NATIONAL OPEN UNIVERSITY OF NIGERIA

SCHOOL OF SCIENCE AND TECHNOLOGY

COURSE CODE: EHS 403

COURSE TITLE: OCCUPATIONAL HEALTH AND SAFETY

COURSE GUIDE

EHS 403
OCCUPATIONAL HEALTH AND SAFETY

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CONTENTS **PAGE**

INTRODUCTION

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

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

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

WHAT YOU WILL TO LEARN IN THIS COURSE

The course content consist of a unit of the course guide which tell you briefly what the course is 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 assignment 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 AIMS

The course aim 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 of occupational health and safety and its significance
- 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 the 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.

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 count for 30% of your total course work. 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 count for 70% of your total course mark.

TUTOR-MARKED ASSIGNMENT

The TMA is a continuous component of your course. It account for 30% of the total score. You will be given four TMAs to answer. Three of this 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 has a value of 70% of the total 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 area 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 materials

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?
- Of what importance is the knowledge of occupational health and safety?
- Enumerate common occupational and environmental hazards, and diseases.
- What is the percentage contribution of occupational and environmental hazards and diseases in the global disease burden?
- What percentage does occupational and environmental hazards and diseases contribute in the global mortality rate from diseases?
- What are the preventive and control measures against occupational and environmental hazards and diseases?

The above list is just a few of the question expected and is by no means exhaustive.

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

CONTENTS **PAGE**

MODULE 1 OCCUPATIONAL HEALTH

UNIT 1 OCCUPATIONAL HEALTH

CONTENTS

1.0 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 the need for occupational health. 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. In this unit, you should learn the definition, scope and evolution of occupational health.

2.0 OBJECTIVES

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

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

3.0 MAIN CONTENT

3.1 Definition of Occupational Health

Occupational health has been defined in various ways:

(a) Occupational health can be referred to as the creation of a state of physical and mental well-being within the occupational environment while taking into consideration factors relating to the social and domestic life of individual.

(b) Occupational health is also the provision of public healthcare for all people gainfully employed. It takes into account the study of all factors influencing the health of workers at their places of work as well as at home.

(c) A joint ILO/WHO committee defines occupational health as "The promotion and maintenance of the highest degree of physical, mental, and social well-being of workers in all occupations."

The ILO recommendation 112, of 1959 defines occupational health as follows:

(i) Protecting the worker against any health hazard which may arise out of their work or the condition in which it is carried on.

(ii) Contributing towards the physical and mental adjustment in particular by the adaptation of the work to the workers and the assignment to jobs for which they are suited.

(iii) Contributing to the establishment and maintenance at the highest degree of physical, social and mental well-being of workers.

In other words, it is the prevention of departures from health among workers, caused by their working conditions, the protection of workers in their employment from risks resulting from factors adverse to health, the placing and maintenance of the workers in occupational environment

adapted to their physiological and psychological well-being and the adaptation of work to man and each man to his job (WAHEB, 1991:139).

3.1.1 Aims and Objectives of Occupational Health

The aims and 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.

3.1.2 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.

3.2 Scope of Occupational Health

The scope of occupational health is divided into three:

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

3.2.1 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.

3.2.2 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 extracts or dilutes 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.

3.2.3 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 fro 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.

3.3 Evolution of Occupational Health in Ancient Time

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.

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.

` The first observation of the health of miners related to their work was during the middle ages by Agricola (1494-1555) and Paracelsus (1493 - 1541). Agricola described it in "De Re Metallica" as the disease that prevailed in the mining industry. Higher percentage of these workers that died was suspected to have died due to lung conditions. Agricola and Paracelsus organised themselves into societies and pursued the improvement of miners' health and social status. Paracelsus realised that the increasing risk of occupational diseases was necessary and concomitant result of industrial development.

In 1700, Bernardino Ramazzini (1633-1714), a physician and professor of medicine in Modena and Padna in Italy, first published "De Morbis Artificum Diatriba" (The diseases of workmen). This was the first systematic study done on occupational diseases. He made use of his observations and that of his predecessors based on visits to workshops in Modena. He is acclaimed the "father of occupational medicine". He showed much sympathy for the less privileged members of the community.

3.3.1 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.

3.3.2 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.

3.3.3 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.

3.3.4 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.

3.3.5 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.

3.3.6 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 etc.

4.0 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.

5.0 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.

6.0 TUTOR-MARKED ASSIGNMENT

1. Define occupational health?
2. What are the aims and 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?

7.0 REFERENCES / FURTHER READING

21st Century for Professionals and Students. Akure: His Mercy Publishers**.**

Aibor, M. S. & Olorunda, J.O. (2006). *A Technical Handbook of Environmental Health in the*

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

Gill, F. S. & 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.

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

UNIT 2 PRINCIPLES AND PRACTICE OF OCCUPATIONAL HEALTH AND INDUSTRIAL HYGIENE

CONTENTS

1.0 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.

2.0 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.

3.0 MAIN CONTENT

3.1 Principles and Practice of Occupational Health

Occupational health and safety is a broad field relating to medicine and other scientific fields such as law, technology, and economics as well as various industries. Despite the variety of scientific fields, certain basic principles can be identified. They are the following:

(a) All workers have rights: Workers, employers and governments must ensure that these rights are protected to guarantee decent conditions of labour. In 1984 the International labour conference stated thus:
    (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

(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.

3.2 Principles and Practice of Industrial Hygiene

According to Amadi (2011:532) industrial hygiene and safety include:

- sampling of raw materials for toxicity
- engineering control of plants, which involves mainly the redesigning of industrial equipment, tools, and work stations
- storage and disposal of radioactive and industrial toxic wastes or substances
- evaluation/analysis of actual potential hazards or stress in the work place.

4.0 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.

5.0 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.

6.0 TUTOR-MARKED ASSIGNMENT

1. List and explain three principles and practices of occupational health.
2. State and explain two principles and practices of industrial hygiene services.

7.0 REFERENCES / FURTHER READING

21st Century. Akure: His Mercy Publishers.

Aibor, M. S. & Olorunda, J.O. (2006). *A Technical Handbook of Environmental Health in the*

Alli, B. O. (2001). *Fundamental Principles of Occupational Health and Safety*. Geneva: ILO.

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

Asogwa, S. E. (1992). *A Guide to Occupational Health in Developing Countries*. Enugu: Fourth

Assessed 30/06/2012

Dimension Publishers.

www.ilo.org/wcmsp5/public.../@publ/wcms-093550.pdf

UNIT 3 WORK ENVIRONMENT AND PRODUCTIVITY

CONTENTS

1.0 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.

2.0 OBJECTIVES

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

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

3.0 MAIN CONTENT

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

1. **The technical environment:** Technical environments in**c**lude tools, equipment, technological infrastructure and other physical or technical elements. This environment creates elements that

enable workers perform their respective responsibilities and activities.

2. **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.
3. **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 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, trade union practices.

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.

4.0 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

5.0 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.

6.0 TUTOR-MARKED ASSIGNMENT

1 List and explain the factors that positively or negatively affect productivity.
2 Enumerate six factors that contribute to toxic work environment.

7.0 REFERENCES / FURTHER READING

Akinyele, S. T. (2009) "The Influence of Work Environment on Workers' Productivity." *African Journal of Business Management*,. 4(3) March 2010.

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

Brener, P. (2004). *Workers Physical Surrounding*: *Impact Bottom line Accounting*. Smarts Pros.Com.

http://www.academicjournal.org/AJBM (Assessed 30/06/2012)

Opperman, C.S. (2002). *Tropical Business Issues*.. Patner Price Water House Coopers.

UNIT 4 PROXEMICS AND ERGONOMICS

CONTENTS

1.0 INTRODUCTION

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

2.0 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.

3.0 MAIN CONTENT

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.''

3.1.1 Types of Space in Proxemics

The types of space in proxemics include, fixed – feature space, Semi-fixed – 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.

3.1.2 Describing Proxemics Based on Hall's Observation

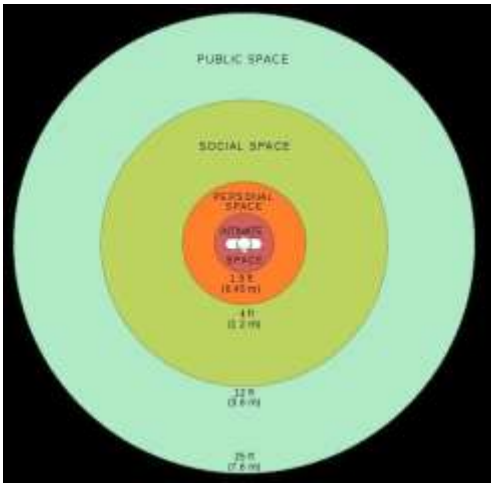

Fig. 1.1: Proxemics Based on Hall's Observation
Source: The Science of Proxemics (2012)

The diagram below 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.

Fig. 1.2: Hall's Observations of Proximal Shifts

S/No	Image	Description	Intimate Distance
1		Expressing affection by embracing, hugging, holding hands, showering love by kissing, cuddling, caressing.	Minimum Distance: <6 inches(15cm) Maximum Distance: 6 – 18 inches(15 to 46cm)
2	**Image**	**Description**	**Personal Distance**
		Casual interaction with friends. Mingling with family members.	Minimum Distance: 1.5 – 2.5 feet(46 – 76cm) Maximum Distance: 2.5 – 4 feet(76 to 120 cm)
3	**Image**	**Description**	**Social Distance**
		Interacting with neighbours and other acquaintances official conversation with colleagues	Minimum Distance: 4-7 feet (1.2 to 2.1m) Maximum Distance: 7-12 feet (2.1 to 3.7m)

4	Image	Description	Public Distance
		Speaking before an audience (public speaking) performing on stage or in a public space	Minimum Distance: 12-25 feet (3.7 to 7.6m) Maximum Distance: 25 feet (7.6m or more)

Source: The Science of Proxemics (2012)

3.1.3 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 extend, 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."

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.

3.1.4 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. 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 bound 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.

3.1.5 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; 2004:145-146).

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.

3.2 Definition and Meaning of Ergonomics

Ergonomics is concerned with the interaction between the worker and the job. 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."

Ergonomics include: Ergonomics of the office and workplace; work ergonomics: minimise back injuries; office chair, posture and driving ergonomics, and manual material handling to prevent injury.

3.2.1 Ergonomics of the Office and Workplace

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 make up 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:

1. 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.

2. 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 non-accidental 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 works 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.

3.2.2 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.

3.2.3 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 (see Figure 1).

Fig. 1.3: Standing Posture

- Keep your 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 (see figure 2).

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 3 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 semi-seated) 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 (see figure 4).

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.

3.2.4 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 (see figure 5).

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 (see figure 6)

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 (see figure 7).

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 (see figure 8).

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 (see figure 9).

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 (see figure 10 and figure 11).

Fig.1.12: Twisting

Fig. 1.13: Pivoting

4.0 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.

5.0 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.

6.0 TUTOR – MARKED ASSIGNMENT

1. What is the definition and meaning of proxemics.
2. Describe ergonomics of the office and workplace.

7.0 REFERENCES / FURTHER READING

Gbefwi, N. B. (2004). *Health Education and Communication Strategies: A Practical Approach for Community – Based Health Practitioners and Rural Health Workers.* Lagos: West African Book Publishers Limited.

http://www.buzzle.com/article/the-science-of-proxemics.html (Assessed 09/07/2012)

http://www.Spine-health.com/Wellness/Ergonomics (Assessed 09/07/2012)

UNIT 5 BASIC OCCUPATIONAL HEALTH TEAM

CONTENTS

1.0 INTRODUCTION

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

2.0 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.

3.0 MAIN CONTENT

3.1 Criteria for Selection of Health Team

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).

3.2 Members of Occupational Health Team

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 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.

3.2.1 Occupational Physician

Occupational physician is trained (and registered) in the management of occupational diseases such as emphysema (chronic bronchitis), asthma and accident. He prescribes drugs to workers and makes suggestions to the management about the improvement of occupational safety.

3.2.2 Occupational Nurse

The occupational nurse is a trained and registered professional 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 illness 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.

3.2.3 Occupational Hygienist Including a Toxicologist

He is mainly concerned with 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.

3.2.4 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.

3.2.5 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.

3.2.6 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.

3.2.7 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.

3.2.8 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.

3.2.9 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.

3.2.10 Medical Laboratory Scientist

He is part of the medical team. He is concerned with the pre-employment, 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 non-communicable diseases. This helps to assess the health status of workers at the work place.

3.2.11 Occupational Radiographer

He is a trained radiologist with adequate knowledge in radiographs**.**

4.0 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.

5.0 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.

6.0 TUTOR-MARKED ASSIGNMENT

1. List three professional health staff involved in occupational health service.
2. Explain the functions of the professional health staff mentioned in 1 above.

7.0 REFERENCES / FURTHER READING

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

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

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

MODULE 2 COMMON OCCUPATIONAL HEALTH PROBLEMS

UNIT 1 COMMON OCCUPATIONAL HEALTH PROBLEMS IN INDUSTRIAL ESTABLISHMENT

CONTENTS

1.0 INTRODUCTION

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

2.0 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.

3.0 MAIN CONTENT

The occupational health problems encountered by workers in industrial establishments are classified into four main categories according to their epidemiological relationships to the factors of occupational environment. These include:

- occupational lung / respiratory diseases
- occupational dermatitis
- occupational injuries and accidents
- occupational cancer.

3.1 Occupational Lung/Respiratory Diseases

Most of the lung/respiratory diseases that afflict workers are known to be occupationally related. 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.

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.

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.

3.4 Occupational Cancer

Cancer as a disease can be categorised under the respiratory disease but in addition to this, it is associated with an exposure to radium.

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.

4.0 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.

5.0 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.

6.0 TUTOR-MARKED ASSIGNMENT

1 List two occupational diseases in industries.
2 State the preventive measures in (a) above.

7.0 REFERENCES/FURTHER READING

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

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

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

UNIT 2 COMMON OCCUPATIONAL HEALTH PROBLEMS IN AGRICULTURAL ESTABLISHMENT

CONTENTS

1.0 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.

2.0 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.

3.0 MAIN CONTENT

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 non-mechanised 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 veterinaries and wild life keepers); brucellosis, bovine tuberculosis, and anthrax (found in animal and cattle rearers; and leptospirosis (characterised by jaundice and fever; Amadi, 2011). Other parasitic diseases include tetanus, sleeping sickness, and malaria.

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.

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.

4.0 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.

5.0 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.

6.0 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.

7.0 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.

UNIT 3 OCCUPATIONAL HEALTH PROBLEMS IN HEALTH CARE ESTABLISHMENT

CONTENTS

1.0 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 establishment.

2.0 OBJECTIVES

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

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

3.0 MAIN CONTENT

3.1 Exogenous Problems

Health workers in health care establishments such as hospitals, health centres, clinics, maternities and dispensaries are faced with numerous health problems. The problems can be classified into two: Exogenous and endogenous.

Exogenous 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.

3.2 Endogenous Problems

(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.

4.0 CONCLUSION

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

5.0 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.

6.0 TUTOR-MARKED ASSIGNMENT

1. Enumerate four factors that contribute to health problems in health establishments.
2. Explain two factors listed in (a) above.

7.0 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.

UNIT 4 COMMON OCCUPATIONAL HEALTH PROBLEMS IN TRANSPORTATION ESTABLISHMENT

CONTENTS

1.0 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.

2.0 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.

3.0 MAIN CONTENT

3.1 Health Problems in Transportation Establishment

It is obvious that many of humanity's productive activities have serious effects on the natural environment. Apart from the use of scarce resources, there are other health problems due to the provision of transportation. A convenient categorisation of these effects includes

pollution, noise, air pollution, pollution of water, soil contamination, biodiversity, land take, safety and accidents.

3.1.1 Pollution

One of the most unwanted side effects of transportation technologies is the pollution of the environment. 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 pollutant 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.

3.1.2 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.

3.1.3 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_2) 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_2) and nitrogen oxides (NO_2) 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.

3.1.4 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.

3.1.5 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.

3.1.6 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.

3.1.7 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.

3.1.8 Safety and Accidents

One of the most disturbing by-products of transportation is injury and loss of life. In 1995, for example, over 10,000 persons lost their lives in Nigeria through auto related accidents with twice or thrice that number sustaining injuries which may be serious or minor. 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.

4.0 CONCLUSION

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

5.0 SUMMARY

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

6.0 TUTOR – MARKED ASSIGNMENT

1. State common health problems in transportation establishment.
2. Write notes on the following:

(i) Noise
(ii) Air pollution
(iii) Water pollution

7.0 REFERENCES/FURTHER READING

Anekwe, C. M. **(**1987). "Some Factors Affecting Transportation Development In Nigeria." *Journal of the Federation of Building and Civil EngineeringContractors in Nigeria*, 4 (2).

Lee, B. et al**.** (1972). "Taxi Cab Usage in New York City Poverty Areas". *Highway Research Record*, No. 403.

Steward, C. E. et al. (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. (Assessed 02/09/2012)

The Roles of Transportation in Nigerian Society.http://www.ilorin.info/.../... (Assessed 02/09/2012)

UNIT 5 CONSTRUCTION SETTINGS

CONTENTS

1.0 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.

2.0 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.

3.0 MAIN CONTENT

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.

3.1.1 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.

3.1.2 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.

3.1.3 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.

3.1.4 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.

3.1.5 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.

3.1.6 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.

4.0 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.

5.0 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.

6.0 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.

7.0 REFERENCES / FURTHER READING

http://www.ehow.com/list_construction_safety_checklist.html
(Assessed 03/09/2012)

MODULE 3 OCCUPATIONAL HEALTH POLICIES

UNIT 1 OCCUPATIONAL HEALTH POLICIES, REGULATIONS AND REGULATORY AGENCIES

CONTENTS

1.0 INTRODUCTION

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

2.0 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.

3.0 MAIN CONTENT

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 polices 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.

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

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.

ii. Overcrowding

With respect to overcrowding, regulation aims to ensure that all factories where work is being carried on should not be so overcrowded as to cause risk or injury to the health of persons employed therein. To this end, each workroom must not be less than 9ft (2.75m) high measured from floor to the lowest part of the ceiling or where there is no ceiling, to the lowest part of the roofing material. The cubic capacity space available for each worker must be at least 400 cubic ft (11.33m^3). This cubic air space excludes any space that may be3 more than 14ft (4.30m) from the floor level.

iii. Ventilation

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 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 emphasised 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

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. Particular attention should be paid to the replacement of dead bulbs and fluorescent tubes. Glazed windows and skylights used for the lighting of workplaces and passages are kept clean and unobstructed except screens used to mitigate heat or glare penetration.

v. Drainage of floors

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

Provision usually requires that sufficient and suitable sanitary conveniences be provided, maintained 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." However, in order to have ease of usage, the following requirements 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.

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 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

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 form 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. H I, 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.

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 monitory 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 identity 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)

4.0 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.

5.0 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.

6.0 TUTOR-MARKED ASSIGNMENT

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

7.0 REFERENCES / FURTHER READING

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

Federal Government of Nigeria (1999). *Constitution of the Federal Republic of Nigeria.* Abuja: Government Printing Press.

Federal Government of Nigeria (1987*). Factories Act 1987.* Lagos: Government Printing Press.

Olojoba, A. O. (2009). *Occupational Safety Services and Public Helath*. Ughelli: Ama Ohoror Printing Press Coy.

WAHEB (1999). *Waste Disposal and Environmental Hazard Control*. Ibadan: Sterling Consultants.

www.ilo.org/dyn/nat/ex/docs/WEBTEXT/.../E87NGAOI.html (Assessed 31/07/2012)
www.elri-ng.org/newsandrelease2.html (Assessed 01/08/2012)

www.occmed.oxfordjournals.org/content/59/3/201full (Assessed 31/07/2012)

UNIT 2 EVALUATION AND MEASUREMENT OF EXPOSURE LEVELS

CONTENTS

1.0 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 area that have implications on the health of the workers and /or people and proffer solution.

2.0 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.

3.0 MAIN CONTENT

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.

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.

3.2.1 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.

3.2.2 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.

3.2.3 Measurement of Physical Agents

(i) Heat

Body temperature stays within the range of 36-39^{o}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 (presbycosis). 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 tuber
- scintillation counters
- proportional counters
- film badges
- thermoluminescent dosimeters.

3.2.4 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.

3.2.5 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).

3.2.5.1 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.

3.2.6 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.

3.2.7 Personal Protective Equipment (PPE)

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

3.2.7.1 Types and Uses of Personal Protective Equipment (PPE)

S/No	Types of PPEs	Use
1	Hand gloves (Rubber and cotton)	Used in all work places to hold firmly and prevent hand contamination or skin penetration.
2	Goggles	To protect the eye from excessive heat and ultra violet radiations.
3	Helmet	To protect the head from injury or unexpected accidents.
4	Respirators	To help in supplying unpolluted oxygen in an environment where there is shortage or non-availability of oxygen.
5	Ear protector/mumps	To prevent damage to the ear drums and prevent impairment of the ear.
6	Rubber boots	To prevent against wounds and injuries to the legs, tetanus and skin penetrable infections.
7	Face masks	To protect the eyes, nostrils and the mouth from inhaling of dangerous dust or fume particles

Source: A Technical Handbook of Environmental Health (2006,)

4.0 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 equipments 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.

5.0 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.

6.0 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.

7.0 REFERENCES / FURTHER READING

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

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

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

WAHEB (1999). *Waste Disposal and Environmental Hazard Control*. Ibadan: Sterling Consultants.

www.noun.ed.ng/.../...CHS 413 (Assessed 02/08/2012)

UNIT 3 WORKSITE WELLNESS PROMOTION PROGRAMMES

CONTENTS

1.0 INTRODUCTION

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

2.0 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.

3.0 MAIN CONTENT

3.1 Meaning of Workplace Wellness Promotion Programme

Workplace wellness is a term used to describe workplace health promotion activities and organisational polices designed to support healthy behaviour in the workplace and to improve health outcomes. 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.

3.1.1 Rationale

Obesity and related conditions have risen to epidemic levels in the developed world and around the globe. The causes for this are numerous and included among the list are increases in automation and labour – saving devices that have resulted in a change in the way we live and work. Many workplaces are now sedentary settings and often provide easy access to energy-dense food and beverages. As a result, workplaces are contributing to the obesity epidemic.

3.2 Employee Health Programmes

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 Workplace Safety Programmes

Nearly 50 workers are injured every minute of the 40-hours work week. Workplace safety programmes can help reduce work-related illnesses and injuries, while also reducing worker's compensation costs. Workplace safety programmes help develop conscientious employees who look out for their own safety and for the safety of their fellow workers.

The topics of enlightened workplace safety programmes range from analysing your workplace and removing hazards, to complying with

regulatory requirements, to investigating accidents, to effectively encouraging employee involvement.

3.4 Workplace Productivity Programmes

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.

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

3.5 Corporate Wellness Programmes

Corporate wellness programmes boost productivity, increase employee health and wellness, reduce on-the-job stress, and cut healthcare costs. 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.

4.0 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.

5.0 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.

6.0 TUTOR-MARKED ASSIGNMENT

Write notes on the following worksite wellness promotion programmes:

(i) Employee wellness programme
(ii) Corporate wellness programme

7.0 REFERENCES / FURTHER READING

http://www.en.wikipedia.org/wiki/Workplace_wellness
(Assessed 13/08/2012)

http://www.wellnessproposals.com/wellness-articles/corporate-well/
(Assessed 13/08/2012)

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 1 OCCUPATIONAL STRESS

CONTENTS

1.0 INTRODUCTION

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

2.0 OBJECTIVES

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

- give the definition and meaning of 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.

3.0 MAIN CONTENT

3.1 Definition and Meaning of Occupational Stress

Stress, by definition, is the interaction between an individual and the demands and burdens presented by the external environment. 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. Managers as well as other kinds of workers are vulnerable to work overload (Primm, 2005).

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.

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. 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.

3.1.1 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.

3.1.2 Prevalence

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.

3.1.3 Economic Factors

Economic factors that employees are facing in the 21st 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.

3.1.4 Preventive Measures

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.

4.0 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.

5.0 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.

6.0 TUTOR-MARKED ASSIGNMENT

State the signs of occupational stress.
Enumerate the preventive measures of workplace stress.

7.0 REFERENCES / FURTHER READING

NIOSH (1999). "Stress at Work." *DHHS (NIOSH) Publication*, 99 - 101. US Nat. Inst. for OSH.

Primm, D. (n.d,). "What Workplace Stress Research is." *Technical Communication,* 52 (2005), 449 – 455.

Thomas, W., Colligan, M. S. W., & Higgins, M. (2006). "Workplace Stress." *Journal of Workplace Behavioural Health* 21 (2) 89 - 97 D0I:10. 1300 / J490 v 2 - 07.

http://www.en.wikipedia.org/Occupational_stress (Assessed 16/08/2012)

UNIT 2 OCCUPATIONAL DISEASES

CONTENTS

1.0 INTRODUCTION

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

2.0 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.

3.0 MAIN CONTENT

3.1 Occupational Diseases in Industrial Establishments

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.

3.1.1 Silicosis

Silicosis is a pneumoconiosis caused by the inhalation of 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.

3.1.2 Asbestosis

Asbestosis is a progressive, irreversible disorder arising from the inhalation of silicates with no free silica content which is caused by the inhalation of asbestos fibres.

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.

3.1.3 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 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 duty work environment.

3.2 Occupational Diseases in Agricultural Establishment

Occupational diseases in agricultural establishment include: Anthrax, Bruccellosis, Byssinosis, and Bagassosis.

3.2.1 Anthrax

(i) **Occurrence:** Anthrax is an endemic disease among agricultural workers. 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:** Within seven days, usually two to five days.

(iv) **Mode of transmission:** The organism 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:** 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 usually referred to as malignant pustule with ring of blisters and marked oedema.

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.

3.2.1 Bruccellosis

(i) **Occurrence:** Brucellosis is a disease that is world-wide. 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 21days 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) All infected animals must be destroyed and buried in a deep lime-pit.

(b) Pasteurise all milk products before consumption.

(c) Occasionally, exposed workers should be educated on the high infective rate of the disease and that great care must be taken when handling meat or specimen from them.

3.2.3 Byssinosis

(i) **Occurrence:** Brucellosis 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 cough, with or without sputum, dyspnoea and undistinguished from chronic bronchitis.

3.2.4 Bagassosis

(i) **Occurrence:** Bagassosis is an allergic condition among farmers that inhale fungal spores (Thermoactinomyles vulgaries) contained in sugar cane fibres after extraction of sugar water from the cane stalk. Fibres are called bagasse and used for making board.

(ii) **Signs and symptoms:** The signs and symptoms are fever, breathlessness and severe cough.

(iii) **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.

3.3 Occupational Diseases in Health Care Establishments

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

3.3.1 Tuberculosis

(i) **Occurrence:** Tuberculosis 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). This is responsible for pulmonary tuberculosis.

(b) Mycobacterium tuberculosis (Bovine type). This affects cattle more than man.

(iii) Incubation period: From four to six weeks

(iv) Mode of transmission:

(a) Human Type: Infection is primarily due to close or frequent contact with an infective case by reason of employment. 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.

3.3.2 Serum Hepatitis B

(i) Occurrence: Serum hepatitis B occurs world-wide and its endemicity is seasonal and varies. This disease is found mainly in medical and Para-medical staff, especially those working in renal dialysis units, blood transfusion centres, veneral disease clinics and laboratories.

(ii) Infectious agent: Probably a virus.

(iii) Incubation period: From 80 to 100 days

(iv) Mode of transmission: The virus gets into the body by inoculation either orally or through veneral spread.

(v) Signs and symptoms: The disease is manifested by acute fever, headache, marked malaise, and fever with jaundice. 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.

4.0 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.

5.0 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.

6.0 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

7.0 REFERENCES/FURTHER READING

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

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

UNIT 3 ENVIRONMENTAL AND OCCUPATIONAL HAZARDS

CONTENTS

1.0 INTRODUCTION

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

2.0 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.

3.0 MAIN CONTENT

3.1 Environmental Hazards

Any condition in a work place that has the potential to cause harm (illness or injury) 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 (West Africa Health Examinations Board, 1991).

3.1.1 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 (Klaassen, 2001), avian influenza, bovine spongiform encephalopathy (BSE), carcinogens, cholera, cosmic rays, DDT (Litovitz et al., 1999), dioxins, drought, dysentery, electromagnetic fields, endocrine disruptors, epidemics, e-waste, explosive material, floods, food poisoning, fungicides, furans, haloalkanes, heavy metals (thomas and chisolm, 1986 and Baselt, 2008), herbicides, hormones in animals destined for human consumption, lead in paint, light pollution, lighting, lightening, malaria, marine debris, mercury (Truhaut, 1977), moulds, mutagens, noise pollution (Amdur, 1991), onchocerciasis (river blindness), pandemics, Pathogens, Pesticides, pollen for allergic people, polychlormated biphenyls (pcb), quicksand, rabies, radom and other natural sources of radioactivity, severe acute respiratory syndrome (SARS), sick building syndrome, soil pollution (Dix, 1981), tobacco smoking (Emeharole, 2009), toxic waste (Casarette and Doull, 1975), ultraviolet light, vibration, wildfire, and x-rays.

3.1.2 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.

3.2 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.

3.2.1 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.

3.2.2 Physical Hazards

Physical hazards include noise, vibration, unsatisfactory lighting, radiation and extreme temperatures etc.

(a) Heat and cold: The common physical hazard in most work-place is heat. The direct effects of heat exposure are burns, heat exhaustion, heat stroke 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 chiblains (inflammation of the hands and feet caused by exposures to cold and moisture), erythocyonosis, immersion foot, and frostbite (destruction of tissue by freezing).

(b) Light: 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), 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 a health hazard in many industries and workplaces including airports, noisy machines such as presses or drills are used. The effects of noise are of two types:

- auditory effects which consist of temporary or permanent hearing loss
- 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: Ionising radiation is finding increasing application in medicine and industry, for example, x-rays and radioactive isotopes. The radiation hazards may result to genetic changes, malformation, cancer, leukaemia, depilation, ulceration, sterility and in extreme cases death.

3.2.3 Biological Hazards

Biological hazards include bacteria, viruses, fungi, infectious waste, infestations, and parasites. Most of these hazards get released from our industries as waste emissions and discharged as solids, liquid or gases, depending on the production process and waste disposal method adopted. 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.

3.2.4 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.

3.2.5 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.

3.2.6 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).

4.0 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.

5.0 SUMMARY

In this unit, you have learnt **e**nvironmental 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.

6.0 TUTOR-MARKED ASSIGNMENT

(1) State two environmental and two occupational hazards.
(2) List the control measures for (1) above

7.0 REFERENCES/FURTHER READING

Achalu, E. I. (2002). *Occupational Health and Safety*. Lagos: Simarch.

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

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

Olojoba, A. O. (2009). *Occupational Safety Services and Public Health*. Ughelli; Ama Ohoror Printing Press Company.

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

http://www.en.wikipedia.org/wiki/List-of-environmental-health-hazards (Assessed 02/07/2012)

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

CONTENTS

1.0 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.

2.0 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.

3.0 MAIN CONTENT

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.

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.

4.0 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.

5.0 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.

6.0 TUTOR-MARKED ASIGNMENT

1. Enumerate four personal or human factors that result to accidents in the workplace.
2. List four environmental factors that give rise to accidents in the working environment.

7.0 REFERENCES/FURTHER READING

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

Asogwa, S. E. (1992). *A guide to Occupational Health Practice in Developing Countries.* Enugu: Fourth Dimension Publication.

Onuzuike, N. (2003) *Fundamentals of Safety Education*. Onitsha: Africana Fep Publishers.

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 1 METHODS OF PREVENTION AND CONTROL

CONTENTS

1.0 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.

2.0 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.

3.0 MAIN CONTENT

3.1 General Methods of Prevention and Control

The general methods 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.

ii. Total enclosure of the process and the hazard: 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, providing the rate of heat generated by a process.

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

xi. Monitoring of the environment: This should be undertaken to measure the effect that control procedures are achieved.

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.

4.0 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.

5.0 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.

6.0 TUTOR-MARKED ASSIGNMENT

1. State five general methods of prevention and control.
2. Enumerate five general measures for industrial accident prevention.

7.0 REFERENCES/FURTHER READING

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

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

UNIT 2 SAFETY PROCEDURE IN DIFFERENT OCCUPATIONS

CONTENTS

1.0 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.

2.0 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.

3.0 MAIN CONTENT

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.

3.1.1 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.

3.1.2 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.

3.1.3 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.

3.1.4 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.

3.1.5 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.

3.2 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.

3.2.1 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.

3.2.2 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.

4.0 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.

5.0 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.

6.0 TUTOR-MARKED ASSIGNMENT

1. List three general occupational safety procedures.
2. State one occupational safety procedure for agricultural tools.

7.0 REFERENCES / FURTHER READING

Taunda, E. (2012). *Occupational Safety Procedures*.

www.ehow.com/legal Assessed 04/08/2012

UNIT 3 SAFETY MANAGEMENT

CONTENTS

1.0 INTRODUCTION

In the last unit, you learnt about safety procedure in different occupations. In this unit, you should learn safety management in the workplace.

2.0 OBJECTIVES

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

- give the definition and meaning of safety
- discuss the safety management concepts.

3.0 MAIN CONTENT

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 of being resulting from the modification of man's environment and behaviour (Onuzuike, 2003).

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.

History reveals that the early man, out of safety consciousness, lived in caves or treetops to protect himself against dangerous wild beasts and enemy tribes. He soon learned to cover the entrance to his cave with a huge stone. As time went on, man invented tools and weapons. He equally learned to build stronger and safer places (houses) in which to live.

In 18th 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.

3.2 Safety Management Concept

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.

3.2.1 Personnel

The health and safety of your workers 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.

3.2.2 Premises

Buildings, parking lot 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.

3.2.3 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.

3.2.4 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.

3.2.5 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.

3.2.6 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.

4.0 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.

5.0 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.

6.0 TUTOR-MARKED ASSIGNMENT

1. What is the meaning of safety in occupational health?
2. State and explain any three areas addressed within safety management concepts.

7.0 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. (n.d.) *Key Safety Management Concepts*.http://www.docstoc.com/article/.../key-safety-management-concepts (Assessed 05/08/2012)

UNIT 4 CHECKLIST FOR INDUSTRIAL INSPECTIONS

CONTENTS

1.0 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.

2.0 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.

3.0 MAIN CONTENT

3.1 Checklist in Workplace

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:

S/N	DATE OF INSPECTION: TIME:	Excellent (3)	Good (2)	Poor (0)	Action Required
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:	Excellent (3)	Good (2)	Poor (0)	Action Required
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				

S/N	DATE OF INSPECTION: TIME:	Excellent (3)	Good (2)	Poor (0)	Action Required
5.	Emergency lighting operable				
D	**CHEMICALS ON – SITE:**				
1.	MSDS (Material Safety Data Sheet) for all chemicals				
2.	Containers clearly labelled				
3.	Do special storage conditions apply?				
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				

S/N	DATE OF INSPECTION: TIME:	Excellent (3)	Good (2)	Poor (0)	Action Required
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				

S/N	DATE OF INSPECTION: TIME:	Excellent (3)	Good (2)	Poor (0)	Action Required
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				

S/N	DATE OF INSPECTION: TIME:	Excellent (3)	Good (2)	Poor (0)	Action Required
	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:**				

S/N	DATE OF INSPECTION: TIME:	Excellent (3)	Good (2)	Poor (0)	Action Required
1.	EIA/EHIA Report				
2.					
3.					
4.					
5.					
6.					

Source: http://www.rtbu-nsw.asn.au/...Workplace

4.0 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.

5.0 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.

6.0 TUTOR – MARKED ASSIGNMENT

List the main features of checklist used in conducting industrial inspection.
Explain the content of chemical on-site in the checklist.

7.0 REFERENCES/FURTHER READING

http://www.rtbu-nsw.asn.au/.../Sample-Workplace-Inspection-Checklist.doc (Assessed 13/08/2012)