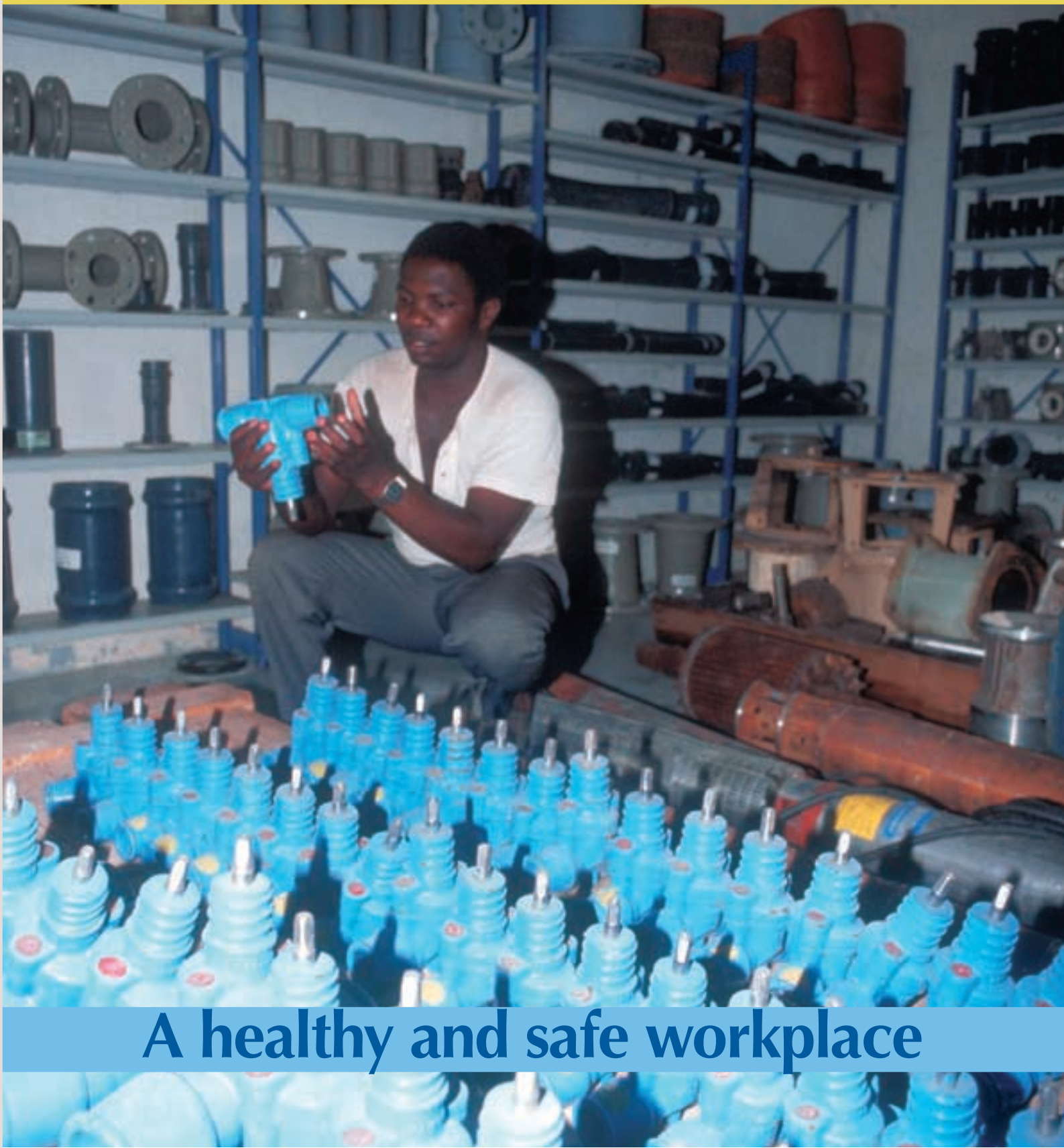


# African Newsletter on Occupational Health and Safety

Volume 14, number 2, August 2004



**A healthy and safe workplace**

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A healthy and safe workplace

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## Contents

<b>Editorial</b> J. Rantanen FINLAND	27
<b>WHO and ILO Joint Effort on Occupational Health and Safety in Africa</b> G. Eijkemans WHO	28
<b>Effects of improper hospital-waste management on occupational health and safety</b> S.V. Manyele TANZANIA	30
<b>Heat stress in date-palm workplacesd A study in the Algerian oases</b> M. Mohamed ALGERIA	34
<b>Work-related diseases and occupational injuries among workers in construction industry</b> R.M. Alazab EGYPT	37
<b>A healthy and safe workplace</b> M. Adamson ZAMBIA	42
<b>Uganda launched and celebrated World Day for Safety and Health</b> M. Ronaldley, M.W. Senyonjo UGANDA	45
<b>A public health project in Ghana</b> S. Lehtinen FINLAND	47

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# A healthy and safe workplace

A healthy and safe workplace is a recurrent topic of discussion in serious talks, strategies and programme texts, as well as in modern legislation. In the minds of occupational health and safety experts, it means a workplace that is free of the risk of diseases and accidents, physical, chemical and biological exposure, and ergonomic problems.

Such characteristics may make a workplace safer, but they do not ensure that it is healthy. Also the organization of work needs to be optimal, the psychological aspects of the workplace, including workplace climate, need to be optimized, and the psychosocial quality of the workplace should meet high standards. In addition, the organization development experts call for possibilities for the workers to influence their own work, fair leadership and management practices, possibilities to develop and learn at one's work, and a job content that is meaningful and offers challenges and possibilities to meet them. There is a growing body of research evidence showing that all of these have also an impact on health and safety.

Is such a workplace a realistic objective? My answer is yes, but it is not yet a reality for the vast majority of workers in the world. Still 20 to 30% of the workers in the industrialized countries, and up to 50–70% of the working people in developing countries are exposed to the traditional physico-chemical, ergonomic and safety hazards, and up to 70% of workers in many sectors, such as health care services, report unreasonable time pressure at work leading to stress. Occupational health services are available for only 10–20% of the workers of the world, and more than one billion workers daily work in conditions which do not ensure them even the minimum level of earnings needed to avoid poverty. In spite of impressive health and safety programmes in the most advanced industrialized countries, when one looks at the global averages, the list of problems and challenges is growing very long.

We are still far from the WHO and ILO objectives of occupational health and safety, and of decent work for all. However, in spite of the less positive average situation, we can see some encouraging trends: numerous training programmes are ongoing in the developing countries and in countries in socio-economic transition. Thousands of experts are conducting studies to ensure that the next generation in our field will be competent and skilful. Numerous development programmes are being carried out with the help of ILO and WHO, and, for example, of the US Fogarty Foundation, Swedish SIDA, Japanese Government, and Finnish development programmes, just to mention a few. Training is the most common topic of these programmes, and it is appropriate as serious occupational health



and safety actions cannot be implemented without special competence. Training also has a very sustainable impact; a person once trained carries on his or her knowledge and competence throughout his/her work career.

But training alone is not enough. We also need policies, legislation, enforcement and implementation, national programmes, service infrastructures, information and data systems, and at least a minimum amount of research. Many developing countries do not have such a battery of resources. This is not merely dependent on the availability of funding, but also on awareness and prioritization. Much can be done with existing resources by proper organization, upgrading of knowledge and competence, and by encouraging local activities with the help of advice and guidance. Many experts in develop-

ing countries know what to do, and they are motivated to act provided the minimum prerequisites are offered to them. There is also evidence that if sufficient prerequisites are provided the results are concrete and often sustainable. The best way to support the local experts in developing countries is to establish and develop permanent infrastructures from which the experts can serve the workers and enterprises. The recent ICOH-ILO-WHO initiative on global action for Basic Occupational Health Services aims at such an infrastructure.

Can we afford to build such an infrastructure? As we study the economic aspects of health and safety, a growing body of evidence shows that occupational health and safety risks cause unreasonable costs to enterprises, societies and the workers themselves. Most of these losses could be prevented. Some studies also show that besides loss control, a good occupational health and safety standard is closely associated with the productivity of a company. We are gradually learning that inputs to health and safety are good investments. Such data make us think about the affordability of health and safety programmes in a new light. The question is no longer whether we can afford health and safety, but rather whether we can afford to be without it.

We are at a turning point in understanding that a healthy and safe workplace is not a burden, but a resource for all, enterprises, societies, countries, and the working people.

A handwritten signature in black ink, appearing to read 'Jorma Rantanen', written in a cursive style.

Professor Jorma Rantanen, President of the International Commission on Occupational Health

# WHO and ILO Joint Effort on Occupational Health and Safety in Africa

G. Eijkemans  
WHO

## Background

Hundreds of millions of people throughout the world are working today under circumstances that foster ill health and/or are unsafe. It is estimated that yearly over two million people worldwide die of occupational injuries and work-related diseases, and the WHO's World Health Report, 2002, indicates that 1.5% of the global burden in terms of disability-adjusted life years (DALYs) result from only a selected subset of occupational risks.

In developing countries, the above-mentioned risk reaches a proportion that is estimated to be 10–20 times higher than in established market economies. An additional problem to the situation of workers in the African Region is the high prevalence and incidence of HIV/AIDS.

Thus, this heavy burden due to the current neglect calls for urgent strengthening of the field of occupational hazard prevention and control in Africa. Safer and healthier working conditions can make an important contribution to poverty alleviation and sustainable development. In this context, efficient application of available knowledge to develop practical solutions to overcome the "knowledge application gap" is more important than generating new theoretical knowledge.

In the field of occupational health and safety, many activities are going on; countries are setting up information systems, training their health personnel, labour inspectors, and other relevant actors; policies and guidelines are being developed, and there is a large group of international collaborators from different regions that are supporting those activities. Traditionally, there has been a lack of coordination between the dif-

ferent actors, and the danger of overlap and duplication exists. This leads to a loss of scarce and valuable resources, to duplication of efforts, and to a slow down of the process that is needed to improve the working conditions of all workers in Africa, as soon as possible. It is with the view to address this situation that the concept of the WHO/ILO Joint Effort on Occupational Health and Safety, in short African Joint Effort (AJE) was developed. The initiative led by WHO and ILO, aims at protecting the workforce and ensuring safety and health at work through fostering partnerships.

## The WHO/ILO Joint Effort on Occupational Health and Safety in Africa

By joining the efforts between the ILO and WHO, the relationships that ILO and WHO have with respectively the Labour and Health sectors have a huge dynamic potential for improving the health of workers in the Region. The recognition of the importance of collaboration of the two organizations in occupational health led, already in 1950, to the First Session of the Joint ILO/WHO Committee on Occupational Health to provide guidance to both organizations. In the recent 2003 ILO/WHO Joint Committee on Occupational Health the African Joint Effort was mentioned as an example of a model for collaboration at regional and national level.

Joining WHO and ILO efforts also sends a strong message to Ministries of Health and Labour to work together; it also gives the potential of "hosting" other partners; although objectives of the different players will undoubtedly be various and diverse, there is one final

objective that joins all: improve the health and the safety of workers in Africa.

So far, progress has been made at different levels:

- Joint Effort Action Plans have been developed, including funding for selected activities in the four identified areas (see Statement of Intent)
- Advances in the ILO/WHO Global Campaign to Eliminate Silicosis have been made
- A constantly updated website on occupational health in Africa ([www.sheaffrica.info](http://www.sheaffrica.info)) exists
- Training and research activities have been carried out in several countries and many partners have supported the ongoing activities; The involvement of ICOH, IOHA and WHO Collaborating Centres and ILO CIS Centres in many training and information dissemination activities have been strengthened
- A Clearing House for Occupational Health and Safety Information was set up in the National Institute for Occupational Health in South Africa
- Joint national profiles on occupational health and safety developed in selected countries and Joint national planning has started
- A Statement of Intent has been signed by the regional directors of WHO and ILO in the African Region in 2003, and has been sent to the Ministries of Health, labour and workers' and employers' organizations in all countries (see the statement text on next page).

## The future

The Joint Effort is a dynamic and growing partnership. The WHO Collaborat-

ing Centres in Occupational Health and the ILO CIS Centres play an important role in supporting the active implementation of the AJE.

One of the main principles of the AJE is the "joint action". It invites all partners that are carrying out activities in

Africa to join the AJE. The principle is that the potential of joining forces is much stronger than the sum of just the individual forces. For additional information, please contact Dr. Gerry Eijkemans, Headquarters WHO, Geneva, at [eijkemansg@who.int](mailto:eijkemansg@who.int)

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## Statement of intent

### WHO/ILO Joint Effort on Occupational Health and Safety in Africa

The emergence of new technologies and expansion of trade and financial regimes have accelerated the speed of globalisation. The record of globalisation is mixed; some countries have been able to take advantage of the market economy, while others have become more marginalised, disintegrated, and impoverished. Market forces and economic growth have not been able to guarantee social justice, employment and development for all.

The number of poor has increased in absolute terms during the second half of the 1990s in almost all regions of the World, especially in Africa.

At present rapid changes in working life are affecting both the health of workers and the environment. This is particularly the case of the African Region where the introduction of new technologies, new chemical substances and materials have led to new occupational and work-related diseases and injuries, while the traditional hazards, such as high dust or noise levels in the workplace, have not been dealt with adequately. This leads to an increased burden of occupational diseases and injuries.

In the formal economy, sub-contracting and flexible working arrangements have increased, often further compromising health and safety standards of the poor. The HIV/AIDS pandemic is eroding the human resource capacity by reducing the labour force in all sectors and posing a major burden on the basic health care systems.

Because comprehensive and harmonised data collection systems are poorly developed, information concerning occupational diseases and injuries in developing countries is difficult to obtain. However, the magnitude of the problem is grave; ILO estimates that 2 million workers die each year from work-related injury and illness. In the 2002 World Health Report, WHO concluded that workplace hazards are re-

sponsible globally for 37% of back pain, 16% of hearing loss, 13% of COPD, 11% of asthma, 10% of injuries, 10% of lung cancer, and 2% of leukaemia. In 2002, in Sub-Saharan Africa alone, ILO estimates more than 257 000 total work-related fatalities, including about 55 000 injuries. These health outcomes provoke a loss of roughly 4 per cent of GNP due to workers' compensation, lost work days, interruption of production, retraining, medical expenditures and so on, not even counting the suffering and poverty caused in families by those deaths and diseases.

Many activities, including technical cooperation as well as research, capacity building, training, information generation and dissemination, have been carried out by ILO and WHO over the years with a view to diminishing the number of occupational accidents and diseases, within the framework of ILO OSH Conventions and the Decent Work Agenda and the WHO strategy on Occupational Health for All. Many other national and international agencies and donors have over the years heavily invested in improving health and safety in Africa. However, the results of all the efforts have been limited, partly due to a lack of coordination and cooperation among the interested parties.

One of the recommendations of the 12<sup>th</sup> Session of the ILO/WHO Joint Committee on Occupational Health was that cooperation and coordination between WHO and ILO needs to focus more on actions at regional level. The current occupational health and safety situation in Africa calls for a special focus on this region, and WHO and ILO responded by the initiation of joint planning exercise and by implementing activities, that have led to the creation of the Joint Effort on Occupational Health and Safety in Africa, short African Joint Effort or AJE.

The Joint Effort is a demonstration of commitment and an endeavour by WHO and ILO to improve the health, safety and quality of life of workers in Africa, serving as a liaison and coordination platform for the different actors in the field of occupational health and safety in Africa.

The objective of this Joint Effort on Occupational Health and Safety in Africa is to improve working conditions and work environment in Africa thus reducing the burden of occupational diseases and injuries, through intensified coordination of occupational health and safety activities.

The focus areas of the AJE are

- Human resource development focused on capacity building
- Assistance with national policies, programmes and legislation
- Information generation and dissemination, research and awareness raising
- Promotion of occupational health and safety to protect workers in particularly hazardous occupations, vulnerable groups (including informal sector workers, women, and children), and in newly transferred technologies.

The activities conducted by WHO and ILO as part of the AJE will be based on the needs and priorities identified by the African regional, governmental and workers' and employers' organizations.

Each collaborative activity will be agreed on a case by case basis, subject to the availability of funds.

In order to achieve the objective of the AJE a firm commitment is needed from national governments, social partners and other relevant stakeholders. WHO and ILO hope that this AJE will bring a renewed focus on occupational health and safety in the region, facilitate national and international coordination and cooperation in the field of occupational health and safety, and finally improve the health and safety of workers in Africa.

Dr E.M. Samba      Date 13.11.2003  
Regional Director/AFRO

Dr H. A-R. Al Gezairy      Date 14.11.2003  
Regional Director/EMRO

Ms Amadi-Njoku      Date 19.11.2003  
ILO Regional Director for Africa

# Effects of improper hospital-waste management on occupational health and safety

S. V. Manyele  
TANZANIA

## Introduction

The improper management of medical waste causes serious environmental problems in terms of air, water and land pollution. The nature of pollutants can be classified as biological, chemical and radioactive. Environment problems can arise from the mere generation of medical waste and from the process of handling, treatment and disposal. This paper analyses the effects of improper medical waste management and recommends proper means for safeguarding health care workers.

Mismanagement of hospital waste implies a combination of improper handling of waste during generation, collection, storage, transport and treatment. Improper handling comprises several unsafe actions, such as handling without personal protective equipment (PPE), poor storage (e.g. high temperature conditions combined with prolonged storage times before treatment), manual transport for longer distances, use of uncovered containers instead of closed plastic bags, etc. Other examples include exposure times beyond acceptable limits, lack of worker and equipment decontamination procedures, etc., all of which affect hospital workers in different ways.

In Tanzania, hospital waste was largely mismanaged in the past, mainly because the sector did not know what to do with the waste. The procedures for safe waste handling were not adhered to; for example, there were deficiencies in designation and identification of infectious waste, segregation, packaging and storage, as well as in transport procedures. Following countrywide training of incinerator operators and health officers in 2003, the management of hospital waste is now taking a new shape. However, treatment techniques

for hospital waste are still poor. There are neither proper methods of treated waste disposal nor written contingency plans.

Safeguarding the health care workforce against occupational health risks arising from hospital-waste management calls for effective infectious waste control measures. In addition to protecting workers' health, such control measures protect public health and the environment from the hazards posed by hospital waste. Proper management ensures that infectious waste is handled in accordance with established and acceptable procedures from the time of generation through treatment of the waste and its ultimate disposal.

The first issue is to define what is meant by hospital waste. The terms 'hospital waste', 'medical waste', 'regulated medical waste', and 'infectious waste' remain poorly defined in the literature (1). No standard, universally accepted definition for these terms exists, and many definitions are in use by practitioners and regulators. Given the diversity of interest and scientific credentials of persons, groups, and agencies (e.g. physicians, health departments, hospitals, environmentalists, trade unions, and state legislators) involved in the medical waste issue, these differences should be expected. However, adoption of a definition by a regulatory agency has serious ramifications because it dictates all the terms.

'Hospital waste' (or solid waste) refers to all waste, biological or non-biological, that is discarded and not intended for further use. 'Medical waste' refers to materials generated as a result of patient diagnosis, treatment, or the immunization of human beings or animals. 'Infectious waste' refers to the portion of medical waste that could transmit an infectious disease (2). Thus, 'medical

waste' is a subset of 'hospital waste', and 'regulated medical waste', which is synonymous with 'infectious waste' from a regulatory perspective, is a subset of 'medical waste'.

As stated, infectious waste is waste that is capable of producing an infectious disease; chances of this are higher within hospitals than outside (2, 3, 4). This definition requires consideration of the factors necessary for induction of disease, which include dose, host susceptibility, the presence of a pathogen, the virulence of a pathogen, and the most commonly absent factor, a portal of entry (2). Therefore, for waste to be infectious, it must contain pathogens with sufficient virulence and quantity so that exposure to the waste by a susceptible host could result in an infectious disease.

Other health care settings, such as dental offices and nursing homes, present work environments similarly complicated as those in hospitals, where workers face a variety of occupational hazards. The hazards can be classified in the following categories: biological or infectious hazards (bacteria, such as tuberculosis, and viruses, such as HIV, hepatitis B and hepatitis C, which can be transmitted by contact with infected patients or contaminated body secretions/fluids); chemical hazards (medications, solutions, or gases, such as ethylene oxide, formaldehyde, glutaraldehyde, waste anaesthetic gases, nitrous oxide, chemotherapeutic agents, laser smoke and aerosolized medications such as Pentamidine); and physical hazards (ionizing radiation, lasers, noise and electricity).

## Exposure routes for hospital waste

The occupational health effects of medical and other hazardous wastes depend

on the duration of exposure and the dose of toxic components that enters the worker's body from the waste. Unmanaged hospital waste constitutes a hazard to the personnel because it contains toxic chemicals and pathogens ready to enter the human body through different routes of exposure (4).

The routes of health care workers' exposure to hazardous substances contained in hospital waste include ingestion (swallowed material), inhalation (airborne chemicals and pathogens), and dermal absorption or through skin openings (3, 4). Due to the structure of the human lung, the body's retention capacity for airborne particulates that carry toxic chemicals and pathogens is highly dependent on particle size. Dermal absorption can be enhanced by scratched, broken, roughened or abraded surfaces of the skin on the ankles, hands, neck or facial areas. The worker's face or hands are the most affected skin areas. Water-soluble toxic chemicals can be absorbed throughout the body since the human metabolism operates on a water-based chemistry. Drinking and eating in hospitals must be done in well-controlled areas. This issue is not well managed in most Tanzanian hospitals and health centres.

The chemical poisons in hospital waste can affect different parts of the body: for instance, hepatotoxic agents (e.g. carbon tetrachloride, tetrachloroethane) affect the liver; nephrotoxic agents (e.g. halogenated hydrocarbons) affect the kidneys; haematopoietic toxins (benzene, phenols) affect blood; and neurotoxic agents (e.g. methanol, metals, organometallics) and anaesthetic agents (e.g. ethyl ether, esters, acetylene hydrocarbons) affect nerve systems and consciousness, respectively (4).

### Occupational health hazards from improper medical waste management

Pathogens present in waste can enter, and remain in the air within the hospital for a long period, in the form of spores or as pathogens themselves (5). This can result in hospital-acquired infections (nosocomial infections) or occupational health hazards. Patients and their attendants also have a chance of contracting infections caused by airborne pathogens or spores. However, there are very limited statistics available relating occupational health with workers' hospital-acquired infections. This topic requires more research. The only publicized health hazard to workers is the spread of disease from contaminated



Photo by ILO / M. Crozet

Mismanagement of hospital waste implies a combination of improper handling of waste during generation, collection, storage, transport and treatment. (People in the photo are not related to this article).

sharps (medical equipment used to penetrate skin and muscles like needles, blades, etc.) (2). When waste that has not been pretreated is being transported outside the hospital, or dumped openly, pathogens can enter the atmosphere. These pathogens can find their way to drinking water, foodstuffs, soil, etc., or they can remain in the ambient air.

Chemical pollutants that cause outdoor air pollution have two major sources: open burning and incinerators. The presence of plastics and hazardous materials in the waste will generate harmful gases – such as oxides of sulphur, oxides of nitrogen, carbon dioxide, etc. – and suspended particulate matter which may contain heavy metals. These when inhaled can cause respiratory diseases. Certain organic gases, such as dioxins and furans, are carcinogenic whose effects have longer latency periods. Open burning of medical waste is practised in many Tanzanian hospitals. This should be strictly avoided. Air pollution control devices should be used for waste combustion technologies which produce toxic emissions. Such units exist now in Tanzania, designed at the University of Dar es Salaam.

Research and radio-immunoassay activities may generate small quantities of radioactive gas. The clinical application of  $^{85}\text{Kr}$  and  $^{133}\text{Xe}$  is the principal source of gaseous radioactive waste material requiring special disposal practices (1, 5). Gaseous radioactive material should be evacuated directly to the outside. For the workers' safety, such gaseous radioactive waste should not be mixed with the indoor air. If a special

exhaust system is not available, an activated carbon trapping device may be used, which requires maintenance of the trap and monitoring of the off-gas; this, in turn, is a question of workers' exposure (1, 5).

Indoor air pollution due to biological agents can be reduced by covering the waste properly, routing the waste so that the shortest distance is used and sensitive areas are avoided. Segregation of waste, pretreatment at the source, etc., can also reduce this problem to a great extent. Sterilizing the rooms will also help to minimize the occupational health risks posed by air pollutants from biological agents. Indoor air pollution can also result from poor ventilation; thus the building design plays an important role in maintaining proper ventilation.

The health hazards due to improper waste management affect not only hospital occupants; they can also spread in the vicinity of a hospital. Occupational health concerns exist for janitorial and laundry workers, nurses, emergency medical personnel, and waste handlers. Injuries from sharps and exposure to harmful chemical waste and radioactive waste can also pose health hazards to workers. The problem of occupational health hazards arising from medical waste is not well publicized as there is a lack of information.

The general public's health can also be adversely affected by medical waste. Improper practices, such as dumping of medical waste in municipal dustbins, open spaces, water bodies, etc., can lead to the spread of diseases. Emissions from incinerators and open burning can

also lead to workers' exposure to harmful gases which can cause cancer and respiratory diseases. Exposure to radioactive waste in the waste stream can also pose serious health hazards to workers. An often ignored area is the increase of home-based health care activities. During the training sessions conducted countrywide in 2003, this topic was addressed as 'home-based health care waste management'. An increase in the number of diabetics who inject themselves with insulin, home nurses taking care of terminally ill patients etc., all generate medical waste which can cause health hazards.

## Recommendations

### Observing exposure limits

With respect to a wide variety of contaminants related to management of hospital waste, certain exposure levels are allowed by law. The most well-known of allowable exposure standards are the threshold limit values (TLVs), which are normally expressed at two levels: the time-weighted average (TWA) based on an eight-hour allowable average concentration, and the short-term exposure levels (STEL), based on the maximum 15-minute average concentration to which a health care worker may be exposed. Currently, TWA and STEL have been adopted as permissible exposure levels (Peels), and are now legally enforceable levels of exposure in countries where environmental laws are in place. If such limits are observed, the occupational health problems can be minimized in hospitals (4).

### Apply a hierarchy of controls

Health care workers' exposure to health hazards can be prevented or reduced. The occupational hygiene hierarchy of controls is a recognized method for primary prevention of occupational injury and disease. The following hierarchy is listed in order from the most to the least effective: elimination of hazardous materials and dangerous activities; substitution of less hazardous materials (e.g. substitute oxidizing chemicals such as paracetic acid for glutaraldehyde, nitrile gloves for latex or vinyl gloves); engineering controls (e.g. lifting devices, safer needle devices, ventilation); administrative controls (such as policies that limit workers' exposure to hazards); and appropriate allocation of personal protective equipment (e.g. gloves, respirators and masks, goggles, gowns, etc.).

### Enforcement of medical waste management regulations

There must be clearly stipulated rules that apply to all persons who generate, collect, receive, store, transport, treat, dispose of, or handle medical waste in any form. This will help to maintain occupational and public health. Those who generate medical waste must be legally responsible. It shall be the duty of every generator of medical waste (which includes a hospital, nursing home, clinic, dispensary, veterinary hospital, animal house, pathological laboratory, blood bank) to take all steps to ensure that such waste is handled without any adverse effect to workers and the environment (6, 7).

Medical waste shall not be mixed with other wastes, and shall be segregated into well-labelled containers or bags at the point of generation prior to its storage, transport, treatment and disposal. Apart from the prescribed label, transit containers containing medical waste shall also bear information on the date of generation, the waste category/class/description, the sender's/receiver's name and address (phone/fax numbers) and the contact person in case of emergency. The label shall also be marked with symbols, such as the universal bio-hazard or cytotoxic hazard symbol, and warning signs, e.g. "handle with care" (7).

Untreated medical waste shall be transported only in a special vehicle owned by a competent authority, as specified by the government. No untreated medical waste shall be kept or stored beyond a period of 48 hours. The municipal body of the area shall continue to pick up and transport segregated non-medical solid waste generated in hospitals and nursing health centres, as well as duly treated medical wastes for disposal at a municipal dump site.

Every generator/occupier/operator shall submit a report to the prescribed authority every year, to include information about the categories and quantities of medical wastes handled during the preceding year. The prescribed authority shall compile this information for future reference. Meanwhile, every authorized person shall maintain records related to the generation, collection, reception, storage, transport, treatment, disposal and/or any form of handling of medical waste, in accordance with these rules and any guidelines issued. All records shall be subject to inspection and verification by the prescribed authority at any time (7).

### Promote training in hospital-waste management

Training of health care workers is the core of health care waste management programmes (8). The sessions conducted by the Ministry of Health in 2003 enabled workers to recognize health and safety hazards, and to prevent further exposure to hazards posed by hospital waste. In reality, health care worker training programmes have increased the workers' morale. However, the training focused only on those handling hospital waste and health officers, while the waste generators (nurses and medical doctors) were not involved. For this reason, a comprehensive integrated health and safety training programme has been developed at the University of Dar es Salaam to provide a cost-effective means of meeting health care waste management needs in Tanzania.

Hospital-waste handling is a hazardous waste activity which requires a high standard of training. It calls for specific training that depends on the nature of the work in the hospital, the hazards and possibility of worker exposure, and the responsibilities of individual workers (8). The training must not only be continuous, but also comprehensive, integrated and structured with the necessary elements.

To reach the qualified stage, the training must follow some of the following steps: need analysis; training administration; learning objectives development and lesson plans; site-specific training; task-specific training; and supervision. As hospital activities are similar, these steps will be almost the same for different hospitals, so that the training sessions can be conducted for each worker categories. Factors to consider include trainers' qualification, reciprocity (e.g. the Ministry of Health's acceptance of course work offered by the University of Dar es Salaam), equivalency (determination that previous experience, education or training is equivalent to a given training course), and programme evaluation (monitoring and revision of the training as a result of the comments received from participants, instructors and supervisors) (8).

### Environmentally preferable purchasing

Environmentally preferable purchasing (EPP) is the act of purchasing products and services that are less damaging to occupational health and the environment. Efforts to implement EPP are an important component of a larger system that supports the integrity of both business and environmental decisions, for

the benefit of workers' health (9).

Five areas have been identified as focal points for EPP (9). They include: products containing mercury; products containing polyvinyl chloride (PVC); reprocessed and reusable products; green building products; and safer products for workers. In addition, waste minimization practices implemented by purchasing products with reduced packaging and the procurement of items that are readily recyclable and/or made of recycled content are highly recommended.

### Proper worker and equipment decontamination

Anything that enters a hazardous waste exclusion zone (radiological area, or airborne radioactivity area) is assumed to be contaminated. If not removed, contaminants eventually penetrate the PPE, tools, instruments, and other equipment in use at the worksite, and may be transferred into clean areas (1). Improper management occurs when such items are not decontaminated (i.e. removing or neutralizing chemicals, radiological, biological or mixed waste contaminants) and hazardous material accumulates on personnel and equipment while work is being performed (1,8).

Factors affecting contaminant permeation of PPE and other equipment include contact time, concentration, temperature, chemical characteristics, and the physical state of the contaminants. Decontamination by physical means can be used for loose contaminants (dusts, aerosols), adhering contaminants, adsorbed or permeated contaminants or volatile contaminants. Decontamination using solutions, chemicals or other materials must follow physical decontamination. Decontamination materials can also be applied directly to chemical or radiological contaminants. Cleaning solutions can involve one or more of the following methods: dissolving contaminants; surfactants; solidification; rinsing; or disinfection/sterilization. It must be stressed that decontaminations differ from sanitation in that the former is conducted either in the contamination reduction zone or radiological buffer zone at the worksite, whereas sanitation functions are performed either in the support zone or outside the boundaries of the hazardous waste activities worksite after decontamination has been completed (1,8).

For this reason, the time required for decontamination must be incorporated in work plans and schedules. By contrast, contamination control and decontamination strategies and procedures

must be well documented in the hospital's health and safety plan (HASP), communicated to workers and implemented before workers enter hazardous areas.

### Medical surveillance programmes for health care workers

Medical surveillance programmes must be designed to accomplish the following goals: to demonstrate that workers are fit to perform their jobs safely and reliably; to provide ongoing assurance that access and hazard controls limit worker exposure; and to comply with occupational health regulations. A comprehensive medical surveillance programme should be designed and implemented by an experienced and qualified occupational health physician or examiner with inputs provided by workers, industrial hygienist, as well as health and safety professionals. Based on the presence of such hazards as lead, asbestos, and carcinogens, special types of medical surveillance are required. The occupational health physician responsible for the medical surveillance programme should work with the rest of the medical surveillance team to determine which forms of surveillance are applicable for activities at each worksite (1,8).

Analysis of surveillance data should include at least the following elements on each infection, in order to detect clusters and trends: type of infection; date of onset; location in the facility; and appropriate culture information. Infection rates should be calculated periodically, recorded, analysed, and reported to the administration and the infections control committee. Tables, graphs, and charts may be used, to facilitate education of the personnel. Surveillance data should be used for planning infection control efforts, detecting epidemics, directing continuing education, and identifying individual resident problems for intervention (8).

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# Heat stress in date-palm workplaces

## A study in the Algerian oases

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### Introduction

The date palm (*Phoenix dactylifera*) is one of the oldest plants on earth, dating back perhaps 30–70 million years or more. Its cultivation is now undertaken in many countries. The number of date palms in the world is on the order of millions, with the number of farmers involved in this agricultural work also in the millions. In many date-palm growing countries, date palms are the main wealth of the people, and dates are a chief food.

For profitable and good-quality production, the climatic requirements of the date palm are hot, dry weather and low rainfall. High humidity or rain during fruit ripening will cause the fruit to crack and ferment, and mould will develop. The maximum average daily temperatures in leading date growing countries ranges from 27° to 35° C, and date palms can withstand temperatures as high as 50° C.

Indeed, a number of tasks in date-palm fields are carried out under hot conditions, which can be very stressful. Date-palm farmers must often work in hot conditions for a good proportion of the agricultural season. With regard to the effects of hot conditions on individuals, Khogali and Awad El-Karim (1) pointed out that working under thermal heat stress not only taxes an individual's physiological function but also poses a serious threat to his health status. They also showed that casualties due to direct exposure to solar energy in outdoor agricultural activities are significant and require special handling, precautions and control. Also, Changnon et al. (2) stated that: "The loss of human life in



Photo by ILO / J. Maillard

Heat stress can cause multivariate problems to workers; heat waves result in about 1000 deaths per year on average.

hot spells of summer exceeds that caused by all other weather events in the United States combined including lightning, rainstorms, floods, hurricanes, and tornadoes. Weather hazards such as tornadoes, floods, lightning, and winter storms each result in about 100 deaths per year on average, while heat waves result in about 1000 deaths per year on average". In addition, heat stress can cause multivariate problems to workers' efficiency and productivity, especially when the workers are engaged in heavy or very heavy physical activity.

It is well known that when doing dynamic physical work, about 30% of the energy is converted into mechanical work and the remainder into heat, which the body has to dissipate to the surroundings to maintain its normal temperature. If the atmosphere is very hot and humid,

it becomes very difficult for the body to dissipate the heat, and thus the body temperature rises. In consequence, the human being is exposed to heat stress illnesses ranging from heat cramps to heat exhaustion and finally to heat stroke (sunstroke). Heat stress is a signal indicating that the body is having difficulty maintaining its narrow temperature range.

As far as ergonomics of agriculture is concerned, this study was carried out to determine to what extent heat stress is prevalent in date-palm field workplaces.

### Method

#### Sample

Initially, thirteen (13) volunteer male farmers were randomly selected from Zeb date palm zone (in the South of Algeria) to participate in this study. The subjects were informed about the purpose and procedures of the study. They were generally young, certified as healthy on the basis of medical examination and were fully acclimatized. Also, they have been engaged in date-palm work for at least two agricultural years. See Table 1 for a summary of the subjects' demographic characteristics.

Table 1. Some of the subjects' demographic characteristics

Subjects	Age (years)	Weight (kg)	Height (cm)	Seniority (years)
13	28.08 ± 5.01	59.83 ± 7.6	169.1 ± 16.37	12 ± 4.33

Seniority means the number of years the farmer spends at work in agriculture

## Heat stress index and equipment

At present, there are many heat stress indices. One of them, which compiles climatic parameters to yield a single parameter, is the wet bulb globe temperature (WBGT), which was developed by Yaglou and Minard (3). It has been widely used in scientific research since its development. Two formulae are available for deriving the WBGT; one is the WBGT for indoors<sup>1</sup> [Indoor WBGT=0.7nwb (natural wet-bulb) + 0.3 gt globe temperature)] and the other is the WBGT for outdoors<sup>2</sup>. [Outdoor WBGT (when a solar load is imposed)= 0.7 nwb (natural wet-bulb) + 0.2 gt (globe temperature) + 0.1 db (dry-bulb temperature)]. Various tools and equipment are available for computing the WBGT index, ranging from very traditional to very sophisticated ones. In developing countries, where this work was carried out, modern and sophisticated equipment is scarce. For this reason, the following traditional equipment was used:

- **Kata thermometer:** This is an alcohol-filled thermometer with a large bulb coated with silvery material. When used, the bulb is heated in warm water until the alcohol rises into the upper reservoir. Then the bulb is dried with a clean dry cloth and suspended in the air. The time the alcohol takes to fall from the upper limit to the lower limit on the stem is timed using a stopwatch. From the cooling time, the dry-bulb temperature and the Kata factor, which is usually printed on the stem, air speed can be read from the monogram provided with the instrument.
- **Whirling (sling) hygrometer:** This is a wooden sling with a handle. The sling, which can be rotated, consists of two similar mercury thermometers. The bulb of one thermometer is covered with a wetted fabric, whereas that of the other is left dry. After rotating the sling for a short time, readings of both the dry-bulb and the wet-bulb thermometers can be taken.
- **Globe thermometer:** This consists of a hollow copper sphere measuring about 15 cm in diameter, and painted black. A mercury-in-glass thermometer is inserted into the sphere to a point such that the bulb of the thermometer is at its centre.
- **Barometer:** This is a non-liquid barometer to measure the atmospheric pressure. It consists of a cylinder of about 10 cm in diameter, the wall of

Table 2. The wet bulb globe temperature (WBGT) results

Date-palm tasks studied	WBGT (°C)				
	2.00 am	5.00 am	8.00 am	Noon	3.00 pm
Digging the soil	08.16	12.7	14.1	15.0	13.5
Pollination	12.89	16.7	19.2	21.8	20.1
Lowering and balancing of branches	23.37	26.9	28.3	32.8	33.3
Cutting of dry leaves	21.67	25.0	28.0	30.8	31.2
Covering bunches	20.72	21.7	27.1	28.3	27.4
Harvesting bunches	17.87	23.1	25.5	27.1	26.6

which deflects with changes in atmospheric pressure. This deflection is coupled mechanically to a pointer, which indicates air pressure from 960 to 1060 millibars (mb). The normal atmospheric pressure is about 1013 mb (one millibar = 0.75 millimetres of mercury).

### Procedures

Thermometers were mounted on a stand, which was 120 cm above ground level. Data were collected five times – at 2.00 am, 5.00 am, 8.00 am, 12 noon and 3.00 pm – during the period when the experimental tasks were carried out. Soil digging was done in February, pollination in April, bunch lowering and balancing in July, dry leaves cutting and bunch covering in August, and bunch harvesting in October. Air velocity, relative humidity, and the WBGT index were obtained using the relevant monograms and formulae. It should be noted that all tasks were carried out as naturally and as similarly as possible to what the subjects have been doing for years, using the same working methods, equipment and hand tools.

### Results

Heat stress was measured while the major tasks in date-palm fields were being carried out. Using various apparatus and equipment, measurements were taken and the outdoor WBGT was calculated. The results are shown in Table 2 above.

### Discussion

Ramsey (4) pointed out that before WBGT results are interpreted, various factors – such as the heaviness and nature of the work and air movement – must be considered if a meaningful heat stress evaluation is to be obtained.

As to both the heaviness and nature

of the work, some date-palm tasks (pollination and the lowering and balancing of bunches) are carried out inside the date-palm crown with one hand only, while the other hand keeps the farmer fixed at the workplace (crown) to avoid falling. It is obvious that such a working position involves a lot of static work. By contrast other tasks (bunch harvesting, dry leaf cutting and bunch covering) are carried out just below the crown in the belt (saddle) working position, when both hands are free while both feet are fixed to the palm trunk and kept tense and motionless for some time, suggesting that this posture, too, involves a lot of static work. It is well known that under certain conditions, especially where the proportion of static work is high, heart rate would perhaps paint a clearer picture about effects of stress and strain than do other work load measures, such as oxygen consumption and psychological measures. Mokdad (5) has shown that pollination and bunch harvesting tasks were moderate (each of these tasks required more than 100 beats per minute), whereas soil digging, lowering and balancing of bunches, cutting of dry leaves and covering bunches were heavy (each of these tasks required more than 120 beats per minute).

According to the table in Appendix 1 of the American Conference of Government Industrial Hygienist(6) (see next page), no heat stress is involved in the two moderate tasks (pollination and bunch harvesting). In addition, no heat stress is imposed on farmers in the heavy task of soil digging, as it is normally carried out during winter. However, in bunch lowering and balancing and dry leaf cutting tasks, farmers are exposed to heavy heat stress even at 8.00 am and 3 pm. For the bunch covering task, heat stress is experienced only in the second half of the day (at noon and 3.00 pm).

As concerns air movement, it is well

known that an individual feels comfortable when metabolic heat is dissipated at the rate at which it is produced. Asstrand and Rodahl (7) have shown that for an average, sedentary, lightly clothed person, this occurs most readily when the air in a standard room has a temperature of 24.5° C, a relative humidity of 40%, and an air velocity of 0.25 m per second. Air movement enhances heat transfer between air and the human body and accelerates cooling of the human body. It is then essential for bodily comfort, as it helps the body to dissipate heat gained from all sources by increasing the effects of convection and evaporation. To be effective, air movement should not exceed 0.5 m per second. Air movement above this limit (i.e. wind) makes people feel uncomfortable. In the Algerian desert where this study was carried out, two types of hot wind, i.e. the Simoom and the Sirocco, frequently blow through the date-palm fields – especially in mid-spring, late summer and early autumn – at a rate of about 8 m per second. These types of wind may be stressful and may have various negative consequences. Apart from the climatic effects, the Simoom and the Sirocco can also affect health, causing headaches, boredom, fatigue and sleeping problems. Generally, they last one to four days. During this period, not only work, but normal life is hardly possible. Therefore, this hot wind may also be considered as another source that makes heat stress more serious in date-palm work, particularly if it comes during busy times, for example, when performing pollination and bunch harvesting tasks. However, if it comes during less busy times, its effects may be negligible.

It can be concluded from all the above results that heat stress is a real problem at least in the performance of some date-palm tasks, such as the lowering and balancing of bunches and dry leaf cutting, as it is experienced even in the mid-morning (at 8.00 am).

### Heat stress management in date-palm workplaces

Since heat stress occurs in date-palm work, at least in the performance of some field tasks, what is done to control it? Three strategies and interventions are suggested. These are:

1) Organizational interventions: As can be seen from Table 2, the WBGT values indicate that at the beginning of the working day, i.e. in the early morning (at 2.00 am, 5.00 am and 8.00 am), the working conditions were free of heat stress for almost all tasks. Summer work

APPENDIX 1: PERMISSIBLE HEAT EXPOSURE THRESHOLD LIMIT VALUES (6).			
Work/rest regimen	Work load*		
	Light	Moderate	Heavy
Continuous work	29.5° C (86° F)	27.5° C (80° F)	25.0° C (77° F)
75% Work, 25% rest, each hour	30.6° C (87° F)	28.5° C (82° F)	25.9° C (78° F)
50% Work, 50% rest, each hour	31.4° C (89° F)	29.4° C (85° F)	27.5° C (82° F)
25% Work, 75% rest, each hour	32.5° C (90° F)	31.1° C (88° F)	29.5° C (86° F)

\*Values are in ° C and ° F, wet bulb globe temperature (WBGT).

These threshold limit values are based on the assumption that nearly all acclimatized, fully clothed workers with adequate water and salt intake should be able to function effectively under the given working conditions without exceeding a deep body temperature of 38° C (100.4° F). They are also based on the assumption that the WBGT of the resting place is the same or very close to that of the workplace. Where the WBGT of the work area is different from that of the rest area, a time-weighted average should be used. These TLVs apply to physically fit and acclimatized individuals wearing light summer clothing.

could therefore be adjusted by changing the working hours. Instead of working during periods of heat stress around mid-day and in the afternoon, the work could be during periods of optimal comfort and no risk of heat stress, i.e. at night and in the early morning, when farmers would feel more comfortable and would perform better. If such an arrangement is opted for, then various factors should be taken into consideration. The facilities, such as workplace lighting and transport, should allow for work at night and in early morning. The farmers' attitudes towards night work must also be considered, because social problems may appear if work is changed to the night shift, etc.

2) Mechanization interventions: Twentieth century engineering, such as the tractor, the reaper, the combine harvester, and hundreds of other machines, gave farmers the mechanical advantage they had long needed to ease their burdens and make their lands truly profitable. Agricultural mechanization enormously increased farm efficiency and productivity. While mechanization is widely used in industrialized countries, the situation in many developing countries is very different. Beyond crop production, mechanization is uncommon. As to date-palm work, it has been and still is done by traditional methods and using hand tools. No machines have been invented to climb the palm trunk, to pollinate the date flowers (inflores-

cences), to lower and balance the bunches, to cut the dry leaves, to cover the date bunches and to harvest the fruit. If mechanization is introduced into date-palm fields, not only work stress will be reduced, but both production quality and quantity will be increased as well.

3) Genetic engineering interventions: Genetic engineering is a method of changing the inherited characteristics of an organism in a predetermined way by altering its genetic material. It has been widely applied to agriculture. Therefore, it may be applied to date-palm agriculture, to alter some of the characteristics of the palm. A substantial proportion of the work stress in date-palm culture is attributed to the tall trunk of the date palm. Climbing the trunk is in fact unnecessary work, but it has to be done to reach the crown where the dates are found. One of the main differences between date-palm fruit and the fruits of other palm trees – for example, the coconut palm – is that dates must be cared for and maintained (bunch lowering and balancing, bunch covering,) if a good quality is to be obtained. If engineers could develop a palm that does not grow very tall – for instance, not beyond 2 metres – this would be a very significant achievement. Not only would the dwarf (short) date palm minimize heat stress; it would also minimize workload as well as handicaps, and/or deaths resulting from falls. In addition, work efficiency would eventually be in-

creased.

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# Work-related diseases and occupational injuries among workers in the construction industry

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## Introduction

The construction industry is not only the process of building. It involves many other types of work aside from the building process, such as painting, landscaping, electrical supply, telecommunications, plastering, and paving. All these types of work make up one industry, but each of them involves different exposure and thus differing health hazards.

The two broad categories of construction projects are building and civil engineering. Building applies to projects involving houses, offices, shops, factories, schools, hospitals, power plants, railway stations, and so on. Civil engineering applies to all the other built structures in our environment, including roads, tunnels, bridges, railways, dams, canals, and docks. In addition, there are structures that appear to fall into both categories – for instance, an airport involves extensive buildings, as well as civil engineering in the creation of the airfield proper and a dock may involve warehouse buildings, as well as excavation of the dock and erection of the dock walls (1).

Construction workers are exposed to a wide variety of health hazards at work. The exposure differs from job to job. The hazards for construction workers are typically of four classes:

- chemical hazards such as dusts, fumes, mists, vapours, or gases
- physical hazards, including extreme heat or cold, work in windy, rainy, snowy, or foggy weather, non-ionizing ultraviolet radiation usually from exposure to the sun, and electric arc welding
- biological hazards; for instance, ani-

mal attacks and histoplasmosis (a lung infection caused by a common soil fungus). Workers may also be at risk of malaria or yellow fever if they work in areas where these organisms and their insect vector are prevalent.

- social hazards. Employment is intermittent and constantly changing; many projects require living in work camps away from one's home and family. These features of construction work, as well as heavy workload, limited control, and limited social support are the factors associated with increased stress (2).

In Egypt, there are about 4 million



Photo by B. Hussein

Construction workers are exposed to a wide variety of health hazards at work.

workers in the construction industry. Of these, female workers represent a small, unknown number, but they usually work in rural areas (3).

Workers in the construction industry are exposed to work-related diseases, which have been defined by WHO as diseases that may be aggravated, accelerated, or exacerbated by workplace exposures and that may impair working capacity (4).

In addition, we cannot discuss the adverse health effects of construction work without referring to occupational injuries. In Egypt, about 13 per cent of work-related deaths and 18 per cent of occupational injuries were recorded among workers in the construction industry (5).

### Aim of the study

This study had two goals; to define the work-related diseases occurring among workers in the construction industry, and to assess the distribution of occupational injuries and common risk factors of these injuries among workers in the construction industry.

### Subjects and methods

This cross-sectional study covered construction workers employed by a big construction company in Egypt.

### Preparatory phase

The total sample size was 487 workers. The criteria for selection were as follows: workers who had been doing the work for at least five years, who worked in one of the following crafts – excavation, superstructure, steel erection, laying of roofs, builders, plasterer, painter, and pavers – and who began their work without a past history of chronic diseases or disability. All workers in each craft were included in the study if they met the criteria for selection. The research setting covered the areas where the company had projects. These sites were located in Giza governorate (Haram and Maadi), and Cairo governorate (Nozha and Kattamia).

For the literature survey, medical journals, periodicals, textbooks, and the Internet service were reviewed. Study forms (interview sheets) were used to collect the subjects' personal history, occupational history, present history, past history and their history of accidents and injuries. Also included were a general medical examination, local medical examination, the results of laboratory investigations, X-rays, computed tomography (CT), and magnetic resonance imaging (MRI).

Table 1. General characteristics of the workers studied

General characteristics	Total (N = 487)	
	N	%
<b>Age (years)</b>		
Range	21-58	
Mean ± SD	40.1 ± 7	
<b>Gender</b>		
Male	487	100.0
<b>Residence</b>		
Urban	371	76.2
Rural	116	23.8
<b>Special habits</b>		
No special habits	97	19.9
Smokers	311	63.9
Ex-smokers	79	16.2
- mean duration of smoking (years)	17.1 ± 3.7	
<b>Duration of work (years)</b>		
Range	5 - 30	
Mean ± SD	13.2 ± 2.1	
Working hours/day	8 hours / day for 6 days / week (48h / w)	
<b>Use of personal protective devices</b>	0	0.0

Table 2. Job description and type of exposure among the workers studied

Craft	Total (N = 487)		Job description	Type of exposure
	No.	%		
Excavation	54	11.1	Digging the area	Dust, injuries
Superstructure	67	13.7	Erection of the columns	Dust, ergonomics
Steel erection	49	10.1	Erection of the steel	Ergonomics, stress
Laying of roofs	51	10.5	Laying concrete	Dust, ergonomics
Builder	71	14.6	Fixing bricks to each other	Dust
Plasterer	63	12.9	Covering walls with cement	Chemicals
Painter	77	15.8	Interior finishing	Dust
Pavers	55	11.3	Laying tiles on the floor	

Administration approval was obtained before conducting the study, and ethical considerations were respected. The workers were told about the aim of the study, and they were informed that all of the data would be used for scientific purposes only. The workers were also given the chance to refuse to participate in the study.

A pilot study was done on about 50 workers before the entire study was conducted. Some changes to the interview sheet were made following the pilot study.

### Implementation phase

The study started in January 2003 and finished in August 2003. The indicators used in the study included:

i) **Incidence rate of disabling or fatal injuries per 100 full-time employees**, calculated as follows (6):

$$\frac{\text{Number of disabling or fatal injuries} \times 200,000}{\text{employee hours worked}}$$

Please note that the figure 200,000 represents the equivalent of 100 employees working 40 hours per week, 50 weeks per year. It thus provides a standard base for the incidence rate.

The employee hours worked were calculated as follows:

The total number of workers x 8 working hours/d X [365 days minus weekends and the year's public holidays]

ii) **Accident disability rate (ADR)** was calculated as follows (7):

$$\text{ADR} = \frac{\text{Total number of days lost}}{\text{Total number of accidents}}$$

The resulting figure indicates the average number of days lost per accident.

iii) **Disabling injuries** were defined

as days away from work or days of restricted activity, while a fatal injury is one that resulted in death, regardless of the time between injury and death (8).

### Coding of data, data entry, analysis of data, tabulation of data

#### Statistical analysis

The obtained data were analysed by using a personal computer (EPI 6 program). Frequency, range, mean  $\pm$  the standard deviation (SD), and correlation coefficient ( $r$ ) were the statistical methods used to analyse the data.

#### Evaluation phase

In the evaluation phase, the results were interpreted, conclusions were drawn and recommendations were given.

### Results

Table 1 shows that the mean age of the workers studied was  $40.1 \pm 7$  years. All of the workers were men, and most of them (76.2%) were urban residents. Most workers (63.9%) were smokers. The subjects' mean duration of working in the construction industry was  $13.2 \pm 2.1$  years. This table also shows that personal protective devices are not used at all by any of the workers. Table 2 shows the construction workers' job descriptions and types of exposure. The most common exposures were dust, vibration, ergonomic stress, chemicals, and injuries. Table 3 shows the prevalence of work-related diseases among the workers studied. It shows that eye complaints (23.6%), musculoskeletal disorders (13.9%), gastrointestinal diseases (13.1%), and respiratory diseases (11.5%) were the most prevalent diseases among them. Table 4 shows the statistical analysis of work-related diseases in correlation to the duration of work. It revealed that varicose veins, hernia, and musculoskeletal disorders, respectively, had the highest correlations. Table 5 shows that being struck by an object (3.9%), falling at ground level (3.7%), and being hit by falling objects (2.7%) were the most common accidents leading to injuries. The incidence rate for disabling injuries increased from 10.2 in the year 2000 to reach 18.1 in the year 2002. During the same period, the incidence rate for fatal injuries decreased from 0.7 in the year 2000 to 0.3 in the year 2002. Table 6 shows that the head (23.5%), upper limb (15.1%), and eye (14.6%) were the body parts most often injured in accidents. Table 7 shows the factors contributing to the occur-

Table 3. Work-related diseases among the workers studied

Work-related diseases	Total (N = 487)	
	N	%
<b>Eye complaints</b>		
Foreign body in the eye	54	11.1
Conjunctivitis	61	12.5
Total	115	23.6
<b>Nasal diseases</b>		
Allergic rhinitis	14	2.9
Chronic sinusitis	13	2.7
Total	27	5.6
<b>Respiratory diseases</b>		
Bronchial asthma	27	5.6
Chronic bronchitis	29	5.9
Total	56	11.5
<b>Cardiovascular diseases</b>		
Ischemic heart diseases	13	2.7
Essential hypertension	22	4.5
Total	35	7.2
<b>Gastrointestinal diseases</b>		
Peptic ulcer	17	3.5
Irritable bowel syndrome	36	7.4
Chronic hepatitis	11	2.2
Total	64	13.1
<b>Musculoskeletal disorders</b>		
Neck pain (mostly due to cervical disc abnormalities)	18	3.7
Low backache (mostly due to lumbosacral abnormalities)	27	5.5
Osteoarthritis	23	4.7
Total	68	13.9
<b>Skin diseases</b>		
Dermatitis	18	3.7
<b>Varicose veins</b>	7	1.4
<b>Hernia</b>		
Umbilical hernia	4	0.8
Inguinal hernia	3	0.6
Total	7	1.4

Table 4. Correlation coefficient between duration of work and the prevalence of work-related diseases

Work-related diseases	Correlation coefficient (r)
- Varicose veins	1.9
- Hernia	1.8
- Musculoskeletal disorders	1.6
- Bronchial asthma	1.4
- Conjunctivitis	1.3
- Dermatitis	1.2
- Sinusitis	0.9
- Chronic bronchitis	0.8

Adjusted R = 1.2

rence of disabling injuries. With regard to human factors, 16.8% of the workers who were injured failed to follow safety rules. As concerns environmental factors, 8.2% of accident victims were hurt because of broken floors. In the case of mechanical factors, 2.6% of those involved in an accident were injured by rapidly moving parts. A combination of human, environmental, and mechanical factors accounted for about 15.5% of the leading causes of injuries.

### Discussion

This study investigated the distribution of work-related diseases and occupational injuries among workers in the construction industry. The principal hazards observed among workers were dust, vibration, ergonomic stress, and chemicals.

Conjunctivitis and the presence of a foreign body in eye can be attributed to the daily exposure to dust generated by

Table 5. Incidence rate of injuries and type of accidents in the period 2000–2002

Accident type	2000				2001				2002			
	Disabling injuries		Fatal injuries		Disabling Injuries		Fatal injuries		Disabling injuries		Fatal injuries	
	N	%	N	%	N	%	N	%	N	%	N	%
Falling from a height	-	0.0	1	0.2	-	0.0	2	0.4	-	0.0	1	0.2
Struck by an object	19	3.9	0	0.0	23	4.7	0	0.0	14	2.9	1	0.2
Struck against an object	9	1.8	-	0.0	17	3.4	-	0.0	26	5.3	-	0.0
Hit by falling objects	13	2.7	3	0.6	16	3.2	1	0.2	21	4.3	0	0.0
Falling at ground level	18	3.7	-	0.0	12	2.6	-	0.0	44	9.03	-	0.0
Total	59	12.1	4	0.8	68	13.9	3	0.6	105	21.6	2	0.4
Incidence rate/100 full-time employees	10.2		0.7		11.7		0.5		18.1		0.3	
Incidence rate of disability	7.8				6.8				7.1			

The data on injuries were obtained from the official company records.

Table 6. Distribution of disabling injuries by accident type and parts of the body affected in the period 2000–2002

Accidents	Parts of the body affected															
	All injuries: N = 232															
	Head		Eyes		Neck		Trunk		Upper limb		Lower limb		Multiple		Total	
N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	
Struck against an object	10	4.3	13	5.6	0	0.0	0	0.0	7	3.0	7	3.0	0	0.0	37	5.9
Struck by an object	12	5.2	8	3.4	17	7.3	11	4.7	22	9.4	8	3.4	0	0.0	78	33.6
Hit by falling objects	11	4.7	13	5.6	0	0.0	0	0.0	6	2.6	17	7.3	0	0.0	47	20.3
Falling at ground level	22	9.4	0	0.0	0	0.0	21	9.1	0	0.0	0	0.0	27	11.6	70	30.2
Total	55	23.7	34	14.6	17	7.3	32	13.8	35	15.1	32	13.8	27	11.7	232	100

The data on injuries were obtained from the official company records.

dry sweeping, drywall sanding, mortar mixing, and tamping. Welch et al. (9) reported a lower proportion (11%) than that detected in this study (23.6%). The difference is explained by the complete absence of personal protective devices among workers in this study.

Allergic rhinitis is an immunological disease precipitated by exposure to dust. Chronic sinusitis is the disease of recurrent attack of sinusitis. It can be aggravated by exposure to chemicals and dust, leading to nasal irritation and predisposing the individual to the activation of microorganisms, usually bacteria, resulting in infections at short intervals. The worker usually complains of headache and irritation.

The increased risk of chronic bronchitis and bronchial asthma can be explained by the combined effect of cigarette smoking and prolonged exposure to dust without the use of personal protective devices. It is clear that exposure to dust and chemicals can lead to aggravation of the attack of bronchial asthma, which is mainly an immunological mechanism provoked by exposure to specific allergens (dust or chemicals). Chronic bronchitis is a chronic disease aggravated by prolonged exposure to dust, which stimulates the multiplication of microorganisms and leads to the development of recurrent attacks of bronchitis. This was explained by Ulvestad et al. (10), who found that cumulative exposures to respirable dust are the most important risk factor for air flow limitation. They confirm their findings by showing an accelerated decline in FEV1 among construction workers exposed to dust.

Cement is widely used in the construction industry in Egypt and is the leading cause of dermatitis among construction workers. Among painters, chemicals can be an aggravating factor of dermatitis. Dermatitis induced by cement presents as a dry, fissured, erythematous lesion. This can be attributed to the chromium content of cement, which can lead to both contact allergic and contact irritant dermatitis. Irritant dermatitis occurs in the form of cement burn, while contact allergic dermatitis presents in the form of eczematous lesion. The cement burn usually develops on the legs and/or feet following prolonged contact with wet cement inside boots. Contact allergic dermatitis usually appears on the skin of workers' hands and fingers. Yamamoto et al. (11) confirm the findings of this study; they reported a positive patch test result for sodium chromate among people with allergic contact dermatitis and a negative patch test among those with

cement burn.

As for musculoskeletal disorders, ergonomic hazards were prevalent throughout the workplaces. Several ergonomic hazards – such as twisting, awkward postures, heavy lifting and exposure to vibration – were observed in the different workplaces. In their study, Rosecrance et al. (12) found a higher proportion (50%) of musculoskeletal disorders among workers. They attributed this high proportion to the awkward postures and to working in a static position for a long time without periods of rest.

As regards ischemic heart disease, it is clear that work in the construction industry is an aggravating factor. This is explained by the muscular activity done by the workers during their work, which increases the cardiac oxygen demand placed on already narrowed coronary arteries.

Concerning hypertension, work in the construction industry can play a role in the progress of the disease through the job stressors (overload at work, the absence of career development, a low income, an unsafe workplace, and unsafe

actions). This can increase the secretion of catecholamines, which over time can aggravate the disease.

In the case of gastrointestinal diseases, the daily exposure to chemicals either by inhalation or through skin contact can aggravate the progress of peptic ulcers and irritable bowel syndrome.

It is often said that workers with chronic hepatitis are not eligible to work in the construction industry. This is because exposure to chemicals, stress, and a heavy workload cause deterioration among those with chronic hepatitis. Workers with hepatitis experience periods of generalized fatigue caused by the activity of the virus, yet they should perform their work although the simultaneous exposures can cause the condition to deteriorate, especially in cases of liver cell failure. Such workers thus work beyond their physical capacities, thereby aggravating their medical condition.

As far as varicose veins and hernia are concerned, both can be caused by the long duration in a standing posture – several hours per day – as well as by walking from site to site carrying heavy

**Table 7. Factors contributing to the occurrence of disabling injuries**

Factors	All disabling injuries: N = 232	
	N	%
<b>Human factors</b>		
Failure to follow safety rules	39	16.8
Lack of attention	17	7.3
Improper posture	23	9.9
- Improper lifting	11	4.7
More than one factor	29	12.5
Total	119	51.2
<b>Environmental factors</b>		
Broken floors	19	8.2
Misplaced objects	9	3.9
Slippery floors	7	3.2
Hazardous chemicals	6	2.6
Poor illumination	4	1.7
Source of electricity	3	1.3
More than one factor	8	3.4
Total	56	24.3
<b>Mechanical factors</b>		
Rapidly moving parts	6	2.6
Heavy tools	3	1.3
Unsafe tools	4	1.7
More than one factor	8	3.4
Total	21	9.0
<b>Combination of factors</b>		
Human, environmental, and mechanical factors	36	15.5

objects, and by lifting heavy objects without regard to ergonomic rules. All these factors lead to weakness in the elasticity of the deep veins, resulting in what we called varicose veins. These same factors also lead to hernia in the weak sites of the body – e.g. umbilical hernia and inguinal hernia.

In the present study, being struck by an object, falling at ground level and being hit by falling objects were the leading causes of disabling injuries. Being hit by falling objects and falling from a height were the main causes of fatal injuries (Table 5, see page 40). These conclusions are supported by the findings shown in Table 7, see page 41: 51.2% of the disabling injuries were caused by human factors. These human factors derive from lack of safety measures at the workplace, lack of health education and the absence of personal protective devices. They explain the gradual increase in the incidence rate per 100 full-time employees from the year 2000 to the year 2002 reported in Table 5. The findings of Huang and Chen (13) in Hong Kong agree with the results of this study. They contended that improving the work environment and promoting safety education among construction workers will help in minimizing or eliminating occupational injuries in the construction industry.

## Conclusions

The most common work-related diseases among construction industry workers in Egypt were eye diseases (23.6%), respiratory diseases (11.5%), and cardiovascular diseases (7.2%). The highest incidence rate for fatal injuries was 0.8% in the year 2000. The incidence rates for disabling injuries per 100 full-time employees were 10.2, 11.7, and 18.1 in the years 2000, 2001, and 2002, respectively.

## Recommendations

- The availability and use of personal protective devices should be stressed.
- Workers suffering from work-related diseases should be transferred to other jobs.
- Safety measures at the workplace should be put into place and then examined regularly to avoid the risk of injuries.

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## What is a healthy and safe workplace?

A healthy workplace is an environment where health risks are recognized and controlled if they cannot be removed. In a healthy workplace, the work is designed to be compatible with people's health needs and limitations, and employees and employers recognize the responsibility they bear for their own health and the health of their colleagues.

A safe workplace is an environment where, to the highest degree, workers' well-being – physical, mental and social – is promoted and maintained. All possible efforts are made to prevent workers' ill health caused by the working conditions, to protect workers in their employment from factors adverse to their health, and to place and keep workers in work environments that are adapted to their individual physiological and psychological conditions while also promoting and maintaining a work environment that is free of harassment.

## Zambian scenario

The opening of copper mines in the early 1930s created various work-related problems warranting the enactment of the first Factories Act in Northern Rhodesia. This law is now known as the Factories Act, or CAP 514 of the laws of Zambia. Later on, other legislative instruments also came into being, all of them geared towards protecting workers at workplaces.

In Zambia, the Factories Act and other supporting legislation are concerned with the provision of suitable physical conditions under which work has to be undertaken. This Factories Act requires that an organization running a factory should have its plans approved by the Labour Department. Among the requirements are basic protective standards covering the minimum working floor space for employees, sanitary, washing, bathing, and restrooms for employees as well as first aid arrangements. Ceilings must conform to a minimum height. Ventilation and lighting requirements must be met. Air conditioning and dust

# A healthy and safe workplace

extraction may be required at the plant, and special facilities may have to be provided to ensure employees' health in a hot, steamy or otherwise potentially injurious process (1)

Protective clothing and equipment are required in certain cases. Fire escapes and fire precautions are required. An elaborate code of regulations governing the guarding of machinery, general safety factors, as well as a host of other measures in the copper mining industry of Zambia, are also included in the above Act.

In the late 1990, the copper mining industry had one of the country's best programmes relating to law on health and safety of employees at workplace.

When the main Zambian copper mines industry was operating, statutory duties were allocated to a Divisional General Manager and to managers down to the shop floor supervisor, in order to ensure that the mines operated in a safe and proper manner, and in accordance with the provisions of the Mining Regulations Explosives Act and Regulations and the Environmental Regulations (2). The Safety Policy of the company which was put in place was meant to:

- provide, where reasonably practical, safe and healthy working conditions
- encourage maximum effort towards preventing, avoiding and reducing personal injury and damage to company property
- inculcate into all concerned the principle that management, supervisors and individuals are responsible that the process and the work are carried out safely, efficiently and without damage to property.

Further, it is important to note that all operations in the copper mining industries of Zambia are guided by strict Mining Regulations. For instance, Rule No 215 of the Guide to the Mining Regulations states that "Every workman whilst at work shall be under the personal supervision of a competent person who for the purpose of these Regulations shall be referred to as the person in charge. Such persons in charge shall when employed in underground or open cast

*workings where rock drilling operations are being carried out or where the nature of the operation is such that danger may arise from the presence of explosives be the holder of a Zambian blasting licence valid for the operation for which he is responsible".*

"The person in charge shall be the first person to enter each workplace assigned to him and the immediate approaches thereto and he shall examine and make safe or cause to be made safe each such workplace". Since safety was cardinal in the copper mining industry, the company in 1996 came up with motto on safety which was "if it is not safe don't do it" (3).

## General causes of unhealthy and unsafe workplaces

In most cases, accidents are due to failure by either the supervisor or persons involved to follow the safety procedures laid down. In the case of ground accidents, for instance, barring down of the workplace is not effectively done either before the work is started or during the course of the work. Other contributing factors are inadequate leadership or supervision, and inadequate preventive maintenance of machinery and equipment (3).

The accident causation theory proposed by Edward E. Adams (4), suggests that:

- 1) Failures in the senior management structure (carrying out the health and safety responsibilities of the employer) produce an inadequate health and safety environment (so called *root*

*causes of accidents*).

- 2) These structural failures lead to inadequate health and safety behaviour by middle management.
- 3) In turn, this causes inadequate health and safety performance by supervisors.
- 4) This creates unsafe activities and conditions at the level of the worker (so called *shop floor errors* or *direct causes*).
- 5) Shop floor errors lead to accidents or dangerous occurrences (called *near misses*).
- 6) These produce human and economic loss.

Further Silavwe 1996 states that "The causes of accidents are mainly created by environmental and personal factors."

Other environmental factors could be classified as follows:

- Atmospheric conditions. In cold working conditions, for instance, if there is lack of regular warmth, not only do the hands become numb and tend to fumble but the mind also is less alert than usual.
- Inadequate light in the factory or plant may cause accidents. For instance, work done under artificial light may strain the eyes and cause variation of optical focus.
- Speed can also cause accidents, as workers sometimes lose concentration, resulting in unnecessary accidents.

Other factors could be inadequate leadership or supervision and inadequate preventive maintenance of machinery and equipment.

It should be noted that between 1986

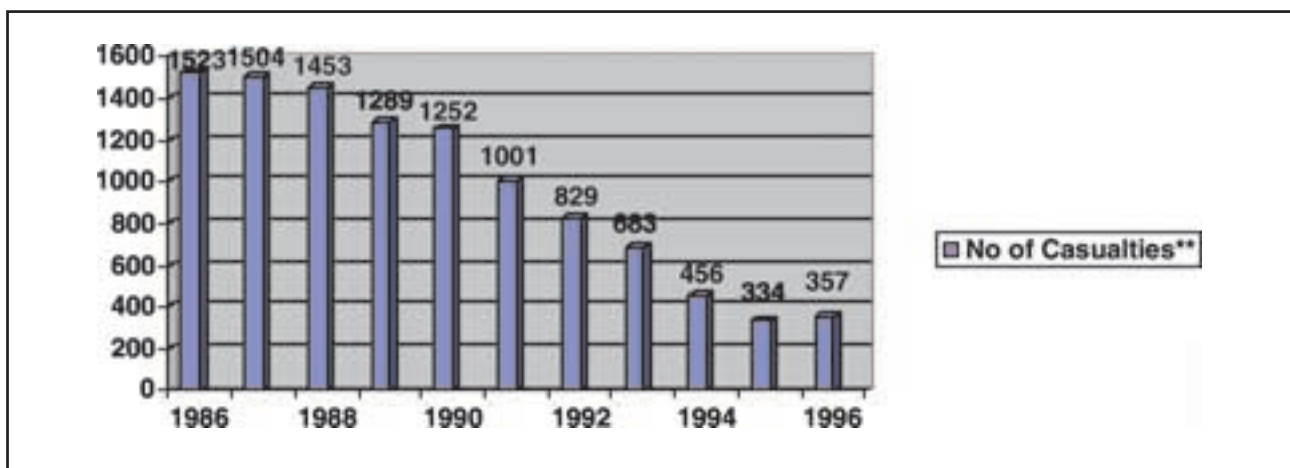


Table 1. Analysis of fatal accidents at a Zambian copper mine, 1986 to 1996 (Sept.)

ACCIDENT CLASSIFICATION	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996 (SEPT.)	TOTAL	%
FALLS OF GROUND	4	9	5	4	4	9	4	8	6	5	6	64	24.1
TRANSPORT	8	4	7	6	11	2	8	7	2	4	2	61	22.9
MEN FALLING	4	1	2	3	1	3	5	2	6	3	4	34	12.8
FALLS OF MATERIAL		1	2	6	6	1	1	2	3	1		23	8.6
EXPLOSIVES			4	5	1	2	5	2	2	2		23	8.6
INUDATION	2	5		1	1			1	1			11	4.1
BURNS	3					1	2		5		4	15	5.6
ELECTRICITY		1		2	1	2				1	1	8	3.0
PRESSURE VESSEL			1		1		2		1		2	7	2.6
OTHERS	3	5	3	1			1	1	1.6	4	1	20	7.5
<b>TOTALS</b>	<b>24</b>	<b>26</b>	<b>24</b>	<b>28</b>	<b>26</b>	<b>20</b>	<b>28</b>	<b>23</b>	<b>27</b>	<b>20</b>	<b>20</b>	<b>266</b>	<b>100</b>

SOURCE: (3).

Figure 1. Number of non-fatal accidents reported to the Mines Safety Department



SOURCE: (3)

and 1996, before it was privatized, the company recorded a total of 266 fatal accidents at its various Divisions. See the details in Table 1.

It is sad to note that 266 workers died as a result of workplace accidents. Out of the reported 266 fatal accidents, 64 workers died due to falls of ground and 61 workers died due to transport-related accidents.

10,970 non-fatal accidents were reported during the ten years under review. Out of these, a total of 2,007 workers were involved in accidents due to falls of ground.

In 1986, more non-fatal accidents were reported than in the other years (Figure 1).

Arising from the foregoing, the company produced the Occupational Health and Safety Policy whose Policy Statement was:

“In order to achieve our vision and business goals, it is critical to create and sustain a safe, accident-free and healthy environment. In this regard, it is man-

datory that every individual employee takes a personal responsibility to safeguard themselves, people around them, and Company property at all times. As such, each employee shall conduct all activities in conformity with statutory occupational health and safety requirements as a minimum standard, and abide by this policy at all times. The Company is committed to providing sufficient resources to meet these requirements.

It is the Company's conviction that there is no work of any nature which cannot be carried out in a safe and proper manner. All breaches of the provisions of this policy shall be dealt with in accordance with existing statutory, contractual and domestic disciplinary codes and procedures”. (2)

This policy was meant to remind all workers of their responsibilities towards safety at workplaces. Management therefore changed the motto from “**If it is not safe don't do it**” to

“**If it is not safe, make it safe and do it**” (2).

In addition, campaigns to promote safety awareness were carried out by all divisions. These campaigns, aimed at increasing safety awareness among all employees, included the display of safety banners depicting safety messages, posters and lectures as well as articles in divisional newsletters and the Mining Mirrors. Workers' empowerment seminars and galas also contributed greatly. Safety quizzes were also held as a way of encouraging safety awareness among employees.

### Effects of unhealthy and unsafe workplaces

The effects of unhealthy and unsafe workplaces are great. For instance, 266 fatal accidents were reported during the past ten years, which means that 266 families suffered the loss of a breadwinner. Moreover, the contributions that could have benefited the nation through PAYE were also lost.

Any accident affecting an employee,

in whatever form, is costly to both the family and the nation as a whole.

## How to attain healthy and safe workplaces

### Management commitment

The employer, the company owners, directors, and senior officers have a central role in establishing and communicating their commitment to health and safety. The employer must make it known that health and safety is a top priority by setting goals for the health and safety programme or policy. The programme or policy should have clear objectives. It should set clear performance standards and principles both for disciplining erring workers and for rewarding effective performance. Further, the programme or policy should adequately delegate responsibility, and should provide for the hiring and training competent staff.

The employer, the company owners, directors, and senior officers must know and must comply with the legislation. They must recognize that they are responsible and accountable for health and safety at workplaces.

### Managerial behaviour

Managerial behaviour in this context refers to the role of the middle management in allocating adequate resources for health and safety. Managers should help the employer to establish a health and safety culture by:

1. following the policies of the employer and ensuring that supervisors also follow them
2. establishing goals that will help implement the employer's policies and programmes in the local work area;
3. developing and enforcing safe and healthy work procedures
4. allocating adequate resources for health and safety
5. ensuring that supervisors are properly selected and trained in their responsibilities
6. providing supervisors with the necessary authority and responsibility for health and safety
7. holding supervisors accountable for their performance
8. knowing and complying with the legislation, and
9. planning schedules (such as shifts and work processes) with safety in mind.

### Shop floor errors

Shop floor errors in this context refer to unsafe acts and conditions that directly cause accidents and dangerous occur-

rences. These errors are usually at the level of the worker, but can involve self-employed persons and others.

Accidents cause injury or illness, and often result in property loss. The seriousness of the loss and injury is often a matter of chance. A "near miss" is a near accident. Near misses may or may not cause property loss.

It should be noted that whilst the employer usually controls the root causes, workers and supervisors often control the direct causes. Therefore, to achieve significant improvement in the health and safety system at workplaces, everyone must work together.

### Conclusion

Accidents are costly to the individuals, families, their organizations and the nation as a whole. Creating a healthy and safe workplace is therefore crucial. For this reason, occupational health and safety is important to everyone. Employers and workers should help each other to prevent accidents. Accident prevention starts with effective internal responsibility system for occupational health and safety.

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### Background

Recognizing the ILO's efforts of recent years to prevent occupational accidents and diseases worldwide, on 28 April 2004 Uganda inaugurated its first World Day for Safety and Health at Work.

The launching and celebration was through the following activities:

**1. Tripartite meetings** were held throughout Uganda, to commemorate the World Day and to take notice of what has been done elsewhere.

Through a series of meetings, it was agreed that the first World Day celebrations should disseminate information and should advocate to raise awareness of occupational health and safety among the general public. Several topical papers were commissioned in this regard:

- the purpose of the World Day for Safety and Health and why Uganda is celebrating it.
- occupational diseases and their effects on the Ugandan workforce, citing biological, chemical, physical and psychosocial hazards.
- the contribution of occupational health to workers' safety and health.
- the contribution of labour inspection to the national economy and to development, focusing on the mission, mandate, goals, objectives and functions of the Occupational Safety and Health (OSH) Department as well as on the responsibilities of employers and employees and the necessity of statutory inspections.
- the importance of inspecting construction sites, underscoring that the development strategy of Uganda needs to focus on improving working conditions in all sectors of the economy, with particular emphasis on the most vibrant and hence the most hazardous sectors, such as construction.

**2. A press conference**, hosted by the Honourable Zoe Bakoko-Bakoru, Minister of Gender, Labour and Social Development, was held on 27 April 2004. This highly successful event had over 50 media houses from print, radio and television in attendance.

In her address, the Hon. Minister emphasized that a systematic approach to OSH management at the enterprise lev-

# World Day for Safety and Health at Work launched in Uganda

Photo by M. Ronaldley



The Honourable Zoe Bakoko-Bakoru, Minister of Gender, Labour and Social Development, lighting the candle at the National War Memorial Square. Holding the candle is Mr. Ongaba, the Secretary General of the National Organisation of Trade Unions (NOTU).

Arua County, Hon. Zoe Bakoko-Bakoru, presided over the vigil.

## Conclusion

Inauguration of the World Day for Safety and Health gave the Department of Occupational Safety and Health, and hence the Ministry of Gender, Labour and Social Development, an opportunity to promote its services and to encourage further interaction by the public. Looking to the future, next year's World Day will focus on employers, asking them to dedicate 15 minutes to undertaking some activities aimed at promoting safety and health at their workplaces. These could take the form of demonstrations on safe practices, lectures, etc.

el is a key for continuous progress. Therefore, the Government of Uganda considers this to be one of the fundamental pillars of its OSH strategy for building and maintaining a preventive safety and health culture nationwide. She further stressed that safe work is not only sound economic policy, but a basic human right. She appealed to the press to act as allies and advocates for safety and health at the workplace, and voiced the need to form a team of media, trade unions, workers, employers and government to work together in addressing the issue.

This particular event gave an opportunity to the media to understand the work of the Occupational Safety and Health Department and its contribution to the productivity of the country.

**3. Local radio talk-show appearances** were made by OSH Department representatives.

Members of the OSH Department staff appeared in a series of live radio call-in talk-shows on one of the popular local FM radio stations – Central Broadcasting Service (CBS) 88.8 FM. The general importance of safety and health at work as well as related topical issues were discussed, giving the public the opportunity to call and ask questions.

**4. A candlelight vigil** was held at the National War Memorial Square in remembrance of all the workers who had been maimed or killed in the course of their work.

Workers, workers' representatives, trade union members, members of the press and Government representatives attended. The Honourable Minister of Gender, Labour and Social Development and Member of Parliament for

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Photo by M. Ronaldley

Mr. Y. Katula and Mr. W. M. Senyonjo on the air during one of the live talk-show radio broadcasts.

# A public health project in Ghana



mon, as could be expected. They were treated, but one of the major problems during the project was the management of the medication of chronic diseases, how to deal with the medication of the diagnosed diseases, said Dr. Philip Landrigan of the Mount Sinai Medical School.

## A good basis for further development

All in all, the project was successful because of the thorough planning and implementation of all phases of the project, Dr. Landrigan continued. Also the well-functioning primary health care infrastructure in Ghana contributed to the success of this project. The training and education of the medical staff is at a good level, and the collaboration runs smoothly. It is anticipated that collaborative efforts of this kind will be continued also in 2004. The results and experiences of the 2003 endeavour were very encouraging.

Interview of Dr Philip Landrigan  
by Suvi Lehtinen

In connection of health examinations, also health education can be provided.

The total population of Ghana is 21 million people, of whom 41% are under 15 years of age. The labour force numbers 9 mill., of whom about 60% work in agriculture. The economy of the country is based mainly on agriculture, but in the metropolitan area there is also industry, mostly textile, lumbering, mining, oil, and food processing. The services account for 39% of the GDP. Life expectancy at birth is 58 years. The total health expenditures are 4.7% of the GDP. The literacy rate of the young people is 92%. The country has been independent since 1957.

## Long tradition in collaboration

Long-term collaboration has been carried out between the US health authorities and the primary health care system in Ghana. Based on this long-term contact, a primary health care project was planned and implemented in 2003, told Dr. Philip J. Landrigan of the Mount Sinai Medical School of Public Health, Director of the Project. The aim of the joint project was to improve the public health situation in the country, and to carry out the project as intensive efforts during 1 to 2 months. Due to the over 10-year experience in collaboration between the partners, only two planning meetings preceded the 1-month project.

The project ran smoothly from the very beginning.

A total of 75 primary health care doctors and nurses, appointed by the Government of Ghana, participated in the project, and 50 doctors and nurses from the USA. The project consisted of both clinical examinations and the treatment of patients, but also of health education programmes targeted also at those who did not need any other medical services in the course of the project.

## Clinics in the villages

During the two planning meetings and site visits, a plan was prepared on how to organize the clinics and how to best utilize the expertise of the whole staff.

The temporary clinics were established at schools, mostly in rural and peri-urban areas, and they consisted of a medical clinic, dental clinic, and a pharmacy. The patients were first interviewed by the nurses, who then referred them to the different clinics, according to their health needs.

Parasitic diseases were the most com-



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