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CHEMICALS

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CIS and SafeWork are units of ILO's Social Protection Sector

Chemical safety

Feeding the population of the world would be impossible without fertilizers and pesticides; pesticides in public health use are an important arm in the fight against such important vector-borne diseases as malaria, yellow fever, and dengue. Modern preservation of food, including chemicals used, has helped to decrease mortality from cancer in humans. Drugs – a set of chemicals – save lives. At the same time, chemicals have caused, and what is more important, continue to cause, immense suffering in the form of acute poisonings, reproductive failures and terata, cancer as well as allergic reactions. They are alsothe cause of deterioration of the environment.

Chemical exposure at work is almost without exception higher than exposures of the general population; therefore, the adverse effects of chemicals are most likely to appear at work. This is true for both acute poisonings, and for the more insidious long-term effects. Furthermore, most chemical hazards first come apparent among exposed workers, thus vigilance for work-related diseases is an important sentinel function for the overall safety of chemicals.

The challenge for the whole society is to reap the benefits from chemicals, while at the same time avoiding their harmful effects to the society, to any individual, and to the environment. In order to reach this goal, the hazards have to be identified, quantitated, and the choice of chemicals and their use patterns must be adapted to the minimization of risks. The risks of chemicals depend on the chemical itself, and on the level and pattern of exposure. International organizations depending on world-wide collaborative expertise are best equipped to assess the inherent hazards of chemicals where a very important aspect is independence of stakeholders – very large amounts of money are implicated in risk assessment activities. On the other hand, the assessment of exposure (what chemicals are produced/imported/used; what are the use patterns and production processes, possibilities for exposure and understanding of the exposed people and management of the hazards involved, what are the exposure levels, how are the chemicals disposed of) can only be done at local level. Furthermore, information without action is useless – it is a heavy responsibility on governments to regulate chemicals in their countries appropriately. What is crucial is that legislation and guidelines themselves mean little without means and willingness to enforce them. A prerequisite for the enforcement is sufficient education and training, appropriate for the individuals concerned: factory floor level, individual sprayer of the pesticide, factory and farm management, environmental and occupational health

personnel, government responsible officials. Although much work remains to be done, history of work-related diseases (e.g., silicosis, asbestosis, byssinosis, isocyanate asthma, aromatic amine-induced bladder cancer, nickel-induced lung and nasal cancer, chromate-induced cement excema) indisputably demonstrates that chemically induced ill health can be avoided, provided that the causes are identified, and proper chemical management is instituted and maintained.

In this issue of the African Newsletter on Occupational Health and Safety, problems and developments of work on chemical safety in occupational settings, are described in African countries.

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Chemicals management and occupational health in Tanzania

Challenges and strategies for improvement

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TANZANIA

Introduction

This paper presents a detailed analysis of the challenges facing environmental and occupational health and safety (E&OHS) in Tanzania. The international challenges stem from the position of Tanzania on the international E&OHS platform (WHO, ILO, UNEP, and the ILO Southern Africa Multidisciplinary Advisory Team, or ILO/SAMAT), while internal challenges comprise weak environmental legislation or standards, lack of E&OHS departments in most of corporations, and lack of political will to enforce the laws. Moreover, corruption of government officials plays a major role in concretizing these challenges. The paper recommends strategies, based on engineering and scientific principles, for tackling these challenges and for improving E&OHS in Tanzania. It is recommended that the provision of information on proper chemicals management, hazard and accident prevention, emphasis on material safety data sheets (MSDS) and cleaner production, as well as cost-benefit analysis for E&OHS, should be part of training programmes for workers and affected groups.

Challenges facing E&OHS in Tanzania

Because of globalization and interconnectedness, industrialization is growing quickly in Tanzania (2.8% on average). Many chemical compounds are currently used to facilitate human activities. As many chemicals are in commercial use, Tanzanians are now exposed to chemical hazards. The rapid increase in the number of chemicals at workplaces has brought dangers to workers, the public and the environment. Some of these chemicals can pose significant risks to environmental and occupational health, at different exposure levels. Despite their importance in our society, chemicals threaten workers and end-users in the form of injuries, damage to health, physical damage to property and to the man-made or natural environment.

International platform for E&OHS matters

The activities of the ILO in Africa bring challenging issues. With regard to E&OHS, the ILO activities in Africa entail support for the private sector and labour standards. The coverage, however, lacks the component of E&OHS training for workers. Moreover, Tanzania is not among the target areas in the ILO's development policies, and rather, the focus is increasingly on Southern Africa (1). The ILO's programme encompasses a wide range of areas in Asia, the Americas and Africa. However, in Africa, only Dakar, Harare, and Yaoundé are included. The ILO's programme in Africa (ASIST) provides technical backstopping services to employment-intensive project, but not in Tanzania. The ILO/SAMAT, centred in Harare, covers the Southern African region only; Tanzania is not included. This organization provides such services as fundamental principles at work, employment, social protection, etc. However, the only access Tanzanians have is free log-in to access data; this is not a privilege for most workers for whom Internet access is a nightmare.

WHO is the major stakeholder in E&OHS issues. In Africa, WHO operates as the World Health Organization Regional Office for Africa, or WHO/AFRO, also centred in Harare. Under WHO/AFRO, workers' health and safety is dealt with by the Occupational Health Section. Although it provides occupational health training, there are only two centres in Africa (the National University of Benin and the University of Witwatersrand, in Johannesburg). These centres are too few for Africa, and Tanzania needs its own centre (or at least one in East Africa) for E&OHS training. The joint efforts by WHO/ILO to promote E&OHS in Africa focus on increasing awareness and on promotion of E&OHS in particularly hazardous occupations and among vulnerable groups. Such efforts are important to Africa, but they are too regionally-oriented and not sufficiently advocated in Tanzania. The only benefit Tanzanians get out of the WHO/ILO efforts appears as a free website where practitioners and non-profit organizations can host information on E&OHS activities.

The number of practitioners in E&OHS matters is very small in Tanzania compared to Zimbabwe, South and North Africa. For example, analysis of the attendance at WHO/ILO Joint Effort Meetings (between 2000 and 2001) has indicated a general weakness for Tanzania, while Zimbabwe has been well represented at all meetings.

At the international level, reputable E&OHS efforts are those of UNEP, WHO, and ILO. However, there is not a single centre in Tanzania, from which these efforts could be extended to workers. The WHO/ILO joint efforts in Africa, for example, have not established an information distribution centre in Tanzania (2). Instead, Tanzania can take part in the efforts of two of the collaborative areas defined in the WHO/ILO action

plan (3). There is also an imbalance in the distribution of the collaborating centres between the various continents for WHO joint efforts. Unfortunately, most of these centres are in Europe, which have lower illiteracy levels compared to African countries. The University of Witwatersrand in South Africa is among the institutions in the process of designation as a collaborating centre for E&OHS; there are only three collaborating centres for Africa today. This yields the lowest ratio in terms of the number of people per centre. To avoid inequalities in workers' health (1), WHO/ILO must utilize the high level of international expertise available in E&OHS to support development in East and Central Africa, not only in Southern and North Africa. It is worth noting that North America poses a difficulty in such a comparison, because the continent has only three large countries but, compared to Africa, a large number of collaborating centres.

Weaker environmental legislation and regulations

Despite industrial growth in Tanzania, E&OHS issues are not getting adequate emphasis, owing to a lack of priority-setting, outdated legislation, lack of data and limited research (4). Some of the legislation dealing with chemicals management and E&OHS is very old; for instance, the Factories Ordinance (1950); the Workmen's Compensation Ordinance (1963), the Accidents and Occupational Diseases Notification Ordinance (1953), the Pharmaceutical and Poisons Act (1978), and the Pesticide Control Act (1979). The only new legislation pertaining to E&OHS is the Occupational Health and Safety Act (2003) and the Industrial and Consumer Chemicals (Management and Control) Act (2003). However, these two laws only partially cover workers in already polluted workplaces. Moreover, the lack of the worker component, the new legislation also lacks clarity in terms of policy on E&OHS, much the same as the old legislation and the National Environmental Policy (1997) currently in force. In addition, the new regulations on chemicals management focus on the producers, exporters, importers and transporters of chemicals.

In countries where corruption is common among government officials, the effectiveness of environmental protection policies will fall short owing to a lack of political will to enforce standing regulations (5). In Tanzania, there is not enough manpower for monitoring compliance with environmental regulations, and even if there would be sufficient manpower for monitoring, the personnel lack technical knowledge and equipment (4). Some suggestions can be made on the basis of this challenge. Granting rights of action to environmental groups and effective enforcement by independent public prosecutors can help to avert the problems caused by close relationships between government officials and industry. This is because court sanctions, whether mild or very stringent, may still be without a deterrent effect as the probability of detection is very low. Moreover, potential environmental criminals always underestimate the probability of being caught, and this overconfidence increases if they can further decrease the probability of prosecution and conviction.

Recommended strategies

Provision and access to information on chemicals management

Information on commonly used hazardous chemicals must be made available. Although chemicals are normally labelled, it is necessary to train workers, farmers and end-users concerning the corresponding hazards and controls, which includes summaries of information not included on the label. This will minimize hazards posed by chemicals in workplaces, homes, and farms. The important information for proper chemicals management can be summarized as follows: corrosiveness; identification; signs of exposure; workplace exposure limits; and exposure reduction. Other issues include health hazard information, workplace controls, and good work practices in handling such chemicals. This information is not readily available in workplaces and where available it is not well understood by workers, presenting the need for training.

Successful training of workers on E&OHS depends on the availability of reliable information, which is required to be able to identify chemical hazards, characterize risks, and to facilitate and develop different management strategies. Knowledge of the physical and chemical properties of chemicals will enable the development of safe handling strategies. Due to the lack of equipment, time, human resources and financial resources, internal information on chemicals is often difficult to develop. As a result, external sources of information are also important.

Local information sources include the printed media and CD-ROMs, which in most cases are old (6). Other sources of local information existing in Tanzania include local WHO Offices, the University of Dar es Salaam, the Government Chemist Laboratory Agency (GCLA), and the Tanzania Bureau of Standards (TBS) which are not readily accessible to workers handling toxic chemicals. International sources of information include UNEP's famous website and government websites (such as OH&S, EPA, and OSHA in the USA, the Canadian EPA, the Canadian OSHA, TOXNET, etc.). The WHO/ILO joint effort in Africa is another international source of information. The joint effort has proposed a strong action plan, which includes collaboration in information exchange, research and awareness raising. To improve the generation, availability and exchange of information on E&OHS, Tanzania must collaborate with the WHO/ILO joint effort. Two important African websites are recommended for E&OHS: *ASOSH.org* and *SHEAfrica.info* (7).

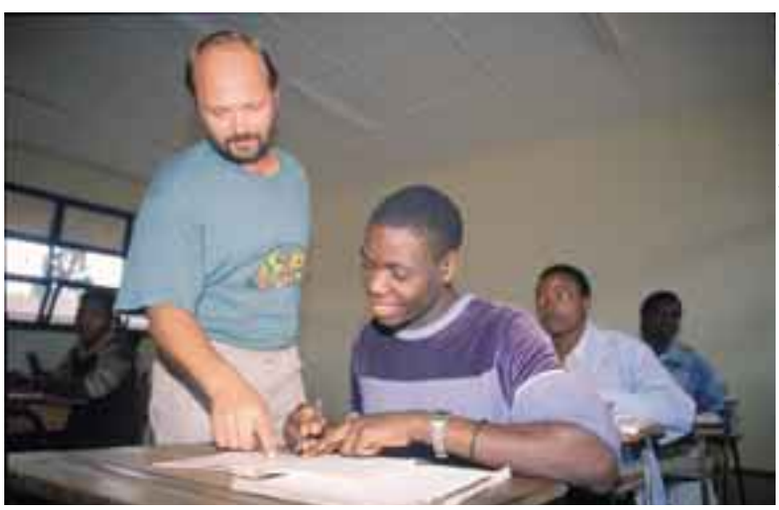

Photo by M. Lintunen

Training is very important to develop awareness of the hazards of chemicals, health effects and the safe handling of chemicals, as well as safe management.

Training programmes for environmental health and safety

The objective and purpose of such training is to develop awareness and to encourage managers, supervisors and operators actively to seek and mitigate potential chemical hazards at their own workplaces. Training programmes must include job hazards, health effects, and required work procedures. Training leads to a greater understanding of the safe operation and management of existing and future workplaces where problems can arise. Training can be done through short and periodic courses, especially for workers involved in chemicals management. For improving E&OHS, the courses must be tailored by multidisciplinary teams, and may include hazardous waste management, safe handling of chemicals, air pollution and its health effects, awareness of hazardous environments, first aid procedures for chemical accidents, etc. The threat presented by chemicals in the environment can be solved in part by training the generators of chemical wastes and the affected community.

Hazards and accident prevention

It is an offence to release or permit the release of a deleterious substance of any type into air or water or on the land. The presence of such substances in workplaces beyond allowable limits is also an offence. Preventing accidental and intentional release of hazardous chemicals in workplaces and in the environment is the shared responsibility of industry, government, and the public. In Tanzania, however, the public has not taken steps towards addressing this threat owing to the lack of awareness, knowledge and information.

The first of the important steps to be taken towards accident prevention must include identifying the hazards and assessing the risks. The second step in risk assessment must include assessment of the relationship between the dose/exposure and the corresponding effects (8). Once information about chemicals is openly shared between industry, government, and the community, the three players in the field of E&OHS can then work together toward reducing the risk to the public health and the environment.

Identification and assessment of hazards within the chemical industries must be done during design phase (9). Thus, all new industries must be screened for environmental performance, a process called environmental impact assessment (EIA). To perform an EIA, experts must make a follow-up by collecting all necessary data about the process, identifying all hazards involved, evaluating them and suggesting prompt measures. Potential hazards should be considered as early as possible in order to avoid negative consequences; e.g. higher costs, longer development times, and workers' exposure to hazardous chemicals. Process hazards analyses (PHAs) should be an integral part of process safety programmes in chemical and other pollution-prone industries, to minimize E&OHS problems.

Promoting cleaner technologies and waste minimization

The aim of cleaner technologies is to reduce the amounts of pollutants and waste production at the source, and to make more efficient use of raw materials, energy and utilities, thus reducing environmental impacts. The essential underlying philosophy is that prevention is better than cure. This is in contrast with the traditional approach to environmental protection usually applied in Tanzania, which relies on end-of-pipe (EOP) technology to handle wastes after the process. Such an approach frequently results in secondary environmental impacts as toxic chemical substances are transferred from one medium to another. The waste option hierarchy follows this cycle: source reduction; reduction of toxic level or negative impacts of wastes produced; re-use elsewhere; treatment; and disposal. The first three options are grouped as in-plant methods (9), while the last three are external options (focused outside the plant premises).

Historically, control of pollution and emissions has been achieved by EOP technologies even in industrialized nations, e.g. the UK (10). Due to external pressures, this attitude is gradually changing. The Tanzania government should make sure that polluting corporations recognize their responsibilities. This system is in place in the UK. Moreover, waste reduction strategies must be applied at the very early stage of plant and process design, at the basic level of the process itself, resulting in fundamental process or reaction changes; or by manipulation of feedstocks and waste streams of an existing chemical plant (9), to avoid future E&OHS-related problems. In addition to the obvious environmental benefits, there are various potential economic benefits that can accrue, ranging from reduced costs of treatment and raw materials to diminished long-term liabilities and the development of new markets for recovered wastes (11).

The measures on cleaner technology are based on the integrated pollution control legislation, coupled with potential external driving forces such as economic benefits, public opinion and corporate environmental policies (10). New measures have been proposed to encourage the development of cleaner technologies (9). The most significant are those designed to integrate environmental care with other business operations (externally focused) different from in-plant methods, and those aiming to release more information about industrial environmental impacts into the public domain, a Canadian concept.

With cleaner technologies, there are mainly two issues to consider: driving forces and barriers. The most constructive role the Tanzania government could assume would be to promote voluntary waste minimization. The driving force, apart from legislative measures, is economic (opportunity and liability). Despite the potentially large environmental and economic benefits resulting from the use of cleaner technologies, there are strong barriers to this move. For example, industries are very slow to adopt waste minimization policies, which is a challenge to E&OHS. Research in the US has indicated that only 10% of the barriers are technical (availability, skills and expertise), 30% financial, and up to 60% political (organizational and legislative) (10). The political barrier, which consists of organizational and legislative constraints, has been identified as the major obstacle. Historically, there is a general lack of corporate commitment to the environment, particularly at a policy-making level. This is especially true of Tanzanian small and medium-sized enterprises (SMEs). The prevalent attitude seems to be that companies will meet mandatory standards, but no more (12).

Cost-benefit analysis for E&OHS

There is no doubt that action to improve standards of health and safety in the workplace involves costs (13, 14). This is recognized in the health and safety legislation in the quantification of general duties by the term "reasonably practicable", which involves some degree of balancing of the additional costs and benefits of safety improvement. A need to balance between the costs and burden to business and the benefits of adequate control of health and safety at the workplace is called cost-benefit analysis (CBA). Studies on the costs of workplace accidents and work-related ill health are normally concerned with both

accidents that result from injury and also the more numerous accidents that merely involve damage or loss to property, plant, materials, or loss of business opportunity. The cost of workplace accidents and work-related illness starts with analysing working days lost per year, on the basis of which the financial cost per year is calculated, based on workers' productivity before illness and not on salaries (also called financial costs). In the UK, for example, the countrywide total cost was estimated to be approximately 14 billion pounds sterling in 1990, which was estimated to be equivalent to 2–3% of the total gross domestic product (GDP) (13).

Environmental health and safety auditing

The aim of auditing safety and risk is to establish whether people on the installation are as safe as they reasonably can be; to establish shortcomings in the systems for the management of health and safety; to determine whether the management systems are likely to be robust over the medium terms and to determine whether senior managers are effective in controlling risk. For the audit to be influential, the senior managers must be involved. The purpose of environmental auditing is to develop a database of information and recommendations as the basis for a national environmental strategy (a summary of the aims and objectives in protecting natural resources) and policy (a set of methods and approaches for achieving these aims), and to collect information in order to allow complicated environmental decisions to be made and justified. Each audit programme is different but most have these features in common: preliminary, planning, main and final stages (15).

Among the main goals of internal auditing are: providing information as a basis for setting the enterprise's environmental policy; establishing a measure against which improvements in environmental performance can be checked and the need for environmental control systems can be shown; providing initial data for the design of such measures; and measuring the effectiveness of the measures once they are in place. Other goals include: checking compliance with legal and technical standards; improving relations with the authorities responsible for pollution control, with public organizations, and with the community.

If external audits are needed to give the authorities a realistic picture of the environmental position in Tanzania, internal audits are necessary because they form the basis for action at the point where it matters most, that is, at the factory. The wish to save money promises to be a powerful stimulus for internal auditing. The existing system of pollution licensing sets fees and fines based on the reported amounts of pollutants released into the environment. Even at the current low rates, under-reporting of emissions means that the companies are paying much less than they should. By revealing the true extent of emission, external audits will dramatically increase the costs of polluting the environment and will encourage companies to save money by conducting their own internal audits.

Conclusion

Chemical engineering researchers alone, even if complemented by workplace health promotion experts, cannot win the battle against the hazards of exposure to chemicals. This is because most of the hurdles are deeply rooted in the political system. Tanzania must aim at changing attitudes, modes of business and decision-making, by means of developing the legal system on E&OHS issues using the strategies recommended in this paper. The scientific recommendations given are not based on political will and can perform well everywhere. Training of workers with high exposure risks is strongly recommended. This can be supplemented by training the end-users of the chemicals in the community on how to avoid the hazards posed by hazardous chemicals. The population surrounding the polluted areas should also be educated in order to reduce the acuteness of the pollution problems. Chemical engineers and occupational health experts should not wait for improvement of the legal system, because liability rules and government regulations cannot produce the desired cure for workers exposed to hazardous chemicals and hazardous workplaces. The efforts currently made by Tanzania are not enough. There is also an imbalance of the international efforts by WHO/ILO, whereby Tanzania is not among the target areas. Thus, Tanzania needs to make her own efforts before seeking assistance.

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Chemical safety at work in Egypt

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EGYPT

The economic context

Egypt has the largest population (67.89 million in 2002 according to the Central Agency for Public Mobilisation and Statistics, or CAPMAS) and the second largest economy (after Saudi Arabia) in the Arab world. The economic reform and structural adjustment programme, launched in 1991, entails a more pronounced shift from a centrally planned economy to a decentralized, market-driven economy in which the private sector plays the leading role. According to CAPMAS, Egypt's labour force rose by 5.6% during 2001, reaching 19.6 million. Agriculture accounted for 17% of GDP and 28% of total employment, whereas manufacturing industries and mining contributed 19% of GDP and nearly 14% of total employment in the financial year 2001/02. Extractive industries (oil, natural gas and minerals) accounted for 8% of GDP. Important industries are textiles, food processing, chemicals, petroleum, petrochemicals, construction, cement, metalworking and tourism.

Development of the chemical industry in Egypt has been facilitated by the country's strong oil industry, which is able to provide raw materials, feedstock and manufacturing infrastructures. Key chemical industry products include fertilizers, petrochemicals, polymers and other chemicals. As an example, Egypt consumes approx. seven million tonnes of nitrogenous and phosphate fertilizers per year.

In terms of statistics on occupational accidents and diseases, the figures for the chemical industry are incorporated into those for manufacturing industry. In the year 2000, 143 fatal accidents were recorded in manufacturing industry as compared to 6 in mining and 17 in construction (Ministry of Manpower). For the year 1998, among a total of 848,059 workers employed in manufacturing industry, 41,344 job injuries were recorded; they resulted in 61 deaths, 10 of which were due to hazardous substances.

The legislative framework

Chemicals are subject to several Acts and Decrees, which have very recently been updated.

Law 12/2003 (replacing the previous Law 137/1981) promulgates the new Labour Code that came into force on 7 July 2003. A specific section of Law 12 – i.e. **Book V, is specifically devoted to occupational safety and health.** Its objective is to ensure safety and health of workers in all areas of work and production. It applies to all establishments in the private and public sectors, to all branches of industry, including of course the chemical industry as well as agriculture.

Photo by K. Rissa

At the national level, Law 12/2003 establishes the administrative authority to administer, regulate and implement its provisions. The General Administration for Occupational Safety and Health located within the Ministry of Manpower is responsible for implementing health and safety policy, procedures, guidelines and legal requirements. It carries out its functions – including an inspection system – through three major administrations, i.e. the occupational health, the industrial health and the industrial safety administrations, and through similar structures at the provincial level.

At the enterprise level, Law 12/2003 stipulates that the employer shall take all necessary measures to ensure safety and health at the workplace, in particular with regard to mechanical, physical, chemical and biological hazards (Article 208). Employers shall also inform workers of the dangers to which they are exposed. The Law also provides for the establishment of an OSH Committee where employers and workers have the opportunity to discuss chemical hazards and preventive action, among other safety issues.

Law No. 12/2003 is supplemented by Ministerial Decrees, which elaborate more specific technical provisions. Chemical safety is dealt with, in particular, by **Decree 55/1983,** which specifies the necessary conditions for providing a safe work environment with respect to physical, mechanical, electrical, chemical and other hazards. It also has special chapters prescribing "Maximum allowable concentrations" for 134 chemicals and a list of suspected carcinogens (28 agents). These lists are being updated.

Compensation services are stipulated under the Social and Health Insurance **Law 79/1975,** to which the list of occu-

pational diseases is appended. Among the 28 diseases included on the list, nearly 20 are caused by chemicals. This list is being revised.

In addition to Law 12/2003 and Decree 55/1983, chemicals as well as major hazard installations are also covered by **Law 4/1994 on the protection and promotion of the environment** and its Executive Regulations of 1995.

The scope of Law 4/1994 encompasses protection of the land, air and water environment from pollution, and sets controls for activities affecting them. It establishes the administrative structure necessary for its enforcement, i.e. the Egyptian Environmental Affairs Agency (EEAA). The EEAA is responsible for the formulation of the general policy and plans for the protection and promotion of the environment. Representatives of six Ministries, NGOs, employers and universities are members of its board.

Environmental impact assessment of establishments requiring licenses to operate ensures that industrial establishments do not pollute the environment. However, for currently established facilities, auditing and monitoring mechanisms are operating under the Ministry of Environment. Emissions of air pollutants and exhaust fumes are subject to permissible limits, which were originally prescribed by Decree 55/1983 and have been updated by the Executive Regulation of Law 4/1994. These limit values apply to both indoor and outdoor premises. This covers chemicals, mineral dusts, limit values for carcinogens, a list of carcinogens workers are not allowed to deal with, limits for physical exposure – such as to noise, temperature, heat stress – etc.

Law 4/1994 (Chapter 2, Section 1, Articles 29–33) and its Executive Regulation (Article 25) regulate the handling of hazardous substances and wastes, which requires a special authorization. The Law and its Executive Regulation set the procedures for obtaining the necessary license for handling hazardous substances. The application for such a license involves, among others, providing the competent authority with a description of the substance, its intended use, its means of transport and its storage. A register must be maintained, and proper packaging, an emergency plan and adequate staff training must be in place. Lists of hazardous substances (A = banned chemicals; B = hazardous substances subject to permit procedures; and C = non-restricted substances) are currently established under Law 4/1994 by the Ministries in their fields of competence.

Law 12/2003 and Law 4/1994 are implemented through a corps of inspectors, under the Ministry of Manpower and under the Ministry of Environment, who work at national and provincial levels. In cases of violation of the law, the penalties that can be set range from fines to imprisonment, or closing down of the establishment or its operation.

Information and management of chemical information

The Egyptian Environmental Affairs Agency (EEAA), with the support of the Swiss Government and in cooperation with six Ministries (the Ministries of Agriculture, Electricity, Health, Industry, Interior and Petroleum), the Customs Authority and the Civil Defence Authority, has developed a fully computerized hazardous substances information management system (HSIMS), which is available through the Internet and on CD-ROM in Arabic and English. The above-mentioned Ministries and several companies are linked to the computer network and have access to the following databases:

- List (A): banned chemicals
- List (B): hazardous substances subject to permit procedure
- List (C): non-restricted substances
- Unified permit forms
- Physical and chemical properties of hazardous chemicals, safety phrases, guidelines for emergency situations (database with about 1,800 hazardous substances)
- Guidelines for labelling, handling and packaging of hazardous chemicals
- Guidelines for storage and transport.

Egyptian companies can easily use the lists and guidelines. Moreover, the EEAA and the ILO Cairo Office have embarked on the translation of the International Programme on Chemical Safety (IPCS) chemical cards into Arabic, which will make this internationally validated information available not only to Egyptian users, but also hopefully to a much larger Arab-speaking audience.

Training on chemical safety

Educational programmes for graduates and postgraduate studies at the university and college levels include chemical safety in disciplines such as occupational safety, occupational health, industrial medicine, occupational hygiene, industrial engineering, industrial chemistry, and environmental medicine. Training and awareness on chemical safety at the workplace is taking place within the regular training programmes offered by the Institute for Industrial Safety of the Workers' University, as well as by the National Institute of Occupational Safety and Health (NIOSH). Numerous types of training are provided under projects funded by Canada, Finland, Switzerland etc., some of them in cooperation with the ILO or using the ILO chemical training modules. However, the need is great and much effort is still required in this field.

Conclusion

This overview of the tools available in Egypt for the management and improvement of safety in the use of chemicals at the workplace is far from exhaustive. The use of chemicals in small and medium-sized enterprises, for instance, calls for a major input in awareness raising and information. All parties concerned, government and safety inspectors in particular, are requesting further training. On a long-term basis, a strengthened safety culture within enterprises would facilitate the implementation of the measures necessary to ensure safety at work with chemicals. Tremendous progress has already been achieved and the willingness of all partners involved will reinforce this trend in the near future.

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A study of farmers' knowledge, attitude and experience in the use of pesticides in coffee farming

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Introduction

Pesticides are commonly used to control coffee pests despite the fact that they have been implicated in a number of poisoning incidences and ill health. Agricultural extension workers in Tanzania are unable to provide an adequate service to farmers with regard to safe use of pesticides because they are not adequately trained in handling, application (1,2) and health aspects of pesticides (3).

Agricultural development policies in many developing countries emphasize external inputs as means of increasing food production. This has led to a growth in the use of pesticides, inorganic fertilizers, etc. and hence a substitution for natural processes and resources. Usages of synthetic agrochemicals have replaced biological, cultural, and mechanical methods for controlling pests, weeds and diseases. On the other hand, in most cases information for the management decisions on agro-inputs comes from input suppliers, researchers, and extension workers rather than from local indigenous sources. It is, therefore, necessary to make better use of indigenous resources in sustainable agricultural production and for health maintenance.

Industrialized countries have been taking significant steps to reduce pesticide use, while use in developing countries is on the increase (4). The introduction of stricter laws, such as the EU Directive 91/4/EEC, which emphasizes the requirement of the Maximum Residues Levels (MRLs) for specific active ingredients combination for horticultural crops that enters the EU Member State and incentives provided to organic farming ensure the protection of the health and environment in the industrialized world. Genetically modified crops and use of natural products are being advocated for their apparent potential for pesticide risk reduction.

Pest control is necessary to increase agricultural production, particularly in the tropics due to pest diversity and high crop losses (5). Due to a greater emphasis in external inputs, coffee farmers have been using inappropriate methods, which increase health risks (2,6), lead to soil degradation and environmental pollution (1,7) and subsequently to low agricultural output (5). Farmers spend a lot of their time trying different techniques and methods at their disposal in most cases through trial and error, to control pests and plant diseases, some of which expose them unnecessarily to health hazards.

In 1995, interviews were conducted with 500 small-scale coffee farmers in Kilimanjaro and Arusha regions, Northern Tanzania, over a two-month period. Findings indicated that farmers in the coffee growing areas are exposed to pesticide hazards due to the lack of knowledge and agricultural extension services.

Materials and methods

The study population comprised about 500 randomly selected small-scale farmers from Arumeru (119), Moshi Rural (139), Hai (135), and Rombo (107) districts in Northern Tanzania whose main cash crop was coffee and who had been using pesticides continuously over the years. The majority were males (97%), aged between 20 and 90 years. In order to determine the sample size for each district, lists of coffee farmers in all the primary societies in each selected district were obtained from Kilimanjaro Cooperative Union (KCU) and Arusha Cooperative Union (ACU) for Kilimanjaro and Arusha regions, respectively. The lists contained the names of primary societies, their respective villages, and the number of farmers in each village. Using proportions, the number of farmers to be included in the study for each village was calculated and the study participants were randomly selected from each village.

A questionnaire with 61 questions was designed based on the East Africa Pesticide Network (Farm worker) project questionnaire (available from the author), to collect data. It contained structured and unstructured questions to provide farmers' bio-data; land tenureship and land use; knowledge, attitude and

Table 1. Reasons for adherence to recommended pesticide dosages in Northern Tanzania, Nov.–Dec. 1995.

Reason	*% frequency*
Crops damaged or dose ineffective	43.1
Advised by an expert	23.6
Suffered from economic loss	18.9
Dose normally used/is effective	4.2
Suffered from health problems	4.2
Pesticide shortage	3.6
Follow label instruction	2.4

practices with respect to safe use of pesticides; input supplies and the extension service to farmers. It was designed in English and translated into Kiswahili, the national language, which is understood by the majority, and pre-tested before using it as a tool. The interviewers were trained technicians from the Tropical Pesticides Research Institute (TPRI) and retired agricultural extension workers. They had an orientation in aspects of safe use of pesticides and procedures for conducting interviews before the study began. They conducted face-to-face interviews in October and November 1995.

Data processing was done using SPSS VER6. Statements made on open-ended questions that were not coded were also used to concretise the numerical data.

Results and discussions

General problems encountered by coffee farmers

The general problems encountered in coffee farming as reported by respondents included problems of unavailability of inputs such as pesticides, spray equipment, and fertilizers (77%). Nine per cent of the respondents' concerns were inputs too expensive, and of poor quality (9%). Lack of protective gear (13%) was also a handicap. Eleven per cent indicated that lack of appropriate knowledge led to difficulties in dealing with pests, diseases, and drought. The pests and diseases considered most important were stem borer (47%), antestia bug (23%), ants (5%), berry moth (4%), leaf miner (3%), coffee berry disease (11%), and leaf rust (7%). Farmers could identify the pests and diseases by name or accurately describing them leading to identification by interviewers.

Selection criteria for pesticides to use and dosage

About 99% of the interviewed farmers reported to have been using pesticides on their coffee. A few of the respondents reported not using pesticides for reasons that included pesticide scarcity or being not affordable. A small proportion reported not using pesticides because they did not encounter pest problems.

About 51% of the respondents reported relying on their own experience in deciding the type of pesticide to use. Extension workers advised only 18%. About 20% took whatever was available and 6% of the respondents experimented with the different types to choose good quality pesticides. Some of the farmers read labels or observed good crops in neighbouring fields and inquired what products were used and chose the same. A survey on the adherence to recommended dosages showed the results shown in Table 1.

Table 2. Self reported pesticide poisoning incidences.

Year	*Scenario*	***Outcome***
1988	While spraying a mixture of Thiodan (*organochlorine insecticide)* and Red copper (*inorganic fungicide),* the victim started frothing at the mouth, developed dry throat and felt weak	After one week victim was completely cured.
1989	While spraying coffee berry disease (CBD) pesticides (*inorganic fungicide),* the whole body became swollen, itchy and the victim felt dizzy. There was no action taken.	Victim recovered
1989	While spraying a mixture of Octave (*fungicide),* Bayleton *(fungicide)* and Actellic EC *(organophosphorus insecticide),* the victim collapsed in the field and lost consciousness. He was rushed to hospital and treated.	Until now he has chest problem.
1990	While spraying in the field, the wind changed direction suddenly and a mixture of Thiodan *(organochlorine insecticide)* and Red Copper (*inorganic fungicide)* entered the eyes of the victim. He received medical treatment.	He had weak eyes.
1992	While spraying Dursban *(organophosphorus insecticide),* the victim became shivery, tired and dizzy. He went to hospital and was treated for poisoning.	He recovered fully.
1992	Thiodan *(organochlorine insecticide)* and Dursban *(organophosphorus insecticide)* gave blemishes to a number of young spray-men. These occurred mainly in the limbs. They took baths and drank a lot of milk. There was a recurrence in 1993.	They felt well after a couple of days.
1993	A boy was poisoned when spraying a mixture of Sumithion *(organophosphorus insecticide),* Thiodan *(organochlorine insecticide)* and Red Copper (*inorganic fungicide).* He felt dizzy and lost consciousness. He was rushed to hospital and it took a long time for him to recover. The same happened to him in 1994	He continues to feel weak and drowsy.
1993	While spraying a mixture of Thiodan *(organochlorine insecticide)* and Bravo *(fungicide),* the victim started itching all over and developed rushes. He took a bath immediately and drank a lot of milk	The marks from the rash did not disappear.

About 25% of the respondents reported using recommended dose rates on coffee while others used experiences, such as those mentioned in Table 1 to decide on what dosage to use. Overdosing and under-dosing were common leading to crop damage by either the pesticides (phyto-toxicity) or pests. Pesticides were applied routinely (49%) or after pest scouting (43%). About 6% of the respondents followed advice from extensionists, researchers or pesticide dealers and 2% relied on their neighbours in deciding when to apply pesticides. Pesticides were applied as formulation mixtures (65%) or single formulation (37%). The formulation mixtures were composed of one insecticide formulation with one fungicide formulation or one insecticide formulation with two or more different fungicide formulations or one fungicide formulation with two or more different insecticide formulations. With this kind of practice, the treatment of poisoning becomes cumbersome, since different groups of pesticides have different modes of action (for diagnosis) and antidotes (for treatment).

Farmers' pest knowledge

About 74% of the respondents knew of the existence of beneficial insects. Only 18% reported knowing other ways of killing pests, and 16% of reducing pest damage other than using pesticides. As one of the ways of killing pests, chameleon featured as a predator for insects, cobwebs trapped insects, ants, red beetles with black spots (ladybirds) eat scales, etc. To reduce pest damage the respondents mentioned frequent weeding to keep the farm clean, scrubbing

Table 3. Farmers' attitudes about pesticides

Statement	*In agreement (%)*
1. It is not necessary to read the label on a pesticide container.	5.4
2. Most of the time I use a little bit less pesticides than the amount recommended.	10.6
3. If a pesticide is sold in the market, it means, it is safe, no matter how one uses it.	13.0
4. Pests do not have to come to contact with the pesticides sprayed, because the smell of the pesticide alone can kill them.	42.0
5. I only consider a pesticide to be effective when I can see the effect immediately after I have finished spraying.	24.0
6. All coffee pesticides should be mixed with water before spraying.	94.0

Table 4. Frequency of coffee farmers' contact with service providers in Northern Tanzania, Nov.–Dec.1995.

	% Contact frequency			
Staff	***None***	***Once***	***Twice***	***>Twice***
1. Extension	51.3	6.0	9.4	31.5
2. Research	84.6	0.0	1.4	0.4
3. Salesmen	82.6	2.6	0.4	0.8
4. Coffee buyer	84.4	0.6	0.4	0.2

the coffee trees to prevent stem borers from hiding and using mechanical means such as wires to kill stem borers. About 16% of the respondents were using some of the alternative methods mentioned above. With proper guidance and training farmers could apply their pest and alternative pest control knowledge to successfully produce agricultural crops, thus reducing the amount and types of pesticides used.

Pesticide poisoning incidences

About 15% of the respondents reported to have been poisoned at one time in their working life. Some of the reported poisoning scenarios are shown in Table 2 on page 63.

Attitudes with respect to pesticide use

The necessity to read the label is shown by most farmers in Table 3, however, earlier only 2.4% of the farmers had indicated the label as a source of information. The awareness that overdosing is not good came to farmers after bad experiences of either crop damage or poisoning, but the effects of under-dosing were not that obvious. The high percentage of farmers agreeing that pests have to come into contact with pesticides to die, or that the effect of pest contact has to be immediate demonstrates ignorance on the mode of action of pesticides. Consequently, their pesticide handling practices might be the cause of unnecessary exposures, environmental pollution and economic loss as they try to make sure they have killed the pests immediately.

Preference for alternative means of pest control other than pesticides was agreed upon by 37% of the respondents. These farmers could form the core group for organic farming advocacy or integrated pest management programmes in coffee farming.

Input supply and extension services

Pesticide procurement was reported to be through cooperative societies (79%); stockists (8%); unlicensed dealers (1%) with the remaining getting their supplies through all the above sources. Currently, the role of cooperative societies in pesticide supply has been reduced as a result of trade liberalization. Unscrupulous pesticide dealers take the advantage of inadequacy of extension service and farmers' ignorance to push their products even when they are not relevant or necessary. Farmers' sensitization is necessary so they can refuse to buy those products.

The services of professionals (extension, research, etc.) were shown to be very low (Table 4).

Conclusion

The findings have shown that farmers in coffee growing areas have managed to produce coffee over the years with minimum supervision and guidance from the agricultural extension service. The farmers showed creativity and motivation in dealing with the pest problem; however, they were constrained by the lack of appropriate knowledge and shortage of inputs.

Putting the responsibility in the hands of farmers to develop the kind of crop protection service they need could make the services more responsive to local conditions, more effective and more sustainable. Agricultural extension and research workers need to introduce linkages with farmers to advance the use of appropriate modern technology where it is needed to enhance the local inputs for improved agricultural production.

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Poverty is diminishing health and safety

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Introduction

"Poverty is sin. I would rather die than be poor!!", said one super-rich Kenyan politician.

One of the main concerns in my country, Kenya, is poverty and decreased living standards as a result of the serious economic downturn that has taken place since 1989. Today more than 5,000 enterprises in Kenya are in the red financially. It is very common to hear through the media that a certain business enterprise has suffered irreparable financial losses and has been put under receivership by their bankers. But surprisingly, despite the very lean economy, only banks make huge profits in Kenya. These factors create unemployment, poverty, political instability and, consequently, health issues.

The Government of Kenya enacted the *Factories and Other Places of Work Act, Cap. 514 laws of Kenya* as early as in 1951. That was before independence, which came much later – in 1963, more than ten years after this statute had come into being. This statute and its subsidiary legislation have been in force all these years; a few amendments have been made from time to time. The statutes are meant to make provision for the health, safety and welfare of persons employed in factories and other similar workplaces, and for matters incidental thereto and connected therewith. The Factories and Other Places of Work Act only provides for the basic requirements in terms of occupational health, safety and welfare.

In Kenya today, the total population is about 32 million, 70% of whom live below the poverty line. The population is rising rapidly. Young men and women are leaving various institutions of learning in search of nonexistent employment opportunities in a virtually stagnant economy. Negative economic growth is a reappearing threat. This paints a very grim picture as concerns the provision of safe workplaces and a healthy living environment. Although the Government and the private sector are nowadays called 'partners' in development, the environment, health, safety and welfare of workers are not improving as could have been expected.

The study and methods

The main objective of this study was to examine the impact of employment scarcity on the provision of elements of occupational health, safety and welfare in various places of work, which fall under the Act, in the locations of Mombasa City, Malindi, Kilifi, and the Voi town in the Coast Province of Kenya. The focus of interest centred particularly on the provision of the following:

(a) Safe conditions and systems of work
(b) Personal protective clothing and devices
(c) First-aid materials, including the availability of a person trained in first-aid.

The following methods were used to generate the data studied:

(a) Routine inspections with a rapid assessment of the occupational health and safety hazards therein
(b) Review of personal protective equipment and first-aid materials provided for the use of workers
(c) Personal interview of either the owner or the person in control of the workplace.

A total of 120 factories and related workplaces were visited in the course of the year 2001. The factories and related places of work were sampled at random in the course of my normal duties as an Occupational Health and Safety Officer. The workplaces visited included factories, warehouses, wood workshops, and construction sites. The number of workers varied from one workplace to another.

Indicators of unsafe working conditions were:

Noise, heat, vibration, electrical hazards, fumes, exhaust gases, dust, fungi, heights, worn-out material or equipment, poorly maintained machinery.

Table 1. Various parameters used to generate data from the field.

WORKPLACES	TOTAL	Number of workers
Workplaces visited	120	
Full provision of PPE*	33	
Incomplete or no PPE	87	
Complete first-aid	78	1,143
Incomplete first-aid	42	
Safe conditions	54	
Unsafe conditions	66	

* PPE = personal protective equipment

Photo by M. Lintuneni

Lack of personal protective clothing or equipment was indicated by:
No overalls or dust coats, no safety shoes, no safety devices to prevent falls, no eye protection, torn or damaged protective clothing and devices.

Absence of first-aid materials was indicated by:
No first-aid box, inadequate first-aid materials, no one trained to give first-aid, first-aid box not accessible.

Results

The results of the study are shown in Table 1 on page 65.

Discussion

From the results of the survey it is easy to recognize that many workplaces – in fact 73% out of all the workplaces visited – were not providing full protective clothing and devices. In most cases the employees were either using their personal clothing or decided on their own protection themselves.

These attitudes and behaviour stem from the fact that many people seek the very scarce employment opportunities, even only one day's work, regardless of the hazards involved. The main goal of the employee, or the would-be employee, is to get work and earn some money to feed his family for at least a day. This means that a person who is not ready to take the scarce and risky or hazardous jobs that are available would not survive anywhere in Kenya. The employers seem to capitalize on the scarcity of employment, exploiting employees as much as possible. The hardest hit are young employees, the less educated, the unskilled and those from poverty-stricken backgrounds. These employees seem not to have many alternatives in Kenyan towns and on large plantations.

In many circumstances the employer would claim that the workers (the casual labour) found on his premises just got the job that particular morning, even if they had been working in the same factory or place of work for at least a month or so. When pushed further to explain the illegal practices in his undertakings, the employer or his agent would claim that they are doing the employees (the casual labour) a big favour by giving them the job in the first place. In addition to those personal sentiments, the employer or his agent would go further to say that the job will soon be ending anyway, so he sees no reason why the company should spend more money on protective clothing and devices.

The survey results indicate that 35% of the total number of workplaces did not have complete first-aid materials. The actual figure is lower because in many of the places of work visited, the first-aid box and its content are accessible and can be used only by the permanently employed staff of the establishment or the company. The so-called 'casual labour' are not supposed to use the first-aid materials. Immediately such a casual worker is hurt, he would be told by the employer to take his day's due and go to the nearest dispensary, clinic, or hospital and not come back to the workplace until he is fully recovered. However, his job is not guaranteed even if he does return later.

The reason for this behaviour is that the names of such employees are not supposed to be found in the company's employment records. If the name of an injured employee were found on the records, he might then be entitled to workman's compensation claims. Since so many such accidents occur, there is a high possibility that the premium for the compensation insurance might go up. This would be another added cost that the employer would not wish to shoulder.

As concerns the provision of first-aid materials, it was found that the cost of replenishing one or two items that run out is not prohibitory. The employers would rather stock their first-aid boxes for 'show' to the officers of the Directorate of Occupational Health and Safety Services than stock them for use by the many employees (the casual labour) in their establishments.

Conclusion

Even though everybody is talking about the globalization of trade, manufacturing, and other related matters including occupational health and safety, in many parameters a developing country such as Kenya still has a long way to go in order to be comparable with countries in the industrialized world.

This study makes it blatantly obvious that so long as most of the Kenyan population are not meaningfully employed in any sort of income generating activity, the question of providing safe workplaces and safe conditions of work will be an expansive mirage. A poor and hungry man is not selective in terms of employment and is never attentive to instructions or training of any kind – be it on occupational health and safety or personal hygiene. Hence, by extension, if poverty is not eradicated from Kenya urgently, then it will destroy all the gains which had been made in the provision of safe and healthy places of work.

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Environmental hazards associated with heavy metals in lake Victoria Basin (East Africa), Tanzania

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Introduction

The three East African countries – Tanzania, Uganda and Kenya – rely heavily on Lake Victoria and its basin. For many years the lake basin has been used as a source of food, water for drinking and irrigation, energy, shelter for aquatic micro-organisms and macro-organisms, transport and as a repository for human, agricultural and industrial waste (Figure 1). In Tanzania, the catchment regions around Lake Victoria, including Mwanza, Kagera, Shinyanga and Mara, are known for cotton and rice production.

Agricultural practices – for instance, the use of fertilizers and pesticides for the control of pests in the cultivation of coffee, cotton, tea, sugarcane, and rice – and other activities such as mining and industry as well as growth of the human population have increased the discharge of waste effluents into the lake, rendering it environmentally unstable. Consequently, the lake ecosystem has undergone substantial changes, which have accelerated over the last three decades. These changes include massive blooms of algae, dominated over a period of time by the potentially toxic blue-green variety known to cause massive fish death. The mass extinction of indigenous fish species due to the introduction of the Nile perch (Lates niloticus), a carnivorous exotic species, some 30 years ago has altered the food web structure in the lake (1, 2).

The waterways, landing fish sites as well as water intake for water supply facilities have of late been choked by the water hyacinth. The weed, which had been absent in 1960 (3), now has blanket coverage, indicating that the lake was productive but is undergoing eutrophication at an increasing rate (4) as a result of nutrient inputs from anthropogenic activities taking place in the catchment regions. The water quality has deteriorated due to deoxygenation of deep water plus pollution from various sources. This has resulted in an increased frequency of waterborne diseases in humans and animals drawing water from the lake (5).

The Lake Victoria fisheries are currently dominated by three commercial species; namely the Nile perch *lates niloticus*, which has a lucrative export market and is known locally as 'sangara'; the *Rastrinebola argenta*, known as 'dagaa', which has found an alternative use as an input for the making of chicken feed; and the Nile tilapia, *oreochromis niloticus*, also known as 'sato', which is the only species left for use as food by the local communities. The in-

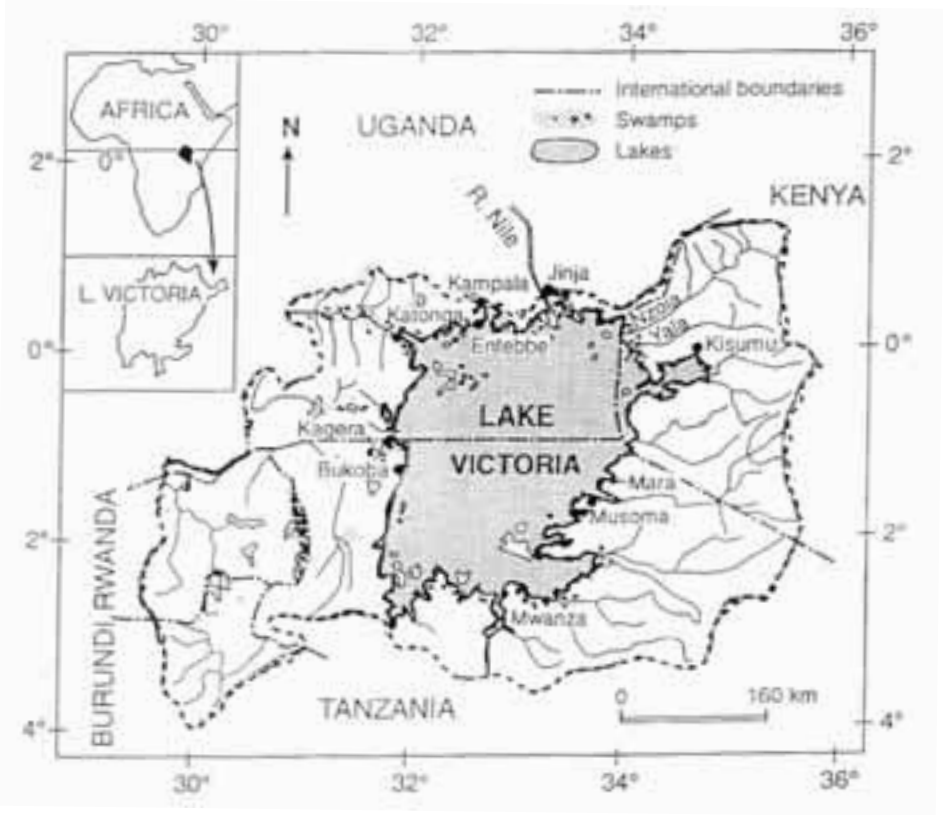

Figure 1. The catchment area of Lake Victoria, East Africa.

creasing conversion of fishery production to yield an export commercial commodity rather than a local protein source has caused overfishing which threatens the artisinal fishing and biodiversity.

Wastes from mining activities in the catchment regions as well as from other sources, including domestic, agricultural and industrial sources, are the main anthropogenic pathways of heavy metals into the lake environment. The release of large quantities of heavy metals into the natural environment has resulted in a number of environmental problems (6,7). Living organisms require trace amounts of some heavy metals – e.g. cobalt, copper, iron manganese, molybdenum, vanadium, strontium and zinc. However, excessive levels of essential metals can pose a health risk to humans and can have environmental effects on aquatic organisms. Non-essential heavy metals of particular concern to surface water systems are cadmium, chromium, mercury lead, arsenic and antimony. The main threats to human well-being, however, are associated with lead, arsenic, cadmium and mercury (8).

In an effort to ensure sustainability of the lake ecosystem, various studies have been ongoing in order to assess the pollution load in terms of pesticides, heavy metals, and other industrial chemicals having adverse effects on human health and on aquatic life; some results have been documented. (9,10,11).

The present paper reports studies of an ongoing project being done at the Tropical Pesticides Research Institute and aimed at assessing the types and levels of heavy metals and pesticides in different environmental samples from the catchment regions of Mwanza, Mara and Kagera in Lake Victoria, Tanzania.

Materials and methods

Study area: The lake catchment area is approximately 184,000 sq km and is shared by Tanzania (44.4%), Kenya (21.5%), Uganda (15.9%), Rwanda (11.4%) and Burundi (7.2%). In Tanzania, the catchment area can be roughly defined as the three regions: Mwanza, which is dry and has high human activity; Mara, which is also dry and has low human activity; and Kagera, which is wet and has an intermediate amount of human activity.

Sampling stations

The sampling points were systematically selected in Mwanza Gulf, stretching up to Simiyu Bridge in Magu district and depending on high human activities such as fishing, agricultural and industrial activity. The sites for water, soil and plant sampling were situated along the rivers, whereas the sites for fish samples were chosen from the six fish processing industries along the Mwanza Gulf and the fishery market at Kirumba-Mwaloni.

Sampling

Samples of whole fish and fillets were taken at each sampling point. Along the rivers, two sets of soils at a depth of 0–15 cm were collected from five sampling points, using a soil auger. This was followed by taking two sets of water samples in the middle of the rivers, using sampling bottles submerged a few decimeters with the mouth facing slightly upwards towards the current. For plant samples, two sets of about 500 g of the most common vegetation were collected at the sites near where the water samples were taken. The standard procedures and materials recommended for environmental sampling of water, soil, fish and plants were followed (12,13).

Analysis

Quality control of the analytical data for twenty-five samples was done at the Southern and Eastern Africa Mineral Center (Seamic) Laboratories, Kunduchi Dar-es-Salaam.

Water samples

The samples were analysed directly, without any treatment, for iron (Fe), cadmium, (Cd), chromium (Cr), zinc (Zn), copper (Cu) and lead (Pb), using a flame atomic absorption spectrophotometer (AAS).

Soil samples

The available analytes were leached out using the aqua regia system. After filtration and appropriate dilutions, Fe, Cd, Co, Cr, Zn, Cu and Pb samples were analysed directly without any further treatment, using flame AAS.

Fish

About 1 g of fish sample was precisely weighed and placed into a digestion flask. Then the following were added: 5 m1 conc. H_2SO_4, 4 m1 1:1 HCl and 0.2 m1 of 2% sodium molybdate. The mixture was gently refluxed for 1 hour and cooled; then 4 m1 of 1:1 nitric acid/perchloric acid was added through the condenser. Boiling without cooling water was done until white fumes appeared in the flask; then heating continued for 10 minutes, followed by cooling to room temperature and, finally, dilution to a final 50 m1. A portion was taken for the determination of Fe, Cd, Co, Cr, Zn, Cu and Pb.

Plant

About 1 g of ground material was digested using nitric acid and evaporated to moist salts. The digestion was repeated until no visible charred material was present. The sample was cooled, then nitric acid/perchloric acid was added 1:1 and this was gently heated until the solution was clear and evaporated to near dryness, then diluted to 50 m1, and analysed for Fe, Cd, Co, Cr, Zn, Cu and Pb.

Results

The concentration of lead in Lake Victoria waters ranged from 0.35 ppm to 0.63 ppm for copper, while the chromium and cadmium concentrations at all sites ranged from less than 0.01 ppm to 0.01 ppm. The zinc concentration in waters ranged from 0.04 ppm to 0.08 ppm and that of iron from 0.01 ppm to 5.62 ppm.

In soil samples, the concentration of lead ranged from 4.8 ppm to 65.6 ppm while that of copper ranged from 1.70 ppm to 26.1ppm. The zinc concentration ranged from 9.0 ppm to 137.0 ppm, that of chromium from 1.6 ppm to 15.0 ppm, of cadmium from 016 ppm to 0.55 ppm and that of iron from 0.01 ppm to 0.28 ppm.

The lead concentration in fish samples from the Mwanza catchment region ranged from less than 0.01 ppm to 28.0 ppm dry weight. The copper concentration was from 2.3 ppm to 6.6 ppm, that of zinc from 17.0 ppm to 179.0 ppm, that of chromium from less than 0.01 ppm to 0.72 ppm, that of cobalt from less than 0.01 ppm to 1.9 ppm, that of cadmium from less than 0.01 ppm to 0.65 ppm, and the iron concentration ranged from 31.0 ppm to 130.0 ppm.

The concentrations determined in plant samples were: lead, 0.01 ppm to 37.5ppm; copper, 6.0 ppm to 27.6 ppm; zinc, 11.0 ppm to 105ppm; chromium, 4.8 ppm to 82.0 ppm; cobalt, less than 0.01 ppm to 204 ppm; cadmium, 0.07 ppm to 2.25 ppm; and iron, a trace amount to 0.04 ppm.

Discussion and conclusion

The results indicate that the metal content in plant samples (Table 1) is higher than that in other environmental samples. The water samples had trace metal concentrations that were within the maximum permissible limits (14) for all but one site at Ilemela River, where the concentration was 5.62 ppm above permissible value for drinking water.

Table 1. Content, in parts per million (ppm), of heavy metals in fish, soil, plant and water samples from Mwanza Region in Tanzania.

SAMPLING SITE	Sample media	Fe ppm	Cd ppm	Co ppm	Cr ppm	Zn ppm	Cu ppm	Pb ppm
Kirumba-Mwaloni market (0–15 cm)	Soil	0.12	0.253	1.6	1.6	20.0	1.7	4.8
Ilemela River 0–15 cm	Soil	0.35	0.16	2.4	3.2	9.0	2.9	9.2
Simiyu River 0–15 cm	Soil	2.79	0.551	15.0	31.2	80.0	26.1	38.8
Mirongo River 0–15 cm	Soil	1.13	0.46	6.6	10.2	137.0	21.4	65.6
Matu River 0–15 cm	Soil	1.50	0.52	12.7	27.5	78.0	25.7	36.4
Water hyacinth – Mirongo River	Plant	0.38	0.75	<0.01	82.0	94.0	11.0	37.5
Water lily – Matu River	Plant	0.18	0.11	3.85	6.7	34.0	9.2	9.07
Water hyacinth – Ilemela River	Plant	0.57	2.24	204	8.9	105.0	21.0	8.42
Rice plant – Ilemela River	Plant	0.03	0.29	634	28.1	11.0	6.0	<0.01
Water hyacinth – Simiyu River	Plant	0.15	0.07	15.0	4.8	19.0	27.6	2.64
Mirongo River at lake entry	Water	018	0.01	<0.01	<0.01	0.04	<0.01	0.63
Water from the Ilemela River	Water	5.62	0.01	<0.01	<0.01	0.06	<0.01	0.45
Kirumba-Mwaloni market	Water	0.41	0.01	<0.01	<0.01	0.08	<0.01	0.35
Water from the Matu River	Water	0.10	0.01	<0.01	<0.01	0.04	<0.01	0.42
Water from the Simiyu River	Water	0.10	0.01	<0.01	<0.01	0.04	>0.01	0.40
Nile perch – Victoria Fisheries factory	Fish	49.0	0.52	1.8	0.21	22.0	3.3	26.7
Nile perch – Tanzania Fish Company	Fish	31.0	<0.01	<0.01	0.05	19.0	3.1	5.38
Nile perch – Omega Fish Factory	Fish	31.0	0.65	1.9	0.72	23.0	3.0	28.0
Nile perch – Tanzania Perch Fish Factory	Fish	46.0	0.24	1.3	<0.01	23.0	2.8	21.7
Nile Tilapia – Kirumba-Mwaloni market	Fish	32.0	0.32	1.2	<0.01	17.0	2.3	23.5
Nile perch, sundries + salted – Kirumba-Mwaloni market	Fish	31.0	<0.01	0.3	0.26	22.0	2.5	14.0
Nile Tilapia, whole smoked dry – Kirumba-Mwaloni market	Fish	53.0	0.27	1.7	<0.01	26.0	3.6	24.6
Fresh Nile perch – Kirumba-Mwaloni market	Fish	100.0	<0.01	0.5	0.58	179.0	6.6	16.6
Rastrinebola argenta ('dagaa'), sun dried – Kirumba-Mwaloni market	Fish	39.0	<0.01	<0.01	<0.01	31.0	3.0	<0.01

Compared with other reported studies in the area (9), the trace metal concentrations obtained in this study for fish are within the recommended levels for daily intake even assuming a daily intake of 1 kg of fish. The levels are, however, above those obtained by other workers, showing there is a steady increase in the levels of heavy metal contamination in the catchment area of the Mwanza region.

A similar increasing trend of some trace element has been observed in Winam Gulf Lake Victoria in Kenya (10) and in Uganda (15).

In view of the fact that heavy metals are not easily biodegradable, there is need for constant monitoring efforts and deployment of technologies that can remove heavy metals in order to ensure the environmental sustainability of the lake basin.

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The ICOH and IOHA Declaration

David M. Zalk
IOHA

On 27 February, 2003, at the 27th ICOH Congress in Iguassu Falls, Brazil, a 26-point document entitled "ICOH and IOHA Declaration to Strengthen the Position of Occupational Hygiene" was ratified.

Mr David Zalk and Professor Bengt Knave.

This document was signed by myself, on behalf of the International Occupational Hygiene Association (IOHA), and Bengt Knave for the International Commission on Occupational Health (ICOH). In light of the international nature of this document, it was also signature approved at the event by both Jukka Takala, head of occupational safety and health at the International Labour Office (ILO), and Maged Younes, head of occupational health at the World Health Organization (WHO). The importance of this document is immediately being felt worldwide, so it is essential that it be shared with all those in the greater occupational health professions in a timely fashion. This opportunity to do so is very much appreciated.

The genesis for the Declaration began at the Workshop on Occupational Hygiene in São Paulo, Brazil from 4–6 December 2002. This workshop was put together thanks to the ever-ongoing work of Berenice Goelzer and the efforts and support of SENAC São Paulo and Fundacentro. The purpose of the workshop was to emphasize the importance of occupational hygiene as a profession in Brazil and focus on the skills necessary to truly achieve prevention under the guise of occupational health. In addition to myself, in attendance at this workshop on behalf of IOHA were Past Presidents Kurt Leichnitz and Paul Oldershaw. Discussions during this workshop included the development of graduate school curriculum, professional certification, and the state of the occupational hygiene profession in the greater occupational health arena within Brazil. A key focus underlying these discussions was the ongoing efforts in Brazil and the region to officially recognize the profession of occupational hygiene.

In São Paulo, Brazil, there is a massive outdoor sculpture located in Ibirapuera Park which is in the heart of their cultural centre. It is known as the Bandeirantes Monument, a tribute to the banner carrying pioneers of Brazil who fought through the wilderness of South America to claim the western boundaries that now comprise their nation. There is currently a group of professionals in Brazil who are considered to be the Bandeirantes of Occupational Hygiene in that region. This workshop assisted in crystallizing the issues facing this group of professionals. It served to adequately assess their needs for them to begin carrying forth their profession's banner toward an official recognition of their preventive role in ensuring occupational health for the labour force. This is not only important for the worker's health we are all dedicated to protect, but also for the continuation of Brazil's burgeoning economy.

IOHA pursued this lack of recognition in concert with ICOH to ensure this issue would be addressed in time for the ICOH Congress to be held in Brazil a few months later. It is essential to recognize the historical aspects of the co-operative efforts between IOHA and ICOH that afforded moving forward so efficiently. At the 26th ICOH Congress in Singapore, then ICOH President Jean-François Caillard worked with former IOHA Presidents Michel Guillemin and Linnea Lillienberg to address avenues of co-operation for these international Non-Governmental Organizations (NGOs). The solution was a formal Letter of Agreement signed by then IOHA President Paul Oldershaw and Jean-François Caillard of ICOH in September of 2000. This Declaration was created upon the key points of that agreement and put into practice their words of co-operation. It was therefore both timely and appropriate that this Declaration was agreed upon and ratified at the next ICOH Congress with many of the original players in this co-operation present.

There is fervent optimism that this document will indeed lead to the recognition of occupational hygiene in Brazil soon. It is IOHA's goal that this precedence set in Brazil will continue throughout Latin America and simultaneously the rest of the world. The Declaration was drafted with the intent to

The ICOH and IOHA Declaration was signed by Professor Bengt Knave and Mr. David Zalk.

be utilized by countries throughout the world for this purpose. It is most appropriate that this document be considered for the utilization by countries in a similar position within the Asian-Pacific region.

IOHA is taking a lead role in representing the occupational hygiene profession and infusing prevention into the global concepts of occupational health. International organizations that represent the occupational health professions, such as WHO, ILO, ICOH, and IOHA, are in a position to co-operate towards common occupational health needs worldwide. This interplay has improved understanding and communication between these organizations for the benefit of the workers we are committed to protect. The Declaration embodies this co-operative effort.

The 26 points within this document emphasize the need for occupational physicians and occupational hygienists to team together in truly achieving prevention of work-related diseases. That is the goal of this Declaration. We at IOHA look forward to working in concert with ICOH to build on this Declaration and put it into practice. The current President of ICOH, Jorma Rantanen, put forward this notion as well in his President's Address. As he stated, in both the ILO Convention No. 161 and the WHO Global Strategy on Occupational Health for All, there is a call for every working individual to be provided occupational health services. Professor Rantanen is working to put forward a new concept known as Basic Occupational Health Service. We at IOHA applaud this effort and would very much like to assist as it is developed internationally. Perhaps this Declaration can serve as a launching point for putting some of these wonderful co-operative ideas and initiatives into practice. This Declaration to Strengthen the Position of Occupational Hygiene serves as an excellent skeletal structure on which to build. Both ICOH and IOHA are looking forward to working together in fielding initiatives that put some muscle onto it.

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ICOH and IOHA Declaration to Strengthen the Position of Occupational Hygiene

(1) We welcome WHO and ILO activities in occupational health and occupational hygiene; these are the right concepts for improvements at workplaces.

(2) We call on WHO and ILO to continue to support occupational hygiene efforts.

(3) We request WHO and ILO to take steps – with the involvement of relevant NGOs – to promote the development of a comprehensive, easily accessible network of data bases on occupational hygiene issues.

(4) WHO's Health for All Policy provides a positive framework for making further progress.

(5) We request WHO and ILO to further develop close co-operation with the European Commission.

(6) Countries are invited to carry out hazard surveillance at workplaces and to evaluate the impact of proposed policies and programmes.

(7) Special assistance is needed for countries facing more severe occupational health problems.

(8) International financial institutions are invited to support multidisciplinary occupational health programmes, including occupational hygiene.

(9) We welcome efforts to involve relevant and well-recognised NGOs at the earliest possible stage of the implementation and in the further development of occupational hygiene and occupational health.

(10) We will strive to implement measures aimed at attaining the occupational health targets.

(11) We welcome the integration of occupational hygiene into national policies, which includes legislation and finance.

(12) We welcome the development of national communication and public information strategies in matters affecting occupational health.

(13) We welcome the implementation and further development of occupational hygiene through measures at the national and international levels - taking into consideration local requirements - and having the support of adequately trained occupational hygiene professionals as well as adequate resources, including for capacity building in OHS management systems.

(14) Hazard prevention and control in the work environment is a multidisciplinary task which should involve occupational health professionals, such as occupational physicians, occupational hygienists, safety engineers, ergonomists, and nurses. The WHO document on "Hazard prevention and control in the work environment (WHO/OCH95.3)" should be considered.

ICOH and IOHA Declaration to Strengthen the Position of Occupational Hygiene

(15) Occupational health professionals should strive for public awareness and for ensuring access to information about work related hazards and their prevention.

(16) Effective measures for monitoring and assessing situations have to be implemented.

(17) We will continue to provide policy advice and guidance on occupational health initiatives at the international, national and local levels.

(18) Hazard prevention should replace hazard control, whenever possible.

(19) Prevention of occupational health damage is many times more effective than its treatment after it has occurred.

(20) We recognise that economic analysis helps with setting priorities with regard to risk-reduction by assessing the cost-effectiveness of the required measures.

(21) It is important to systematically include the interaction between the human factors and the design of workplaces.

(22) We invite all national and international organisations concerned with occupational health to promote a holistic concept of health-, environment-, and safety management systems in enterprises.

(23) We will promote good occupational health practice in enterprises.

(24) The comprehensive scope of occupational health management should be multidisciplinary.

(25) Indicators for assessing the performance of OSH management systems should be introduced.

(26) Any OHS management systems should be implemented along the lines of the "ILO Guidelines on Occupational Safety and Health Management Systems (ILO/OSH-MS2001)".

Agreed at the 27th International Congress on Occupational Health, Iguassu Falls, Brazil

Date: 27 FEBRUARY, 2003

Professor Bengt Knave
President
International Commission on Occupational Health
(ICOH)

David M. Zalk
President
International Occupational Hygiene Association
(IOHA)

Hazed Yannes
WHO

J. TAKALA
ILO

Third International Course on

Occupational Health Nursing

8 – 12 May 2004, Søsterhjemmet Hostel, Copenhagen, Denmark

The course aims at helping OHNs to face the new challenges of the changing work life.

Target group
- OHNs who have worked in the field of OHS at least for five years, teachers, researchers, and authorities in OH-nursing.

Main topics
- The changing work life, a challenge for the development of OH expertise
- Nursing as a profession; what is nursing, concepts and fundamentals, aims and frameworks, basis of knowledge
- The role of the occupational health nurse in a multiprofessional OH services team
- Implementation of research into practice
- Development of methods in occupational health nursing; consultative methods in occupational health practice, follow-up and evaluation of OH services and interventions, development of the Hanasaari model.

Organisers
The course is organised in close collaboration with FOHNEU and SCOHN/ ICOH. Course leaders Anne Boström, Vice President, FOHNEU and Marjatta Peurala, researcher, Finnish Institute of Occupational Health, Finland.

Registration and further information, please contact Annika Bärlund, course secretary, NIVA (Nordic Institute for Advanced Training in Occupational Health, www.niva.org), tel. +358 9 4747 2333, e-mail: annika.barlund@ttl.fi. Deadline for registration 27 February 2004.

Themes of the African Newsletter in 2004

	Theme	Deadline for manuscripts
1/2004	Multidisciplinary occupational health services (including occupational health nursing)	27 February 2004
2/2004	A healthy and safe workplace	30 May 2004
3/2004	Allergies	30 September 2004

Readers are encouraged to submit manuscripts addressing the above themes. Also articles on other topics in the field of occupational health and safety are welcome.

Please let the Editorial Office know in advance if you are planning to submit a manuscript. Submitted articles will be published provided there is space in the Newsletter.

Please send the manuscripts to:

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African Newsletter on Occupational Health

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The maximum length of the typewritten manuscript is 4–6 pages, including all the figures, tables and the list of references. The maximum length of Editorial is 1–2 pages; news in brief may be from couple of lines to one page. Please send your text both in printed and diskette form; if possible, either written in Word or Word Perfect.

The manuscripts should be typed with double spacing (including references and tables) on one side of the paper, with wide margins (at least 3 1/2 cm).

Before submitting the typescript, please check and correct the typing, as well as the references and numerical values given in the text. As far as possible, avoid footnotes and abbreviations; if abbreviations are essential they should be defined the first time they occur and used consistently.

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The illustrations should be in black and white, or in colours and original drawings in black ink or in colours. Number the figures in the order in which they appear in the text and indicate their position in the margin of the typescript. In the text, illustrations should be referred to as Figure I, Figure 2 etc. Each figure should be identified by the author's name, the title of the article and the figure number. In cases where it is not obvious, the top should be indicated. Diagrams and sketches should be suitable for direct reproduction and should be sent as separate original documents too.

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2. Breslow Ne, Day NE. Statistical methods in cancer research; vol II (The design and analysis of cohort studies.) Lyon: International Agency for Research on Cancer, 1987. (IARC Scientific publications no 82.)
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