and is finding increasing application in medicine and industry, but it is also dangerous to human health. This type of radiation, because of its properties, can generate electric power to kill cancer cells, and in many manufacturing processes. For example, x-rays, gamma rays and radioactive isotopes. The radiation hazards may result to genetic changes, malformation, cancer, leukaemia, depilation, ulceration, sterility and in extreme cases death.

### 3.4.3 Biological Hazards

Biological agents such as bacteria, viruses, fungi, infectious waste, infestations, and parasites have been found to occur in occupational exposures. Workers may be at risk of viral or bacterial infection, allergies and respiratory diseases. Most of these hazards get released and from our industries as waste emissions and discharged as solids, liquid or gases, depending on the production process and waste disposal method adopted. Exposure to biological hazards in workplace results in a significant amount of occupationally associated diseases. Biological hazards can be transmitted to a person through inhalation, injection, ingestion and contact with the skin. Meanwhile, the hepatitis B and human Immuno-deficiency virus (HIV) are presently considered important biological hazards to those working in the health sectors. Also very common is tuberculosis from human contact and veterinary health bays.

### 3.4.4 Mechanical Hazards

Mechanical hazards occur through appliances which present themselves in various forms in the work place. Examples are unguarded part of machines, pointed objects, unprotected electrical cable, sharp apparatus. A modern power driven tool vibrating a thousand of times are liable to produce stiffness of the fingers. Hand cramps and corns can occur in writers, painters, typists due to rapid repetitive fine movement of the fingers. These can result to workplace accidents, injuries and loss of lives. Most accidents could be prevented by applying relatively simple measures in the work environment, working practices and safety systems and ensuring appropriate behavioural and management practices.

### 3.4.5 Social or Psychosocial Hazards

These are hazards related to organisation in the workplace, for example, the workers relationship with his fellow workers, or with the management. Such relationship has a lot of influence on the individual worker's moral, job satisfaction and the general well-being and health.

The hazards here may include lack of job satisfaction, emotional tension such as sexual harassment, bullying (which may include verbal abuse), work pressure such as excessive working time and overwork, boredom, psychological stress, poor wage. The consequent health effects may therefore include fatigues, depression, alcoholism, drug misuse, sickness, absenteeism and rapid ageing with its subsequent effect on productivity.

### 3.4.6 Control Measures

Control measures in the workplace includes:

- workplace hazards are better controlled at the source whenever possible
- records of any exposure are maintained for many years
- both workers and employers are informed about health and safety risks in the workplace
- there is an active and effective health and safety committee that includes both workers and management
- worker health and safety efforts should be ongoing (ILO).

#### Self-Assessment Exercise 2

1. The common physical hazard in most work-places is.....
2. Biological hazards can be transmitted to a person through the skin. (true/false)
3. The radiation hazards may result to malaria. (true/false)

### 3.5 CONCLUSION

You have learnt both environmental and occupational hazards in the workplace and environment. You have learnt also its effects on workers as well as its control measures. Identification of the roles of human and environmental factors in occupational hazards would be discussed in the next unit.

### 3.6 SUMMARY

In this unit, you have learnt environmental hazards that exist in the environment. Occupational hazards such as physical, biological, and chemical are also present in the workplace and environment. Control of these hazards is necessary for the health of the workers, the employer and the organisation.

### 3.7 TUTOR-MARKED ASSIGNMENT

- (1) State two environmental hazards and give the control measures for each.
- (2) Enumerate two occupational hazards and outline their control measures

- (3) Write succinctly on
- a. physical hazards
  - b. biological hazards
  - c. mechanical hazards

### **3.8 REFERENCES/FURTHER READING**

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### **3.9 POSSIBLE ANSWERS TO SAEs**

#### **Self-Assessment Exercise 1**

1. Any condition in a work place that has the potential to cause occupational injuries, diseases, disabilities or death through work to a worker is a hazard
2. TRUE

#### **Self-Assessment Exercise 2**

1. Heat
2. True
3. false

## **UNIT 4 IDENTIFICATION OF THE ROLES OF HUMAN AND ENVIRONMENTAL FACTORS IN OCCUPATIONAL HAZARDS**

### **CONTENTS**

- 4.1 Introduction
- 4.2 Objectives
- 4.3 Main Content
  - 4.3.1 Human Factors that Result to Occupational Hazards / Accidents in the Workplace
  - 4.3.2 Environmental Factors that Give Rise to Occupational Hazard/Accidents in the workplace
- 4.4 Conclusion
- 4.5 Summary
- 4.6 Tutor-Marked Assignment
- 4.7 References/Further Reading

### **4.1 INTRODUCTION**

You learnt environmental and occupational hazards in the previous unit. In this unit, you should learn the human factors that result to hazards/accidents in the workplace. You should learn also environmental factors that give rise to accidents/hazards in the working environment.

### **4.2 OBJECTIVES**

At the end of the unit, you should be able to:

- identify the human factors that result to accidents / hazards in the workplace
- highlight the environmental factors that give rise to hazards/accidents in the working environment.

## **4.3 MAIN CONTENT**

### **4.3.1 Human Factors that Result to Hazards/Accidents in the Workplace**

Accidents do not just happen. They are always caused. It has been recognised that accidents are caused by human factors (workers) in the workplace. Personal or human factors are conditions operating in the individual involved in the accident situation, usually in the form of unsafe act, behaviour or condition.

An unsafe act is any act on the part of a person, which will increase his chances of having an accident. The unsafe acts of people account for approximately 80% of all accidents (OSHA, 1998). Some unsafe acts are so hazardous that it takes only very little repetitive actions before the occurrence of an accident. Examples of personal or human accident factors include:

- ignorance or inadequate knowledge – cannot read and understand instructions and signs on machines
- immaturity/under-age - younger workers are more prone to accidents than older experienced workers
- insufficient/lack of skills
- physical limitation/disability
- negligence of safety rules and precautions
- emotional factors, for example, anger, impatience, recklessness, fear, over-excitement etc
- health/physiological factors, for example, sickness, fatigue/tiredness, and boredom.
- unsafe personal habits/acts, for example, smoking, alcoholism, carelessness, forgetfulness, hurry, procrastination, inquisitiveness, curiosity, over-confidence, thoughtlessness, inattentiveness, horseplay at work etc
- training and experience - lack of training and proper handling of machine can increase frequency of accidents.

### **4.3.2 Environmental Factors that Give Rise to Hazards/Accidents in the Workplace**

It has been recognised that accidents are caused by environmental factors in the workplace. Examples of environmental factors include:

- poor lighting or darkness leads to poor visibility via increased accidents
- disorderliness - poor organisation of things, often called poor housekeeping
- temperature/humidity - extremes of it can lead to discomfort and fatigue via increased rates of accidents
- overcrowding
- faulty conditions, for example, faulty tools, machines, gadgets
- slippery surfaces - wet and dirty floor can lead to falls
- noise – excessive noise can slow concentration and increase tendencies for errors and accidents

- undue permission of hazards in the environment, for example, sharp objects such as bottles, knives, nails, fire, volatile substances, poisons, naked current carrying wire etc
- poor environmental hygiene.

### Self-Assessment Exercise 1

1. Accidents are always caused by human factors. **(true/false)**
2. An unsafe act is any act on the part of a person, which will increase his .....
3. Occupational accidents can be caused by environmental factors in the workplace. **(true/false)**

## 4.4 CONCLUSION

You have learnt about the human factors that result to hazards/accidents in the workplace. You have learnt also the environmental factors that give rise to hazards/accidents in the working environment. In the next unit, you will about learn methods of prevention and control in occupational health.

## 4.5 SUMMARY

In this unit, you have learnt to identify the human factors that result to accidents or hazards in the workplace. You have learnt also the environmental factors such as temperature/humidity, poor lighting, slippery surfaces, overcrowding, and noise that give rise to hazards or accidents in the working environment.

## 4.6 TUTOR-MARKED ASIGNMENT

1. Enumerate four personal or human factors that result to accidents in the workplace.
2. List four environmental factors that can give rise to accidents in the workplace.
3. Accidents do not just happen. Justify this statement.

## 4.7 REFERENCES/FURTHER READING

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## 4.8 POSSIBLE ANSWERS TO SAEs

### Self-Assessment Exercise 1

1. True
2. chances of having an accident
3. True



## 4.9 END OF MODULE QUESTIONS

1. Stress sets off alarm in the brain, which responds by preparing the body for
  - a. learning new skills
  - b. defensive action
  - c. energizing physically
  - d. energizing psychologically
2. All the following factors contribute to occupational stress except
  - a. toxic work environment
  - b. negative workload
  - c. extensive working hours
  - d. productive working hours
3. Bullying in the workplace can contribute to stress by
  - a. creating hostile environment
  - b. affecting work ethics
  - c. all of the above
  - d. none of the above
4. All the following factors can prevent occupational stress except
  - a. Proper workload
  - b. well-designed jobs
  - c. improved communication
  - d. discrimination based on language
5. Inhalation of dust can lead to serious pneumoconiosis such as
  - a. fracture
  - b. stress
  - c. asbestosis
  - d. dust emission
6. Agricultural workers are exposed to all the following occupational diseases except
  - a. brucellosis
  - b. byssinosis
  - c. silicosis
  - d. bagassosis
7. Anthrax is an infectious disease that naturally occur in
  - a. the community
  - b. the soil
  - c. the farm
  - d. the lungs
8. The infectious agent that causes anthrax is
  - a. *Bacillus anthrax*
  - b. *Bacillus* spores
  - c. *Bacillus anthracis*
  - d. *Bacillus anathrax*
9. Serum hepatitis B is also known as
  - a. HIB
  - b. HVB

- c. HBV
  - d. SBH
10. All the following are physical hazards except
- a. vibration
  - b. radiation
  - c. infection
  - d. none of the above

**MODULE 5            METHODS OF PREVENTION AND CONTROL**

Unit 1            Methods of Prevention and Control

Unit 2            Safety Procedure in Different Occupations

Unit 3            Safety Management

Unit 4            Checklist for Industrial Inspections

# UNIT 1 METHODS OF PREVENTION AND CONTROL

## CONTENTS

- 1.1 Introduction
- 1.2 Objectives
- 1.3 Main Content
  - 1.3.1 General Methods of Prevention and Control of Hazards in the Workplace
  - 1.3.2 General Measures for Industrial Accident Prevention
- 1.4 Conclusion
- 1.5 Summary
- 1.6 Tutor-Marked Assignment
- 1.7 References/Further Reading

### 1.1 INTRODUCTION

In the previous unit, you learnt about human and environmental factors that result in hazards/accidents in the workplace. In this unit, you will learn about the general methods of prevention and control of hazards in the workplace.

### 1.2 OBJECTIVES

At the end of this unit, you should be able to:

- list the general methods of prevention and control of hazards in the workplace
- identify the general measures for industrial accident prevention.

### 1.3 MAIN CONTENT

#### 1.3.1 General Methods of Prevention and Control

Occupational diseases and injuries are in principle preventable. Among the general methods and approaches of prevention and control of hazards in the workplace include:

- i. Substitution or elimination: Substitution or elimination as the most effective method of control is not to use the hazardous substance or process at all, consideration should be given to whether it is necessary or if it can be replaced by one which will not have an adverse effect either on the workers or the final product. For example, carbon tetrachloride has been largely replaced by less hazardous solvents such as trichloroethylene. In engineering, radiation can be replaced by quieter ones. Elimination or substitution challenges to find an alternative method of achieving the goals.
- ii. Total enclosure of the process and the hazard: If a hazardous substance or work cannot be eliminated or substituted, then enclosure the hazard is the next best option of control. Many hazards can be controlled by partially or totally enclosing the work process. Total

- enclosure of the process and the hazard, will effectively isolate the worker from the hazard, but special consideration may have to be given to the protection of maintenance men who have to enter the enclosed area.
- iii. Segregation of the process: Segregation of the process will reduce the number of workers involved and the time they are exposed. If a completely separate area is designed for the process, for example, work with radiation, the workers can leave the area when the specific task is completed and will be the only ones exposed. Exposure can also be reduced by placing limitations on the time of exposure, for example, by reducing working time with noisy processes, and by removing workers from exposure once a stipulated dose has been reached.
  - iv. Automation or mechanisation of the process: Automation or mechanisation of the process will prevent the worker from coming into contact with the contaminant and increase his distance from it as far as possible.
  - v. Partial enclosure: With local/exhaust ventilation situated at the site of emission of dust, vapour and fumes can remove the contaminants from the breathing zone of the exposed persons.
  - vi. Good general ventilation: This is invaluable in removing small quantities of low toxicity substances, which may leak into the atmosphere, there by removes air from the workplace to keep the concentration of an air contaminant below hazardous level. This system uses natural convection through open windows or doors, roof ventilators and chimneys, or air movement produced by fans or blowers.
  - vii. Wet methods: Water sprays, can be used to suppress dust, but it has to be remembered that water evaporates and the hazard can return if drainage is inefficient.
  - viii. Guarding of dangerous machines: If it is absolutely impossible to guard a machine, it will be necessary to employ highly skilled, highly trained labour to operate it.
  - ix. Good general environmental conditions: These are conducive for safe and efficient working; the reverse can be hazards in the workplace.
  - x. Good housekeeping: Administrative control can limit the amount of time workers spend at hazardous job locations. Administrative control can be used together with other methods of control to reduce exposure to occupational hazards.
  - xi. Monitoring of the environment: This should be undertaken to measure the effect that control procedures are achieved.

### **Self-Assessment Exercise 1**

- 1. Occupational diseases and injuries can actually be prevented. (true/false)
- 2. Not using the hazardous substance or process at all in order to prevent an injury is termed .....
- 3. Good general ventilation can remove small quantities of low toxicity substances. (true/false)

### **1.3.2 General Measures for Industrial Accidents Prevention**

General measures for industrial accidents preventions include:

- i. Pre-placement and periodic medical examinations: This is aimed at assessing the health and fitness of newly employed persons to ensure that the workers' health is not jeopardised. It helps to place workers in jobs that match their physical and mental ability. This will no doubt reduce the risk of accidents.
- ii. Health and safety education: The objective here is to educate workers and employers about safety and potential health hazards associated with their jobs and how to protect themselves.
- iii. Training and supervision of workers: This involves the training of workers on appropriate safety measures, to acquire skills on various work procedures.
- iv. Provision of protective equipment: This is for workers and enforcement of their use by management and statutory agencies.
- v. Application of ergonomic principles: The design and use of machines and work tools, and in job placement.
- vi. Supervision and maintenance of good housekeeping
- vii. Control of environmental conditions: Such as light, pressure, radiation, ventilation, noise and temperature.
- viii. Personal hygiene/cleanliness: This is a very important method of controlling hazards. Your family can be exposed to the hazards you work with if you bring chemicals and other workplace contaminants home with you on your clothes, hair or skin. Before you leave work, wash or shower and change your clothes when necessary to prevent bringing workplace contaminants home. Leave your dirty clothes at work, or if you must wash them at home wash them separately and not with the family wash. Washing hands regularly, and eating and smoking away from your work area help to prevent ingesting contaminants.

### **Self-Assessment Exercise 2**

1. Educating workers and employers about safety and potential health hazards associated with their jobs, can prevent injury. **(true/false)**
2. Health and safety education is a bad approach in terms of prevention and control of hazards in the workplace **(true/false)**

## **1.4 CONCLUSION**

You have learnt the general methods of prevention and control in the workplace as well as the general measures for industrial accident prevention. In the next unit, you will learn about safety procedure in different occupations.

## **1.5 SUMMARY**

In this unit, you learnt the general methods of prevention and control in the workplace. You have learnt also, the general measures for industrial accident prevention including pre-placement and periodic medical examination, health and safety education, provision of protective equipment and personal hygiene/cleanliness.

## **1.6 TUTOR-MARKED ASSIGNMENT**

1. State five general methods of prevention and control of hazards in the workplace.
2. Enumerate five general measures for industrial accident prevention.
3. Comment briefly on substitution as a way of preventing occupational hazards.

## **1.7 REFERENCES/FURTHER READING**

- Aibor, M. S. & Olorunda, J. O. (2006). *A Technical Handbook of Environmental Health in the 21<sup>st</sup> Century for Professionals and Students*. Akure; His Mercy Publishers.
- Amadi, A. N. (2011). *ABC of Environmental Health*. Owerri: Readon Publishers Ltd.
- Takele, T. and Mengesha, A. (2006). *Occupational Health and Safety*. Ethiopia Public Health Training Initiative.

## **1.8 POSSIBLE ANSWERS TO SAEs**

### **Self-Assessment Exercise 1**

1. True
2. Substitution or elimination
3. True

### **Self-Assessment Exercise 2**

1. True
2. False

## **UNIT 2 SAFETY PROCEDURE IN DIFFERENT OCCUPATIONS**

### **CONTENTS**

- 2.1 Introduction
- 2.2 Objectives
- 2.3 Main Content
  - 2.3.1 Purpose of Safety Procedure
  - 2.3.2 Monitoring Equipment
  - 2.3.3 First Aid Availability
  - 2.3.4 Significance of Training
  - 2.3.5 Documenting Injuries
  - 2.3.6 Safety Procedure Awareness
- 2.4 Purpose of Safety Procedure for Agricultural Tools
  - 2.4.1 Prevention/Solution
  - 2.4.2 Other Considerations
- 2.5 Conclusion
- 2.6 Summary
- 2.7 Tutor-Marked Assignment
- 2.8 References/Further Reading

### **2.1 INTRODCUTION**

In the last unit, you have learnt the general methods of prevention and control. In this unit, you will learn the general safety procedures that can be applied to different occupations. You will also learn safety procedure for agricultural tools.

### **2.2 OBJECTIVES**

At the end of this unit, you should be able to:

- identify general safety procedures that can be applied to different occupations
- highlight safety procedures for agricultural tools.

## **2.3 MAIN CONTENT**

### **2.3.1 Purpose of Safety Procedures**

The purpose of occupational safety procedures in different occupations is to help with the prevention of injuries, illness and deaths that occur at the workplace. If workers are aware of safety procedures, they will keep themselves and others in the workplace from being hurt. An employer must post the safety procedures in the workplace, as well as ensure every worker has read the safety procedures before starting their jobs.

### **2.3.2 Monitoring Equipment**

Before a worker operates machinery, the machinery must be in good working condition and clean. If the machine is not functioning properly, this puts the worker's safety in danger, so does un-cleaned equipment that can cause germs and bacteria to spread throughout the workplace. If the machinery in the workplace is used to make products for customers, the germs from the equipment could cause safety issues with the customers that use the products as well, leading to a possible lawsuit for the employer.

### **2.3.3 First Aid Availability**

Workers suffer from small injuries while on the job daily. The injury could require bandage or some type of over-the-counter medication to relieve the temporary pain. An employer should keep a first aid kit for workers somewhere in the workplace. When a worker suffers from a minor injury, he should be able to ask his manager for first aid treatment kit.

### **2.3.4 Significance of Training**

Training is a required safety procedure for workers. An employer should generally document that training has been provided to workers, to show compliance to occupational health and safety procedures were followed.

### **2.3.5 Documenting Injuries**

Whenever a worker is hurt on the job, an employer must document the injury. Even if the injury is not severe, it must be documented in compliance with occupational safety procedures.

### **2.3.6 Safety Procedure Awareness**



It is safety procedure for all employers to make workers aware of their safety rights. This can be done by passing out literature or copies of occupational health safety policies and procedures to workers. However, the employer must post a visual sign for all workers to see somewhere in the workplace at all times.

### **Self-Assessment Exercise 1**

1. The purpose of occupational safety procedures in the workplace is to prevent .....
2. Training is a required safety procedure for workers (**true/false**)

## **2.4 Purpose of Safety Procedure for Agricultural Tools**

Farming is listed as one of the most dangerous professions in the developed and developing countries like Nigeria. Some injuries can be sustained during a vehicle rollover or maintenance accident.

Farmers and agricultural workers must be aware of the hazards associated with farm equipment. By using safety procedure, workers can avoid being injured. Some of these procedures include inspecting the equipment before use, having access to operations manuals and keeping equipment in good working condition.

### **2.4.1 Prevention/Solution**

If a vehicle, such as a tractor was to overturn, the user can be injured; hazardous fluids may leak from the engine. Four items have to be securely sealed and covered to prevent leaks: the fuel tank, reservoir for oil, battery and the coolant system. Occupational health safety procedure requires that the vehicle should have a seat belt. It has to be resistant to wear and able to keep the driver safety in the event of a rollover.

### **2.4.2 Other Considerations**

Before any piece of equipment is used, it should be inspected for broken or worn parts. Workers should make sure that all guards are properly installed before using a piece of equipment. Before fixing a piece of equipment that has been locked up, it should be turned off, the worker needs to wait until all parts have stopped moving.

### **Self-Assessment Exercise 2**

1. Some injuries can be sustained during agricultural vehicle rollover. (**true/false**)
2. For safety reason there is no need to securely seal and cover the Tractor fuel tank. (**true/false**)

## 2.5 CONCLUSION

You have learnt general occupational safety procedures as well as the purpose of safety procedure for agricultural tools. In the next unit, you will learn about safety management.

## 2.6 SUMMARY

In this unit, you have learnt general occupational safety procedures such as first-aid, documenting injuries, and safety procedure awareness. You have learnt also the purpose of safety procedure, vehicle rollover or maintenance for agricultural tools.

## 2.7 TUTOR-MARKED ASSIGNMENT

1. Outline the major purpose of occupational safety procedures
2. List three general occupational safety procedures.
3. State one occupational safety procedure for agricultural tools.

## 2.8 REFERENCES / FURTHER READING

Taunda, E. (2012). *Occupational Safety Procedures*. [www.ehow.com/legal](http://www.ehow.com/legal) Accessed 04/08/2012

Takele, T. and Mengesha, A. (2006). *Occupational Health and Safety*. Ethiopia Public Health Training Initiative.

## 2.9 POSSIBLE ANSWERS TO SAEs

### Self-Assessment Exercise 1

1.
  - i. injuries
  - ii. illness and deaths that occur at the workplace
  - iii.
2. True

### Self-Assessment Exercise 2

1. True
2. False

## **UNIT 3 SAFETY MANAGEMENT**

### **CONTENTS**

- 3.1 Introduction
- 3.2 Objectives
- 3.3 Main Content
  - 3.3.1 Definition and Meaning of Safety
  - 3.3.2 Safety Management Concept
  - 3.3.3 Personnel
  - 3.3.4 Premises
  - 3.3.5 Equipment
  - 3.3.6 Data
  - 3.3.7 Integration
  - 3.3.8 Safety and Health Check-Ups
- 3.4 Conclusion
- 3.5 Summary
- 3.6 Tutor- Marked Assignment
- 3.7 References/Further Reading

### **3.1 INTRODUCTION**

In the last unit, you learnt about safety procedure in different occupations. In this unit, you should learn safety management in the workplace.

### **3.2 OBJECTIVES**

At the end of the unit, you should be able to:

- give the definition and meaning of safety
- discuss the safety management concepts.

### **3.3 MAIN CONTENT**

#### **3.3.1 Definition and Meaning of Safety**

Safety has been defined as a state of being free from danger, harm or injury; a state of being safe, a state in which hazards and conditions leading to physical, psychological or material harm are controlled in order to preserve the health and well-being of individuals and the community.

Safety has always been one's greatest concerns. It is a part of wellness approach to life. In 1948, Abraham Maslow in his theory of human needs included the need for safety or security as one of the basic necessities of man.

In 18<sup>th</sup> Century, during the Industrial Revolution, there was a remarkable advancement in technology that brought about the invention of machines. This breakthrough led to the employment of machines in the production of goods, which the craftsman previously produced manually. In this way, there was transition in production from 'manpower' to 'machine-power' and from production in the home to production in the factory. With the advent of the machine, with its characteristic moving parts, cutting blades and power operation, came many new types of hazards, accidents and injuries, both in the workplace, at home, and in other settings.

Therefore safe living has become a very important and increasingly complicated problem, as a result of the numerous products of science and technology. This complexity of modern living demands, not only a greater awareness of the growing number of hazards which surround us, but knowledge of effective ways of coping with them.

We must therefore learn how to remove all potential hazards and dangers around us and or compensate for those which cannot be removed. People should cultivate safety consciousness as a part of their life philosophy. They should be able to identify the various hazards in their environment, as well as know how to control them so as to minimize accidents and the problems associated with them.

Workplace safety refers to the limitation of elements that can cause harm, accidents and other negative outcomes in the workplace. It represents a culmination of policies, behaviours and precautions that work to limit hazards accidents and other kinds of harm in the work environment.

### **3.3.2 Safety Management Concept**

Safety management system provides organizations with a frame work to improve employee safety and health, reduce workplace risks and create better working conditions. Protecting your valuable corporate assets is one of the most important things you can do to ensure long-term success in your business. Therefore, implementing good safety management concepts is vital to the success of your company. Not setting good safety measures in place or failing to follow them could result in injury, death or any number of negative outcomes. Safety management concept covers areas such as, personnel, premises, equipment, data, integration, safety and health check-ups.

### **3.3.3 Personnel**

The health and safety of employees should be at the top of the list of priorities for all establishments. Aside from the obvious terrible impact of a worker getting

injured or dying, there are other negative effects such as raising accident-related costs or facing expensive law-suit. Moreover, preventing injuries and illnesses in the workplace can reduce absenteeism, lower turnover, raise productivity and improve workers morale.

Workers should be aware of their surroundings and report any suspicious behaviour as they see fit. It is better to be safe than sorry, so encourage workers not to be shy and speak up if they think something does not seem right. One way of keeping potentially harmful visitors out of the office is to require all workers to wear badges at all times. Also, the office should have a sign-in sheet at the front for any visitors who then must be escorted around the premises by a worker.

### **Self-Assessment Exercise 1**

- |   |
|---|
| <ol style="list-style-type: none"><li>1. Safety has been defined .....</li><li>2. Safety management system reduce workplace risks. (true/false)</li></ol> |
|---|

### **3.3.4 Premises**

Buildings, parking areas and anywhere else where workers or equipment are should be kept safe at all times. Whatever type of security system provided surveillance cameras should be set up throughout the building as well as around the outside. Every walkway, doorway and entryway should be kept clear of any obstacles in case of emergency to prevent potential accidents. There should be also emergency plans set in place for every part of the premises for any type of emergency.

### **3.3.5 Equipment**

All equipment should be up to date and ready to use or it should not be used at all. Regular maintenance should be conducted on all equipment and any and all problems should be reported and recorded for easy look up. Make sure that any worker who uses the equipment is properly trained and understands how to inspect the equipment on his own before using it.

### **3.3.6 Data**

The employer should make sure that the company computer firewall is up to date and that no outside people are trying to get into their system. The company data contains extremely important information and the employer should go to great lengths to protect it. The employer should implement password protection for any documents or data that the company do not want getting out and routinely change the passwords especially after letting a worker go.

### **3.3.6 Integration**

Every safety programme should be integrated into all aspects of the company and should be emphasised just as much as production, sales and quality control. Safety procedures should not be considered separate of anything else but a part of everything. That way, it is just assumed that everything is done as safely as possible as it should be instead of taking extra time to focus on safety and then basically forgetting about it.

A good way to integrate health and safety procedures into everyday life is to make it a part of the company's incentive programme as well. As opposed to just giving out rewards for production-or profit-driven figures, give bonuses to departments for being accident-free for a certain amount of time. The more workers see safety as a part of their everyday routine, the more they will subconsciously think about maintaining a high level of safety throughout the day.

### **3.3.7 Safety and Health Check-Ups**

In order to be certain that the company has the highest standards for safety and health, it is necessary to have frequent check-ups. Even if the company has gone a long time without any injuries in the workplace, still do frequent check-ups to make sure that no departments or workers are getting complacent. Certain indicators that can be used to gauge the level of safety are statistical reports, opinion surveys, risk analysis, periodic inspections, and process improvement initiatives. Make sure that all the workers answer any and all questions completely truthfully. The point of these check-ups is not to get anyone in trouble, but to constantly improve the level of safety throughout the company.

## **3.4 CONCLUSION**

You have learnt the definition and meaning of safety. You have learnt also safety management concept. In the next unit, you will learn how to use checklist for industrial inspections.

## **3.5 SUMMARY**

In this unit, you have learnt the definition and meaning of safety as well as safety management concepts. You have learnt also the areas covered by safety management concepts. Such areas include: personnel, premises, equipment, data, integration, and safety and health check-ups.

## **3.6 TUTOR-MARKED ASSIGNMENT**

1. What is the meaning of safety in occupational health?
2. What is meant by safety management concept in the workplace?
3. State and explain any three areas addressed within safety management concepts.

### 3.7 REFERENCES/FURTHER READING

Amadi, A. N. (2011). *ABC of Environmental Health*. Owerri: Readon Publishers Ltd.

Onuzuike, N. (2003). *Fundamentals of Safety Education*. Onitsha: Africana-Fep Publishers.

Mark, S. (2012) *Key Safety Management Concepts*. <http://www.docstoc.com/article/./key-safetymanagement-concepts> (Accessed 05/08/2012)

Takele, T. and Mengesha, A. (2006). *Occupational Health and Safety*. Ethiopia Public Health Training Initiative.

### 3.8 POSSIBLE ANSWERS TO SAEs

#### Self-Assessment Exercise 1

1. as a state of being free from danger, harm or injury
2. True

#### Self-Assessment Exercise 2

## **UNIT 4 CHECKLIST FOR INDUSTRIAL INSPECTIONS**

### **CONTENTS**

- 4.1 Introduction
- 4.2 Objectives
- 4.3 Main Content
  - 4.3.1 Checklist in Workplace
- 4.4 Conclusion
- 4.5 Summary
- 4.6 Tutor-Marked Assignment
- 4.7 References/Further Reading

### **4.1 INTRODUCTION**

In the previous unit, you learnt about safety management. In this unit, you should learn how to use checklist to conduct inspection of workplace.

### **4.2 OBJECTIVES**

At the end of the unit, you should be able to:

- describe how check-list can be used for industrial inspections
- identify main features of a checklist.

### **4.3 MAIN CONTENT**

#### **4.3.1 Checklist in Workplace**

Safety checklists are documents used during safety inspections for the purpose of identifying potential hazards. Each workplace and industry has its own set of hazards, and the safety professionals must be able to identify which checklists are appropriate to specific workplaces and processes in order to ensure that full compliance with safety standards is achieved in the workplace. Safety checklists provide a tool for determining possible workplace hazards and should be completed during inspections, reported on used as a basis for safety recommendations and filed for record-keeping purposes. Safety checklists can be useful to identify possible workplace hazards and to prevent work-related incidents, injuries and illnesses. The checklist format below should be used by Environmental Health Officers (EHOs) and other health team members for the inspection of workplace. Areas covered by the checklist format include: company name/details, company address, date of inspection, and time of inspection. Other areas include; fire, electrical, general lighting, chemicals on-site, first-aid, floors, office hazards, machines, rubbish waste, work benches, storage and other items. The checklist will meet the detailed requirements and specific needs of the workplace.



**COMPANY NAME / DETAILS:**

**COMPANY ADDRESS:**

<b>S/N</b>	<b>DATE OF INSPECTION:</b>	<b>TIME:</b>	<b>Excellent</b>
<b>Good</b>	<b>Poor</b>	<b>Action Required</b>	
<b>(3)</b>	<b>(2)</b>	<b>(0)</b>	

**A FIRE:**

1. Extinguishers in place, clearly marked for type of fire and recently serviced
2. Adequate direction notices for fire exists
3. Exit doors easily opened from inside
4. Fire wardens appointed
5. Exits clear of obstructions
6. Fire alarm system functioning correctly
7. Fire instructions available and displayed
8. Assembly points clearly identified
9. Regular fire drills carried out
10. Training sessions conducted

**S/N DATE OF INSPECTION:            TIME:**

<b>Excellent</b>	<b>Good</b>	<b>Poor Action Required</b>
<b>(3)</b>	<b>(2)</b>	<b>(0)</b>

**B ELECTRICAL:**

1. No broken plugs, sockets or switches
2. No frayed or damaged leads
3. Portable power tools in good condition
4. No temporary leads on the floor
5. All electrical equipment has been tagged
6. Emergency shut – down procedures in place
7. No stained leads

**C GENERAL LIGHTING:**

1. Adequate illumination
2. Good natural lighting
3. No direct or reflected glare
4. Light fittings clean and in good condition
5. Emergency lighting operable

**D CHEMICALS ON – SITE:**

1. MSD (Material Safety Data Sheet) for all chemicals
2. Containers clearly labelled
3. Do special storage conditions apply?

**S/N DATE OF INSPECTION:      TIME:**

<b>Excellent</b>	<b>Good</b>	<b>Poor</b>	<b>Action Required</b>
<b>(3)</b>	<b>(2)</b>	<b>(0)</b>	

**E FIRST AID:**

1. Cabinets and contents clean and orderly
2. Easy access to cabinets
3. Employees aware of location of first aid cabinet
4. First aid cabinet clearly labelled
5. Eye wash facilities are provided (were appropriate)
6. Emergency numbers displayed
7. Supply of soap and towels
8. Adequate stocks

**F FLOORS:**

1. Even surface, no cracks or holes

2. Loose boards or drainage grills or vents are cleaned regularly
3. Oil and grease removed
4. Entry across walkways kept clear
5. No electrical leads across walkways
6. Walkways adequately lit and clearly marked
7. Unobstructed vision at intersections

**G OFFICIAL HAZARDS:**

1. Filing
2. Chairs
3. Desks
4. Glare from windows
5. Photocopiers – fumes
6. Air conditioning maintained regularly
7. Disposal of waste

**H MACHINES:**

1. Kept clean
2. Adequately guarded
3. Starting and stopping devices within easy reach

4. Waste storage/disposal
5. Drip pans to prevent spillage
6. Adequate work space around machine
7. Noise levels controlled
8. Lighting satisfactory
9. No bending or stopping required

**I RUBBISH/WASTE:**

1. Bins located at suitable points in plant
2. Bins emptied regularly
3. Oily rags and combustibles in covered container

**J WORK –BENCHES:**

1. Clear of rubbish
2. Tools not in use stored correctly
3. No damaged hand-tools
4. Work height
5. No sharp edges

**K STORAGES:**

1. Materials stored in racks and bins

2. Storage designed to minimize lifting
3. Floors around racking clear of rubbish
4. General conditions of racks and pallets

**L OTHER ITEMS:**

1. EIA/EHIA Report
- 2.
- 3.
- 4.
- 5.
- 6.

Source: [http://www.rtbu sw.asn.au/...Workplace](http://www.rtbu.sw.asn.au/...Workplace)

#### **4.4 CONCLUSION**

You have learnt how to use the check-list format to conduct industrial inspection. Other items not contained in the format but found on the premises that worth reporting on should be included.

#### **4.5 SUMMARY**

In this unit, you have learnt the use of check-list format for industrial inspection. Areas covered by the check-list include: fire, electrical, general lighting, chemical on-site, etc.

#### **4.6 TUTOR – MARKED ASSIGNMENT**

1. List the main features of checklist used in conducting industrial inspection.
2. Explain the content of chemical on-site in the checklist.

#### **4.7 REFERENCES/FURTHER READING**

<http://www.rtbu-nsw.asn.au/.../Sample-Workplace-InspectionChecklist.doc> (Accessed 13/08/2012)

#### **4.8 END OF MODULE QUESTIONS**

1. What is a hazard?
  - a. the likely hood of someone being injured
  - b. something that can cause harm or injury to a person
  - c. something that requires assessment
  - d. none of the above
2. From the following options, what is the best way to control hazards in the workplace?
  - a. use personal protective equipment
  - b. eliminate the hazard completely from the workplace
  - c. replace the hazard with a less risky one
  - d. provide a checklist of potential hazards
3. An employee who spots a risk in the workplace should?
  - a. make it safe before any management staff should see it
  - b. report to a supervisor

- c. report to the health and safety officer
  - d. ignore the risk
4. A system for hazard prevention and control includes:
- a. hazard reporting system
  - b. workplace and safety inspections
  - c. all of the above
  - d. none of the above
5. What hazard do safety goggles protect against?
- a. hazardous substances
  - b. heat
  - c. dust
  - d. strong light
6. What is the first thing you should do when you discover a fire?
- a. call the police
  - b. alert the fire department
  - c. ensure your own safety
  - d. none of the above
7. Substitution as an effective way of preventing occupational hazard requires that
- a. the hazardous substance or process is not used at all
  - b. the hazardous process is enclosed
  - c. the number of workers is reduced
  - d. exposure of workers is reduced
8. The objective of health and safety education is to
- a. enlighten workers and employers about safety and health hazards
  - b. assess the health and fitness of workers and employers
  - c. provide protective equipment
  - d. design machines and work tools



9. Occupational safety procedures are aimed at
  - a. preventing injuries and deaths at the workplace
  - b. improving technical know how
  - c. inventing machines and tools
  - d. monitoring machinery
10. The state of being free from harm, danger or injury otherwise defines
  - a. well-being
  - b. safety
  - c. harmless
  - d. protection
11. A checklist is the same thing as
  - a. an inventory
  - b. an identification tag
  - c. a ledger
  - d. none of the above
12. Safety checklists are usually completed during
  - a. inspections
  - b. registration
  - c. training
  - d. competitions